Growing Pains

Binding Constraints to Productive Investment in Latin America

Editors

Manuel AGOSIN

Eduardo FERNÁNDEZ-ARIAS

Fidel JARAMILLO

INTER-AMERICAN DEVELOPMENT BANK

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Foreword

During the past five years, most countries in Latin America and the Caribbean registered significant economic growth rates and showed a dynamism that has been absent for much of the past 25 years. Although the region has not been immune to the effects of the current global financial crisis, economic reforms in recent decades have left most countries better positioned to weather the storm. Despite these positive signs, the region's growth still lags behind other emerging economies, varies widely within the region and is largely explained by extremely favorable external conditions that have now taken a dramatic turn for the worse.

In this context, the Inter-American Development Bank (IDB) joined with Harvard University's Center for International Development and various research institutes in Latin America and the Caribbean in an ambitious research project to understand the factors inhibiting higher levels of productive investment and rapid, sustainable growth rates in the region.

Following a methodology developed by Ricardo Hausmann, Dani Rodrik and Andrés Velasco, the project included "growth diagnostics" for 14 countries in Latin America: Argentina, Brazil, Chile, Colombia, Ecuador, El Salvador, Guatemala, Guyana, Nicaragua, Panama, Paraguay, Peru, Mexico and Trinidad and Tobago. The focus was on identifying the binding constraint to growth, that is, the barrier whose removal would yield the greatest benefit in terms of growth. The results of this research study are compiled in this book, which features seven of the country case studies.

This project was coordinated by Manuel Agosin, Eduardo Fernández-Arias, and Fidel Jaramillo, who are also the editors of

the book. Ricardo Hausmann and Peter Montiel served as academic advisors for the project. The editors would like to thank Christian Daude and Alfie Ulloa, as well as the participants in the discussion workshops in Washington on May 3–4 and September 20–21, 2007, for all their contributions.

Eduardo Lora
Chief Economist and General Manager
of the Research Department a.i.

Preface

A typical medical researcher asks questions along these lines: does molecule x affect the level of variable y in the average person of a certain population? X could be salt and y could be blood pressure. X could be an analgesic and y could be a headache. A typical medical doctor asks the question: what should I give this particular patient to make him healthier. The two questions are not totally unrelated, but they are quite distinct.

Similarly, an economic researcher could ask the question, does variable x affect the rate of growth of the average economy chosen at random from a certain population? X could be the level of inflation, the average tariff rate, the level of spending in schools, or the independence of the central bank. An economic advisor would ask the question: for this particular country, at this particular time, what should the government do to achieve sustained and shared growth? Again, the two questions are not completely independent, but neither are they the same question—not even by a very long shot.

Much of the empirical research on growth has been addressed to the question of what variables are causally associated with growth in the average country. A workhorse of this research agenda has been the Barro-style (1991) cross-country growth regression. Millions of regressions have been run with all sorts of explanatory variables, including a wide variety of geographic, institutional, demographic, and policy variables.

It seems obvious to take one of those estimated regressions and use it to design a growth strategy for a country. Suppose the equation had two variables that are difficult to change, such as geographic latitude and the average age of the population. Disregard them and

focus on those that seem more amenable to be influenced by policy. Credit to the private sector as a share of GDP and secondary school enrollment may be two variables that appear to be statistically and economically significant and potentially amenable to policy change. Why not base a growth strategy on a mix of education and finance policies?

There are two reasons that might give pause. The first is that governments do not decide either how much credit the private sector will receive from private banks or how many students stick around until they reach high school. The second reason is that while in the average country a higher level of credit to the private sector may be associated with higher growth, there is no certainty that a country is an average country in this particularly respect. Similarly, while aspirin may relieve pain for the average patient, a doctor might think twice before giving it to a particular patient if he suffers from stomach ulcers.

So, would this country be expected to be average in terms of its reaction to credit easing or educational improvements? One quick test is to see whether the country's low private credit ratio is related to low supply or low demand. One is distinguished from the other by looking at the interest rate. If supply (demand) were limited, then the interest rate would be high (low). If education were an important limitation on growth, returns to schooling would be high, as estimated, for example, through a Mincer regression.

In other words, it is erroneous to start from the assumption that if a variable is associated with growth in the average country, then it would be associated with growth in this particular country. This is just like realizing that an aspirin is unlikely to make an ulcer patient feel any better, even if many other patients do appreciate its effects.

This is the idea behind growth diagnostics. As a good doctor, it is important to know much more about a patient than about the average man in the street. Do not suppress information about a patient when interpreting evidence coming from other unknown people. In other words, just because that information was not available for all

the other patients in the regression, do not disregard it when thinking about a particular patient.

Anna Karenina starts with the famous line: "Happy families are all alike; every unhappy family is unhappy in its own way." Paraphrasing Tolstoy: All rich countries are the same; each poor country may be held back by very different things. The point of growth diagnostics is to find out what these are, in a particular country context.

The right way to start is by obtaining as much information as possible. A poor country is not expected to have rosy indicators; but not all dimensions are expected to be equally binding. Yes, infrastructure is substandard, banks are not Swiss, and schools leave a lot to be desired. This does not mean that all are equally binding. Education may be poor but other things may be so much worse that high-skilled individuals are either leaving the country or driving taxis. Banks may look small, but they are full of liquidity and desperate to find sound customers to lend money to at very sensible interest rates. Why there are so few takers may be the question to ask.

So, if all possible constraints are not equally binding, which ones might be more binding? Which one, if relaxed, might allow for the biggest bang for the effort? This becomes a question worthy of Sherlock Holmes. And it becomes an exciting whodunit for the economic analyst.

Here is where some tricks of the trade become useful. First, if something is a binding constraint on growth, it should be expected to have a high actual or shadow price. If education is binding, the returns to those few lucky people that received a good education should be very high. If instead, the highly educated are leaving the country, something else must be even more binding.

Second, movements on the presumptive binding constraint should show up in movements of the aggregate growth rate. For example, if the hypothesis is that availability of finance is the binding constraint, changes in the observed market interest rates should be reflected in the rates of growth or investment. But if growth and investment fall at precisely the same time that interest rates are

falling and banks are full of liquidity, it would be hard to argue that lack of loanable funds is the problem.

Third, if something is really holding a society back, members of the society must be finding ways around it. If poor provision of property rights is the binding constraint, then people would flock around those with political power and offer them shares in any new endeavor in exchange for protection. If finance is the binding constraint, then those with profitable activities would become conglomerates that reinvest their profits in all sorts of activities.

Fourth, it is instructive to reflect upon what underpins the performance of the most successful parts of an economy. In what resources are they least intensive? If the question is why there are so few animals in the Sahara, for example, it helps to note that the few animals found there tend to be camels and not hippos. The camel can be expected to thrive in areas where water is scarce. It is safe to infer that the few things that survive in the Sahara are those that are least intensive in the resource that is missing: water.

Fifth, it has become common practice in economics to blame people's credibility and expectations for the way things turn out in life. If a country is not growing, it is easy to argue that people do not invest because they do not believe that the future will be as good as the present. Since it is impossible to know what people think about the future, this appears to be, at first sight, an explanation that is plausible but hard to verify. However, the experienced Sherlock would realize that if the argument is based on the idea that investors are scared by the possibility that something bad might happen in the future, it is important to check that profits today are reasonably high. So, current earnings would be expected to be fine, but the price/earnings ratio to be low. This would signal that today's earnings are not expected to last.

Finally, a constant cannot explain a variable. China's Confucian history and cultural tradition cannot be used simultaneously to explain why growth there has been so high since 1978 and so low from 1500 to 1978. The difference between Latin America's current low savings rate relative to East Asia cannot be explained by longstanding

cultural differences because the savings rates in Latin America in the 1960s were substantially higher than those in East Asia.

Armed with these and other tricks, the economic Sherlock would use all of his knowledge and skills to look for plausible binding constraints. Once he has stumbled onto a possible candidate, it is useful to try to posit a *syndrome*: that is, an overall explanation or story that can account for why that particular constraint binds. This syndrome should explain the observed symptoms but should also have some other testable implications. The good analyst would check for these implications in order to convince himself that he has a robustly tested explanation for what is wrong with the country he is examining.

Take the case of Brazil. Interest rates have been incredibly high for much of the recent past. The Central Bank of Brazil thinks that in order to keep inflation from creeping above the target, it is forced to set interest rates at levels that would generate a profound recession in any other country. One can only imagine how much Brazilians would invest if they faced the interest rates paid by Chileans or Salvadorans. Thus, it would appear that, in spite of low educational attainment, poor infrastructure, and incredibly high tax rates, Brazilians would be happy to invest more if they could obtain funds at reasonable rates. To prevent them from doing so in order to keep aggregate demand and inflation in check, the Central Bank is forced to set very high rates. Why is this the case? My personal view is that the overall story of Brazil starts with a government that collects the highest level of taxes as a share of GDP of any developing country and is unable to save any of it. The overall fiscal deficit of the country has exceeded the dismal rate of public investment, meaning that fiscal savings are negative in spite of surprisingly low public investment and high tax revenues. Moreover, the tax and spending structure is such that those with a capacity to save are taxed and the money is transferred to pensioners who have a much higher propensity to spend. So, the government starves the economy of savings.

This is not the conclusion reached by the authors of the chapter on Brazil in this volume. Why? The deep answer is that growth diag-

nostics is still a young practice with evolving methods and limited tools. Moreover, it resembles more the case of a civil suit than a criminal case. In the former, the decision criterion is "the preponderance of the evidence." In the latter, it is "beyond reasonable doubt." A policymaker cannot avoid making decisions, and will have to do so with the best available information and analysis—even if he would have wished to be more certain than he is. Economic analysis in the real world seldom provides enough information to satisfy all doubts. Cogent arguments may exist for an alternative story and it may be hard to tell them apart. The role of the responsible analyst is neither to hide the doubts so as to create a wrong sense of infallibility nor to avoid decisions. Instead, he should state the story he thinks is most plausible, describe the alternative stories that may account for the known facts, and try to think through the strategies that could tell them apart. In addition, he could think of policy interventions that are expected to be appropriate for each scenario and ideally find a strategy that may work under all the possible alternatives.

In the case of Brazil, it seems plausible to think that if the savings constraint were lifted, the economy would accelerate and soon the country would hit the infrastructure constraint, given that the government has invested so little in the sector over the years. Thus, a strategy that would raise public savings would be useful whether the constraint is aggregate savings or infrastructure. For the story based on low aggregate savings, the ideal use of the increased public savings would be to reduce the public deficit and let interest rates come down. This would trigger more private investment. If the problem were infrastructure, one would expect to use the increased public savings for that purpose. If the policymaker is uncertain, he would split the difference.

The approach ends up being very Bayesian. Look for symptoms or signals that may be orienting. Look at all prices and quantities available. To interpret the information, it is useful to remember the Bayesian equation. Start from certain prior beliefs of what the problem is; then find a symptom. Update beliefs about what the right story is depending on the ratio of the conditional probability that

the symptom would be observed if the story is right relative to the unconditional probability that the signal is observed.

Consider an example. Suppose the question is whether a particular air passenger is a terrorist. The test is whether he is carrying a bomb. A typical passenger would not be expected to be carrying a bomb, but there is a very high probability that a terrorist would be carrying bombs. Bayes' formula says that beliefs should be updated according to the ratio of the probability that a terrorist carries a bomb relative to the unconditional probability that any random person is carrying a bomb. Since priors are such that a normal passenger is not expected to be carrying a bomb but a terrorist is expected to be carrying a bomb, then finding a person with a bomb significantly changes the view as to whether he is a terrorist or not. By contrast, many terrorists have beards, but so do many nonterrorists. Thus, finding a person with a beard does not change priors by as much as finding him with a bomb because the difference in the probabilities along the hypothesis is much smaller.

Unfortunately, in real life it is difficult to find single symptoms that pin down a diagnostic unequivocally. One must rely on all the signals possible and try to make the most of it. Suppose insufficient aggregate savings is the suspected constraint to growth in a particular country. For this to be true, lending interest rates should be high, indicating that society is willing to pay a high price for more of the missing factor. But interest rates can be high for many reasons. For it to be a constraint in aggregate savings, the deposit interest rates or the rates paid by the government on its debt should also be high. Otherwise, the problem might be bad financial intermediation. But if aggregate savings are low, why can't an investor get funds from the international market? Why doesn't the country borrow more from abroad to complement its meager domestic savings? The answer may be that the country as a whole already did borrow too much and that it has reached a credit ceiling. But then one would like to confirm this by showing that either the current account deficit or the accumulated debt is high and that country risk is particularly high. Moreover, one would want to show that movements in this

constraint are reflected in the level of domestic investment. This is what one finds in the current decade for Brazil, where interest rates skyrocketed in 2002, causing a collapse in subsequent investment and growth. By contrast, in the same period, interest rates in Mexico fell, but so did investment. Brazil and Mexico would be expected to be quite different in this regard. And yet, this may not be enough to settle the issue, and more sources of evidence might be useful to further corroborate the story.

I find it useful to start a growth diagnostic with a good description of the growth process that includes not just the long view but also the fluctuations, as these may be indicative of movements in the binding constraint. I then like to move down a certain decision tree, which may be similar to that proposed in Hausmann, Rodrik and Velasco (2005) or some other version constructed ad hoc for the issue in question. After I locate where I think I am in the decision tree, I like to formulate a syndrome: a story that helps explain what the binding constraint is, and also what causes it. Savings may be the binding constraint because the government overborrows. Such a syndrome would predict that savings is the binding constraint but would also have testable implications about a country's fiscal indicators. It also would suggest a political economy story behind this fact. So, once I posit a syndrome, I like to check for the additional testable implications that emerge from it.

This book is a collection of efforts at applying this approach to a set of Latin American countries. It is interesting on two grounds. First, it is informative about the countries in question. Second, it is useful because it expands the set of tools and practices of the method. As such, it is an important contribution in both dimensions. However, this effort is still a work in progress. Only through further practice can the more complete set of tools that this task requires be developed. But this book is an excellent contribution to that agenda.

Ricardo Hausmann
Kennedy School of Government
Harvard University

CHAPTER 1

Binding Constraints to Growth in Latin America: An Overview

Manuel Agosin, Eduardo Fernández-Arias, and Fidel Jaramillo[*]

The Region's Growth Record in a Comparative Setting

Growth in Latin America and the Caribbean has fallen far behind that of the fast-growing countries of Asia.[1] Many analysts attribute the shortfall to differences in investment rates. As Figure 1.1 illustrates, the ratio of gross fixed capital formation to GDP in Latin America has been considerably lower than that of East Asia and the Pacific. Moreover, over the past two decades, investment in Latin America as a percentage of GDP has fallen below the levels of the 1970s. Investment in 2006 was 5 percentage points below its peak level 30 years earlier. When compared to East Asia and the Pacific, the contrast is even sharper. Even at the height of the financial crisis during the late 1990s, investment in East Asia and the Pacific exceeded that in Latin America by 10 percentage points. At present, the gap is still larger, as average investment in Asia is almost double that of Latin America.

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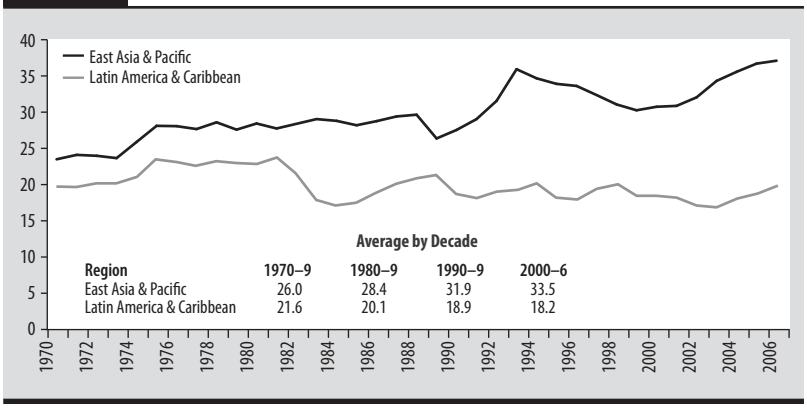
* Manuel Agosin is with the Department of Economics, Universidad de Chile. Eduardo Fernández-Arias and Fidel Jaramillo are with the Inter-American Development Bank.

[1] Unless otherwise specified, the term "Latin America" will refer henceforth to both Latin America and the Caribbean.

FIGURE 1.1 Gross Fixed Capital Formation, East Asia & Pacific and Latin America, 1970–2006
(*percent of GDP at 2000 prices*)

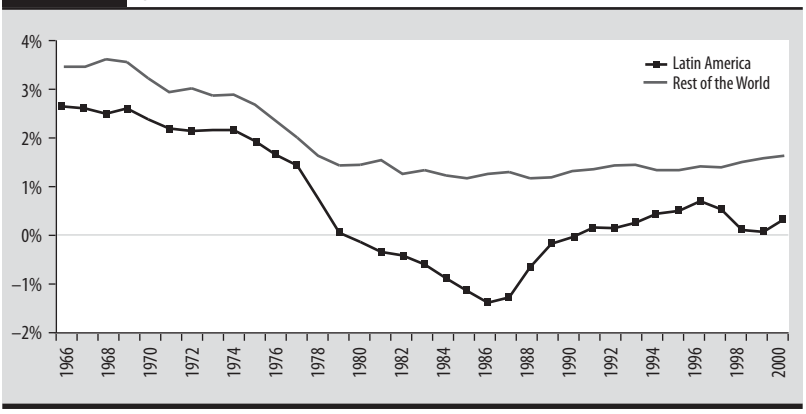


Source: Authors' calculations based on Penn World Tables and World Bank, World Development Indicators (WDI).

Clearly, a major reason why Asia's growth rate has outpaced Latin America's relates to Latin America's poor investment performance. This book focuses on this link between investment and growth, explaining what is holding back investment, particularly private, productive investment. While public investment has varied significantly in the region due to its more volatile growth pattern, the big difference between Asia and Latin America lies not in the rate of public investment but in the rate of private investment. During the current decade, the ratio of private investment to GDP has averaged about 32 percent in Asia, compared to only 14 percent in Latin America.

In part as a result of lackluster private investment, the growth of output per worker in Latin America has lagged behind that of the rest of the world. Figure 1.2 summarizes the evolution of GDP per worker for the typical country over 45 years (1966 to 2000), using ten-year rolling averages to smooth out cyclical fluctuations. Even leaving aside the 1980s, a decade lost to the debt crisis, growth in worker productivity has always come up short of the rates in the rest of the world, including the 1960s and 1970s, when growth was more robust. The impression that old times were better tells a misleading

FIGURE 1.2 Growth of GDP Per Worker, Latin America and the Rest of the World, 1966–2000
(*percent*)



Source: Authors' calculations based on Penn World Tables and WDI. Ten-year rolling averages are used to smooth out cyclical fluctuations.

story of economic success in the region. Latin America grew quickly when the entire world grew quickly; but when compared to growth in the rest of the world (or other reasonable benchmarks), the region's growth has been consistently subpar.

In the long term, incomes in Latin American countries have failed to catch up with those of the world's leading economies. Table 1.1 shows per capita GDP at purchasing power parity in current U.S. dollars as a percentage of U.S. per capita GDP for the larger Latin American countries from 1960 to 2006. Data for the fast-growing Asian exporters of manufactures and Ireland and Mauritius are shown as benchmarks.[2]

The results are so strong that they hold even when taking into account possible measurement errors derived from constructing

[2] Ireland is a suitable benchmark for the more developed countries in Latin America and the Caribbean (Argentina, Brazil, Chile, Mexico, and Uruguay), while Mauritius provides an interesting comparison for countries in Central America and the Caribbean. Like Central America and the Caribbean, the Mauritian economy was based until the late 1970s on the export of a single commodity (sugar). Since then, it has become an exporter of manufactures, first of garments in export processing zones (EPZ) and later of more sophisticated goods. Like its counterparts in Central America and the Caribbean, tourism plays an important economic role.

TABLE 1.1 Lag in Per Capita Incomes in Latin America and the Caribbean, 1960–2006
(GDP per capita, PPP, as a percentage of U.S. GDP per capita)

	1960	1970	1980	1990	2000	2006
Latin America and the Caribbean						
Trinidad & Tobago	41.9	40.8	83.2	39.5	43.0	64.1
Chile	39.5	37.9	31.2	26.4	33.3	37.5
Argentina	60.2	55.1	50.1	30.3	33.0	35.9
Uruguay	46.9	36.2	38.5	29.5	31.3	30.0
Panama	19.9	24.9	25.8	21.1	23.1	26.5
Costa Rica	34.0	31.8	31.6	22.8	24.3	25.2
Venezuela	42.1	36.8	41.4	29.3	21.3	23.6
Mexico	28.5	28.9	34.7	25.3	23.5	23.1
Dominican Republic	17.2	16.0	18.8	15.3	18.9	21.3
Brazil	20.3	23.2	32.0	25.7	20.9	21.1
Colombia	20.9	19.2	22.2	19.6	17.7	18.1
Peru	24.2	27.5	24.3	13.3	12.2	13.5
Ecuador	20.9	18.1	28.8	17.9	12.6	13.2
El Salvador	25.1	23.0	20.3	13.1	13.8	13.2
Paraguay	17.3	16.3	22.0	18.7	14.4	12.8
Jamaica	26.3	24.4	16.6	16.7	13.2	12.0
Guyana	—	16.8	15.8	7.3	10.9	10.9
Guatemala	21.0	19.4	18.5	12.5	11.2	10.5
Nicaragua	32.2	32.5	23.4	14.2	10.0	9.8
Bolivia	17.3	15.3	15.4	9.9	8.5	8.7
Honduras	12.5	10.6	10.9	8.5	6.5	6.6
Haiti	—	9.2	10.4	6.9	6.0	5.1
Asia						
Hong Kong	23.4	38.7	61.7	84.2	79.3	90.4
Singapore	31.3	36.1	58.8	71.8	85.7	81.2
Korea	10.7	14.2	21.1	38.2	45.7	51.4
Malaysia	15.3	13.7	24.2	24.5	33.2	37.4
Thailand	9.0	11.4	13.7	18.8	18.8	21.9
China	3.4	2.8	3.8	6.3	11.6	17.6
Indonesia	5.4	4.7	9.4	10.6	11.0	11.9
India	6.7	6.4	6.0	6.9	7.7	10.0
Other benchmark countries						
Ireland	40.7	44.5	47.9	51.8	72.6	80.0
Mauritius	29.1	23.0	27.1	36.0	44.0	49.0

Source: Authors' calculations, based on Penn World Tables and WDI.
Note: Countries are ordered according to GDP per capita in 2006.
—*not* available

national accounts at the individual country level or translating into internationally comparable figures. According to this measure, no Latin American country, with the possible exception of Trinidad & Tobago, has been gaining on U.S. income levels. Even Chile's performance, one of the best in Latin America since 1990, pales over the longer run when compared to Asian country performance or even to Mauritius. In 1960, Chile's GDP per capita was three to four times that of Korea's (in current PPP dollars). By 2006 Korea's GDP per capita exceeded half of the U.S. level, while Chile's GDP per capita was barely 37 percent of the U.S. level and even lower than it had been almost half a century earlier.

A comparison between Chile and Ireland is equally instructive. Though in 1960 the countries had similar per capita GDPs, now Ireland's GDP per capita is four-fifths the level of U.S. per capita GDP. Comparing Ireland and Argentina is even more dispiriting. In 1960, Argentina and Ireland had per capita incomes equivalent to 60 and 40 percent of the United States' income, respectively. Argentina's per capita income is now less than half that of Ireland's.

Comparisons between the Central American countries and Mauritius yield similar results. Countries with initially similar resource endowments and economic structures ended up with very different levels of income per capita, with Latin American countries at the lower end of the spectrum. Overall, Latin American growth has been very disappointing. This book attempts to answer the question: what is holding back private investment and growth?

Table 1.2 examines GDP and export growth rates and presents a picture of long-term performance. Growth rates of GDP and exports in Latin America have indeed lagged behind those of the fast-growing Asian exporters of manufactures. GDP and export growth rates in the Asian countries have doubled those in Latin America in both periods shown in the table: 1961–90 and 1991–2006. These two periods contain years of poor Latin American performance (the "lost decade" of the 1980s) and years of slow growth in Asia (the years following the Asian crisis of 1997–98). Nonetheless, even taking into account crises of varied origins, growth in the Asian countries

TABLE 1.2 Growth of GDP and Exports in Latin America and Benchmark Countries
(annual percentage change)

	GDP		Export volume	
	1961–90	1991–2006	1961–90	1991–2006
Latin America and the Caribbean	**3.4**	**3.5**	**4.7**	**6.7**
Argentina	1.9	4.2	6.0	7.1
Bolivia	2.3	3.6	2.9	6.6
Brazil	5.4	2.7	8.2	8.0
Chile	3.7	5.6	7.1	8.0
Colombia	4.8	3.1	5.3	5.2
Costa Rica	4.8	5.1	7.9	9.0
Dominican Republic	5.3	5.5	3.9	6.0
Ecuador	4.5	3.1	7.4	6.4
El Salvador	2.6	3.8	3.5	9.3
Guatemala	4.0	3.6	5.0	3.6
Guyana	0.6	3.6	–1.6	11.2
Haiti	1.4	-0.7	—	—
Honduras	4.2	3.6	5.1	3.3
Jamaica	1.9	1.9	—	—
Mexico	5.1	3.1	8.6	10.4
Nicaragua	2.2	3.3	4.4	8.4
Panama	4.6	5.0	1.6	3.7
Paraguay	5.4	2.2	8.2	4.4
Peru	2.8	4.3	2.4	8.6
Trinidad & Tobago	2.7	5.3	4.4	6.9
Uruguay	1.5	2.8	5.5	5.9
Venezuela	2.9	3.0	–0.7	1.5
Asia	**7.1**	**6.1**	**10.2**	**11.6**
China	6.8	10.2	7.4	17.5
Hong Kong, China	8.6	4.7	11.6	9.4
India	4.3	6.2	7.1	14.0
Indonesia	6.2	4.6	5.1	7.1
Korea, Rep.	8.1	5.6	20.6	13.9
Malaysia	6.8	6.3	8.2	9.9
Singapore	8.7	6.5	—	—
Thailand	7.7	4.8	11.5	9.1
Other benchmark countries				
Ireland	4.2	6.5	8.5	12.5
Mauritius	5.9	4.8	9.2	4.5

Source: Authors' calculations, based on WDI.

Note: Growth rates of exports refer to exports of goods and services, in terms of volume. Regional averages are unweighted.

— not available

always outstrips that of Latin America countries. While growth of output and exports accelerated in the latter period in several Latin American countries, they remained well below the averages recorded for most Asian countries.

The country studies included in this book address the issues of growth and export composition in detail in the context of evaluating the ability of countries to identify and develop new competitive activities, or pursue intensive self-discovery. Self-discovery refers to the efforts of entrepreneurs to discover profitable opportunities by producing goods or services that are new to the country in question, although they are produced elsewhere in the world (Hausmann and Rodrik, 2003). As discussed later in this chapter and in the country studies, the paucity of self-discovery is a significant constraint to growth in several countries.

A starting point is a useful, albeit imperfect, approximation of the extent to which Latin American countries have been lagging behind Asian countries in the realm of self-discovery and export concentration. As shown in Table 1.3, Asian countries have considerably more diversified export baskets than most Latin American countries. This is due partly to the heavy commodity concentration of exports in Latin America and the greater presence of manufactures in Asia. But that fact in itself is interesting to note. Manufactures per se tend to be more diversified than commodities. However, there are countries such as Australia and New Zealand, whose exports are also dominated by agricultural goods (and minerals, in the case of Australia), and that, at the same time, export a much greater variety of goods than most Latin American countries. The figures on export concentration for these two natural resource–based developed economies suggest that it is possible to move away from the heavy export concentration that characterizes commodity exporters toward a more diversified export pattern dominated by more sophisticated goods, even if they are related to a primary products base. It also suggests that vigorous self-discovery is not the monopoly of manufacturing exporters.

Not only has income growth been slower in Latin America than in Asia, but it has also been more volatile, judging by the coefficient

TABLE 1.3 **Export Concentration: Latin America, Asia, Australia, and New Zealand**
(Hirschman-Herfindahl Indexes estimated at the three-digit SITC level)

	1995	2000	2003	2006
Latin America and the Caribbean	**0.30**	**0.29**	**0.29**	**0.31**
Argentina	0.13	0.14	0.16	0.13
Bolivia	0.22	0.20	0.26	0.40
Brazil	0.09	0.09	0.09	0.09
Chile	0.31	0.29	0.26	0.39
Colombia	0.24	0.30	0.21	0.21
Costa Rica	0.30	0.30	0.26	0.23
Dominican Republic	0.22	0.23	0.20	0.16
Ecuador	0.38	0.45	0.41	0.53
El Salvador	0.35	0.21	0.12	0.15
Guatemala	0.28	0.22	0.15	0.17
Guyana	0.38	0.36	0.32	0.29
Honduras	0.54	0.30	0.23	0.28
Jamaica	0.48	0.55	0.64	0.58
Mexico	0.12	0.14	0.13	0.15
Nicaragua	0.27	0.32	0.22	0.29
Panama	0.36	0.27	0.39	0.36
Paraguay	0.34	0.34	0.42	0.32
Peru	0.24	0.23	0.25	0.26
Trinidad & Tobago	0.36	0.40	0.35	0.42
Uruguay	0.17	0.18	0.19	0.23
Venezuela	0.52	0.62	0.80	0.91
Asia	**0.14**	**0.16**	**0.15**	**0.17**
China	0.07	0.08	0.10	0.11
Hong Kong	0.09	0.11	0.13	0.19
India	0.14	0.13	0.12	0.16
Indonesia	0.14	0.13	0.12	0.19
Korea	0.15	0.16	0.15	0.16
Malaysia	0.18	0.22	0.22	0.19
Singapore	0.22	0.28	0.25	0.27
Taiwan	0.11	0.17	0.15	0.13
Thailand	0.09	0.11	0.09	0.14
Other				
Australia	0.12	0.12	0.12	0.19
New Zealand	0.12	0.12	0.13	0.14

Source: UNCTAD, *Handbook of Statistics, 2007.*
(http://stats.unctad.org/Handbook/TableViewer/tableView.aspx?ReportId=1687).
Note: Regional averages are unweighted.

of variation of annual growth rates.[3] From the data in Table 1.4, it would seem that higher output volatility is strongly associated with greater volatility in the terms of trade. Access to international financing, as measured by the ratio of the financial account of the balance of payments to the broad money supply (M2), has also been more volatile in Latin America than in Asia or the developed countries (see Table 1.5).[4] In part, the higher volatility of growth in Latin America than in Asia may also be the consequence of more frequent crises.

The evidence shows that Latin America and the Caribbean has been the region with the highest incidence of output collapses in the developing world over the last 50 years (see Blyde, Daude and Fernández-Arias, 2008). Furthermore, growth spells have been shorter and frequently were unsustainable (see Berg, Ostry and Zettelmeyer, 2008). It is highly likely that output instability is associated with lower long-term growth. The channels through which volatility affects growth could include hysteresis effects such as the destruction of installed capacity, which is difficult or impossible to rebuild, and the deskilling of the labor force through protracted unemployment.

The shortfall in growth rates in Latin America relative to the rest of the world and, particularly, to the fast-growing countries of Asia, is due not only to lower investment rates but also to differences in the growth of total factor productivity (TFP), which measures the efficiency with which factors of production (capital and labor) are transformed into final output. Apart from its technological com-

[3] When it comes to output growth, in order to come up with a meaningful indicator of volatility, the standard deviation is normalized by the average growth rate. This is because there are significant differences between countries in average long-run growth. By contrast, the average change in the terms of trade over long periods should be zero. Technically, the change in the terms of trade, as a relative price, is, in the long run, a stationary variable with zero mean. Therefore, an appropriate volatility measure for this variable is just the standard deviation of annual changes.

[4] See also Broner and Rigobón (2006) and Agosin and Hauita (2008).

TABLE 1.4 Measures of GDP and Terms of Trade Volatility

	Coefficient of variation of GDP growth		Standard deviation of terms of trade change	
	1961–90	1991–2006	1961–90	1991–2006
Latin America and the Caribbean	**137**	**94**	**16.1**	**8.8**
Argentina	286	160	5.1	4.8
Bolivia	188	41	11.7	11.2
Brazil	88	72	14.5	18.8
Chile	146	57	6.6	10.7
Colombia	39	85	13.9	7.7
Costa Rica	77	54	14.5	5.4
Dominican Republic	121	62	14.2	5.2
Ecuador	84	102	14.1	10.2
El Salvador	196	52	35.2	10.4
Guatemala	77	27	36.9	8.4
Guyana	940	105	—	1.2
Haiti	274	–634	13.4	5.9
Honduras	79	66	16.7	11.2
Jamaica	295	125	—	7.1
Mexico	73	102	14.6	2.7
Nicaragua	362	68	22.3	11.1
Panama	110	54	8.3	9.6
Paraguay	75	108	24.7	8.4
Peru	200	85	10.2	10.0
Trinidad & Tobago	193	78	13.1	8.4
Uruguay	278	204	12.3	4.8
Venezuela	145	245	20.0	21.0
Asia	**58**	**62**	**7.4**	**5.7**
China	134	20	8.2	3.5
Hong Kong, China	55	76	1.8	1.1
India	78	37	12.5	9.4
Indonesia	53	112	12.9	19.4
Korea, Rep.	40	70	3.4	4.2
Malaysia	42	71	10.8	2.7
Singapore	48	61	2.3	1.4
Thailand	34	103	7.1	3.4
Other benchmark countries				
Ireland	55	44	3.0	2.9
Mauritius	37	22	11.0	5.0

Source: Authors' calculations, based on WDI data.

Note: Coefficient of variation of GDP growth: standard deviation of average annual growth rate, divided by average annual growth rate, multiplied by 100. Standard deviation of terms of trade change: taken over annual percentage changes in the terms of trade. All regional averages are unweighted.

TABLE 1.5 Level and Volatility of the Financial Account of the Balance of Payments in Emerging and Developed Economies, 1975–2004
(financial flows as a share of M2)

	1975–82		1983–89		1990–7		1998–2004	
Region and country	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Latin America	**18.6**	**13.9**	**–8.2**	**16.3**	**9.1**	**12.1**	**2.2**	**15.9**
Argentina	1.0	7.1	–8.2	18.8	13.1	23.6	–14.4	37.1
Brazil	32.3	8.0	–10.2	18.8	5.1	7.6	6.9	7.7
Chile	29.2	23.0	–12.4	20.0	17.5	6.6	4.4	2.3
Colombia	12.3	10.7	15.4	10.5	15.6	16.1	5.2	6.2
Costa Rica	13.7	21.5	–17.4	6.0	3.8	6.6	7.3	5.2
Dominican Republic	22.8	12.4	4.3	6.2	2.0	8.4	12.3	13.3
Ecuador	27.9	7.2	–38.9	36.8	10.2	13.4	–25.8	78.1
Mexico	16.6	11.1	–3.3	9.1	16.7	13.8	12.5	1.9
Panama	26.9	28.7	–14.3	26.7	–4.6	13.1	10.1	9.4
Peru	8.1	17.9	–10.3	19.5	18.8	18.3	7.5	3.0
Uruguay	14.1	5.4	5.5	6.6	2.1	5.4	–1.2	10.8
Asia	**16.6**	**6.0**	**7.7**	**7.7**	**6.9**	**5.9**	**–3.9**	**4.0**
Bangladesh	21.0	7.7	13.1	4.6	4.5	3.9	–0.7	1.8
China	—	—	1.9	2.1	3.1	2.1	0.9	1.0
Indonesia	—	—	19.2	11.2	7.9	3.9	–7.4	5.9
Korea, Rep.	19.4	6.7	–0.1	11.2	4.8	4.6	1.5	3.3
Malaysia	11.7	7.2	8.2	11.9	11.1	7.4	–4.8	2.1
Philippines	25.2	8.3	7.4	10.0	16.3	3.8	–3.8	3.3
Singapore	19.9	3.1	8.6	8.8	–2.6	9.5	–14.7	5.6
Thailand	13.8	4.5	8.0	4.6	10.7	8.2	–6.6	3.7
Turkey	5.1	4.5	3.3	5.0	6.2	9.6	0.8	9.3
Developed countries	**2.4**	**3.5**	**2.2**	**3.3**	**1.3**	**3.2**	**–0.5**	**3.2**
Germany	0.4	0.9	–4.0	2.9	0.8	2.6	–1.0	1.9
Austria	2.8	2.4	0.3	1.1	1.6	1.3	0.5	1.8
Finland	5.6	6.1	5.2	5.7	1.5	8.6	–10.9	5.4
France	0.3	1.2	0.9	1.1	–0.8	2.1	–2.2	2.5
Italy	2.2	3.5	2.8	2.5	1.4	4.6	–0.8	3.1
Netherlands	–1.9	2.7	–3.2	2.8	–3.3	1.5	–2.2	1.4
Spain	3.1	1.1	3.1	3.4	2.6	3.1	1.1	2.8
Australia	7.4	5.4	12.5	3.4	6.6	2.0	6.6	2.5
Canada	7.2	4.8	4.9	3.7	2.3	3.1	–2.0	1.8
Denmark	8.5	3.6	7.2	5.2	–0.2	5.5	–0.9	5.7
Japan	–0.4	1.3	–2.5	1.1	–1.6	0.7	–0.9	1.2
Norway	8.5	10.2	3.4	5.7	–2.0	6.1	–11.9	12.0

(continued on next page)

TABLE 1.5 Level and Volatility of the Financial Account of the Balance of Payments in Emerging and Developed Economies, 1975–2004 *(continued)*
(financial flows as a share of M2)

	1975–82		1983–89		1990–7		1998–2004	
Region and country	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
New Zealand	–2.2	6.3	–0.1	3.9	5.9	4.1	3.4	0.9
United States	–0.9	1.1	2.7	2.0	2.5	1.1	5.8	2.5
United Kingdom	–1.9	3.0	0.8	4.5	1.2	1.5	1.5	0.9

Source: Agosin and Huaita (2008).

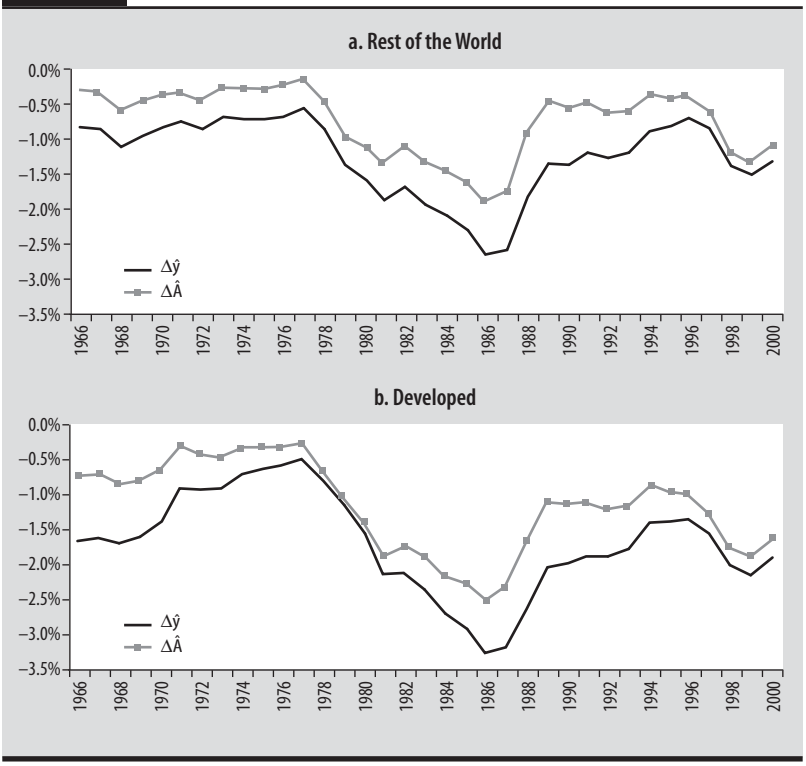
Note: All regional averages and standard deviations are unweighted. Countries included in Latin America and Asia are only those that are engaged with private international capital markets. The average for developed countries includes Greece, Portugal, and Switzerland, data for which are not shown for reasons of space.

— not available

ponent, productivity is also affected by the efficiency with which markets work and are served by public services: external constraints on technologically advanced firms may also produce inefficient aggregate results in terms of low TFP. With some wrinkles, TFP is calculated in a fairly standard way (see Appendix A for technical details). Figures 1.3A and 1.3B show the growth gap in output per worker and in TFP in the average Latin American country relative to the rest of the world (as in Figure 1.2) and also to the typical developed country. Relative to the rest of the world and to developed countries, factor accumulation has been consistently slower over time, but its direct effect in growth accounting terms would explain only about half a percentage point of the annual growth gap, which is around 40 percent and 30 percent of the total shortfall, respectively. This result of the primacy of slower productivity growth as an explanatory growth factor in an accounting sense also holds for the most recent period (the decade around 2000) and for almost all countries, including the faster-growing Chile (see Figure 1.4 for a country break-down relative to the typical country in the rest of the world).

Productivity and factor accumulation interact in complex ways that are important to understand in order to find the causes of their

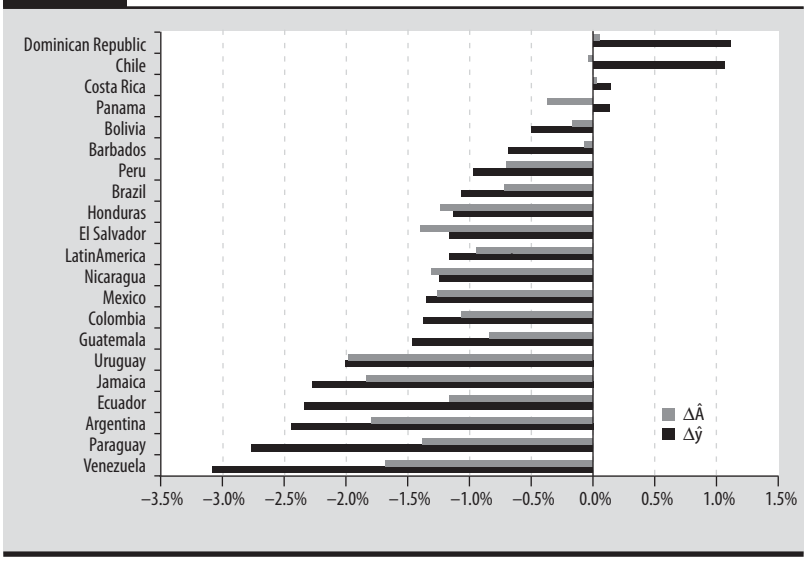
FIGURE 1.3 Average Growth Gaps between Latin America and other Countries, 1961–2004



Source: Authors' calculations based on Penn World Tables and World Bank, *World Development Report*, various years.

joint underperformance. On the one hand, factor accumulation is important for the evolution of productivity and thus entails an indirect effect on growth. For example, the misallocation of investment due to policy distortions or lack of policies supporting socially productive investments entails low aggregate output and therefore low TFP. Furthermore, new technology is embodied in new capital vintages, which are therefore key for TFP growth. This line of reasoning justifies a focus on the process of investment even when low TFP growth is a clear symptom. On the other hand, low aggregate productivity (and low public investment and human capital) leads to low returns to investing physical capital and lower private investment. While in this case the driver of growth underperformance is a productivity

FIGURE 1.4 Growth and TFP Gaps by Country Relative to Rest of the World (1995–2004)



Source: Authors' calculations based on Penn World Tables and WDI.

shortfall rather than inefficient investment, the root of the problem may be better identified by looking at its implications for private investment. As explained in detail in the next section, the basic methodology utilized in the country studies relies on the power of analyzing impediments and disincentives to private investment to find the overall constraints to growth.

Summarizing, long-term growth in Latin American countries has been relatively poor in comparison with more dynamic regions and individual countries, due to both slower productivity growth and factor accumulation. Countries in Latin America are not closing the gap that separates them from the developed countries; export growth has been modest in comparison with other regions of the world; their export structures tend to remain concentrated in primary products instead of becoming more sophisticated as in more dynamic countries; the terms of trade and financial conditions are more unstable than in other emerging economies; and output is highly volatile and prone to collapses.

Growth Diagnostics Methodology

The country studies in this book seek to understand the underlying constraints to economic growth in individual Latin American countries. In a recent paper, Hausmann, Rodrik and Velasco (HRV, 2005) proposed a new approach to inform policy-oriented research on how to foster a country's economic growth. They call this approach growth diagnostics methodology (GDM). They focus on what they call binding constraints to growth: that is, the constraints whose removal would have the largest payoff in terms of growth.

This binding constraints approach posits that the development process is a succession of bottlenecks, which evolve over time as they are overcome, leading to a different set of binding constraints. In the normal course of successful economic reform, binding constraints are removed and the economy grows until a new binding constraint limits it. Moreover, even when no binding constraint is removed, political/economic events or shocks can be such that new binding constraints supersede earlier ones.

As a consequence, it is argued, cross-country growth regressions fail to deliver adequate diagnoses because the marginal effect of traditional explanatory variables vary dramatically, depending on interactions and country circumstances that cannot be captured within the assumptions of separability and linearity needed to implement this statistical method. Furthermore, the measurability required in regression exercises forces the analyst to use outcome variables as regressors, which cannot be translated into policy recommendations unambiguously. In addition, simple growth accounting suffers from an extreme form of this weakness: even leaving aside well-known measurement errors, the diagnostic information it provides does not allow the analyst to pinpoint underlying problems and policy solutions.

The conventional way of diagnosing a country's inability to raise investment and grow faster may be conveniently labeled the "kitchen sink" or "laundry list" approach. This approach to reforms does not pay enough attention to interactions and sequencing; even

if validated by serious growth regression exercises, reforms are bound to fail. In the best case, they would deliver little; in the worst case, they could lead to counterproductive policies. In this view, the implementation of the Washington Consensus was doomed from the start. By contrast, the growth diagnostics approach calls for country-specific analyses and conclusions, for country-tailored "clinical economics," searching for specific binding constraints and the corresponding policies to relax them.

The discussion turns now to the methodology utilized in the country studies included in this book to identify the most severe constraints to growth (actual and potential) in the spirit of the binding constraints approach, primarily based on HRV and supplemented by other new methodological developments.

This book shows that the growth diagnostics methodology does yield innovative growth diagnoses. The most successful studies posit and test a syndrome underlying the observed binding constraints in the context of a rich narrative of the growth process.[5] The diagnostic work in these studies starts from an examination of impediments to growth by reviewing their proximate determinants. It then assesses their relative importance in order to focus on the most informative constraints in the diagnosis and most promising for policy action, and finally identifies the specific distortions that lie behind these key impediments or binding constraints. Below an outline of the kinds of techniques utilized in the country studies to implement this approach is presented. While these techniques fall short of constituting a full-fledged methodology, they do provide tools and a discipline for examining the growth policy problem of countries.

The key question that the methodology tries to answer is why a country exhibits low rates of private investment, or more generally, what it would take to obtain higher productive private investment.

[5] The notion of "syndrome" is taken from medical terminology. A set of causes may be considered a syndrome if one is unlikely to observe its effects when it is absent. On the other hand, one is highly likely to observe its effects when the causes it describes are present.

Starting from a growth model, HRV derive an equation for the (constrained) balanced growth path and for the return on capital.

The balanced-growth path of capital (k) is given by:

$$\frac{\dot{k}_t}{k_t} = \sigma\left[r\left(1-\tau\right)-\rho\right], \tag{1.1}$$

where

$$r = r\left(\alpha,\theta,x\right) \tag{1.2}$$

σ = elasticity of intertemporal substitution in consumption
r = gross social rate of return on capital
τ = tax rate on capital (including "implicit" taxation)
ρ = cost of capital (which can be proxied by the international interest rate adjusted for country risk)
α = total factor productivity
θ = index of externalities
x = availability of complementary factors of production (such as infrastructure or human capital).

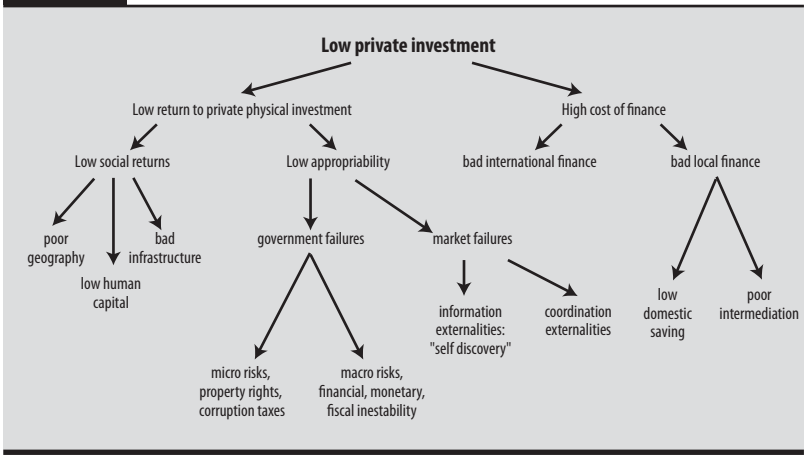
These equations represent the entry point to the problem of growth diagnostics. The growth of the capital stock, and of income, may be low for a variety of reasons. In the first place, the gross social rate of return may be low [equation (1.2)], owing to low TFP or the unavailability of key complementary inputs (infrastructure or skilled labor). On the other hand, the effective or private rate of return may be low because of low appropriability of returns [in the very stylized formulation of equation (1.1), a high τ or high θ]. Low appropriability may be due to government failures such as high taxation, corruption, or poor rule of law, or to the market's failure to take advantage of potential externalities (which require centralized decisions). For a given private rate of return, when capital accumulation is higher, the cost of capital ρ is lower.

Improvement in any of these parameters in given country circumstances can be expected to be helpful for inducing higher productive private investment. In an extreme case, some parameters would be

relevant (binding constraints); others would be irrelevant. The policy counterpart to this notion of binding constraint is the question of what changes would bring the most growth bang for the buck; or, in other words, which policies have the lowest cost/benefit ratio.

The transition from this abstract model to an examination of real life problems of individual economies is effected with the use of a decision tree that organizes thinking around specific types of binding constraints. This allows the analyst to run through a large variety of candidate causes and look for symptoms that would allow one to accept or reject a particular cause. The analyst is likely to discard a large number of potential causes because the evidence indicates that they are not binding in the period for which the analysis is undertaken, even if the particular problem is found to be present. For example, in practically all Latin American countries, the labor force suffers from low skill levels, school enrollment rates are low, and educational accomplishments are unremarkable. However, low skills may not be a binding constraint if there is little demand for skilled labor. One would have to look elsewhere to find what is holding back investment and growth. The decision tree used by HRV and adopted in the country studies is presented in Figure 1.5.

FIGURE 1.5 Decision Tree Approach for Finding the Binding Constraint to Investment



Source: Hausmann, Rodrik, and Velasco (2005).

Going down the decision tree in an orderly manner, the questions to be asked concerning private investment fall into two general categories:

1. Does the country face **low returns** to domestic investment? Following the left branch of the tree, a positive answer leads to the examination of social returns, or investment potential, and of the degree to which those returns can be appropriated in the form of private returns, or investment incentives.

   1a. Is the problem one of low **social returns**? If so, is it because of (inter alia):
   - Scarcity of human capital or entrepreneurship
   - Poor infrastructure, or high transport, telecommunications, or trading costs
   - Lack of other public goods to complement private investment (for example, are supporting financial markets, such as insurance, available for most types of commercial risks)
   - The manner in which the country has integrated into the world economy through trade (for example, are export baskets subject to Dutch disease or more generally are they not supporting structural transformation toward higher development, or is access to new technology poor)?

   1b. Is the problem one of low **private appropriability** of investment returns? If so, it is useful to distinguish between government failures that impede adequate appropriability and market failures that do not provide the necessary private incentives to carry out investment initiatives with high social returns.

   Are there important **government failures**, such as:

- High tax rates and/or inefficient tax structures affecting private investment
- Overregulation of labor or product markets
- Lack of law enforcement (weak property rights, informality of the economy and labor force) or risk of creeping or outright expropriation
- Macroeconomic risks (financial, monetary, and/or fiscal instability)?

Are there substantial **market failures**, such as:

- Large positive investment spillovers external to individual investors (lack of protection of intellectual property rights, or information externalities that account for low levels of pioneering self-discovery[6])
- Returns that cannot be captured by individual investors because they require coordination among many actors, the absence of which prevents the emergence of new activities (coordination failures)?

2. Does the country face a **high cost of financing** domestic investment? Following the right branch of the tree, a positive answer to this question can be further decomposed into sub-questions such as:
    - Does the country have a low domestic propensity to save and/or problems accessing international finance (high country risk, unattractive conditions for foreign direct investment, macroeconomic risk)?
    - Does the country have problems with the domestic financial system (inefficient/costly financial intermediation, poor creditor protection, absence of key segments of the capital market, poor bank regulation, prevalence of related-party lending, absence of institutions that lend to innovators or newcomers)?

[6] See Hausmann and Rodrik (2003).

What symptoms would be informative of binding constraints in one or more of these areas? The decision tree assumes that growth impediments are reflected in low private investment rates. The question is then how to identify weak links in the investment process depicted in the tree: that is, constraints that are binding, and that can be substantially relaxed.

Given a list of potential constraints, the search for those that are binding involves qualitative investigation to test each constraint against the implications that would be observed if it were binding. Investigations of this sort are, like all scientific inquiry, such that each hypothesis can be rejected, but none can be "proven." Instead, when a hypothesis is tested against multiple implications and is not rejected under any of them, then there is a degree of confidence that a binding constraint has been identified. More realistically, given the substantial margins of error in these procedures, conclusions are generally derived based on the preponderance of the evidence discovered. In this context, a Bayesian assignment of weights indicates that country-specific shortfalls are more informative of binding constraints than generic problems to be expected in developing countries, which matches the tailored diagnostics encouraged by this approach.

Detecting the Symptoms

In the original formulation, HRV advanced the proposition that the key to identifying binding constraints was to observe relative prices and determine whether they appeared to be out of line with those in undistorted economies. If the cost of capital (interest rates) is high relative to the international interest rate, allegedly this is an indication that capital is relatively scarce (a binding constraint) in that country. If it is not, then it can be inferred that the private returns of available investment opportunities are generally low. For example, prices may reveal that certain factors complementary to investment are scarce, such as a high premium to education (as detected, say, in Mincer regressions). Other impediments may also be mapped into the price space, such as the incidence of taxes or risks. Where markets do not

exist, as in the case of public infrastructure, the analyst may try to infer implicit prices from usage data.

The studies in this book make ample use of the information embedded in price signals to reveal the importance of constraints, as opposed to the traditional analysis based almost exclusively on quantities and their comparison to inaccurate benchmarks. Prices are summary statistics that reveal scarcity in the market. For example, direct observation of a wage skill premium is more precise than a judgment of whether the share of skilled workers appears adequate. However, unfiltered prices may be misleading: for example, if appropriability is an important problem, social scarcity would not be reflected in market prices, and shadow prices (a theoretical construct) would be needed. Furthermore, in some cases, markets are notoriously incomplete or nonexistent (such as markets for long-term or venture capital, or the unit costs of nonexistent infrastructure). Where prices do not tell the whole story or are not an accurate gauge of scarcity, researchers can also look at quantity data. In particular, stock estimates may be required to supplement flow data to reveal quantity imbalances. For example, Klenow and Rodríguez-Clare (2004) and Blyde and Fernández-Arias (2005) utilize quantity data of the kind traditionally used in growth accounting, based on stock data of factor inputs, to uncover constraints. Furthermore, the judicious use of enterprise opinion survey data may add information on constraints to investment and is utilized in some of the country studies.

Whether using price, quantity, or qualitative information, most of the studies use a common principle to detect binding constraints: when altered, these constraints are expected to provoke substantial changes in observed investment and growth. If interest rates fall over time while growth does not accelerate, it is difficult to argue that the cost of financing is a binding constraint. If the education premium falls without a growth response, there is no case for a human capital binding constraint.

Another technique used to detect the presence of binding constraints in each one of the branches of the decision tree is the analysis of the adaptations they induce in the agents' behavior. For

example, if financing is a binding constraint, then large firms and conglomerates can be expected to represent a large share of the economic structure. If lack of public goods is a binding constraint, successful producers are expected to exhibit an unusually high level of cooperation to overcome this handicap. If fear of expropriation is an important impediment to investment, then observed profit margins are expected to be high without triggering investment or entry. Correspondingly, the toolkit employed by the researchers who conducted the studies in this book also included the examination of microeconomic information available at the enterprise level. In addition to the detailed industrial surveys in some countries, recent World Bank surveys at the firm level convey relevant information on the investment decisions of firms that has not yet been fully analyzed.[7] The surveys cover a wide variety of establishments in different industries, including information on whether a firm exports or not, its size, its financial position, and its interactions with government agencies and financial institutions.

In particular, techniques similar to those used in Rajan and Zingales (1998) to tease out the relevance of financial development are used in these country studies to infer binding constraints from the structure of production. For example, the hypothesis that road infrastructure is a binding constraint can be tested by looking at whether the country is underspecialized in products or sectors that use roads intensively. Similarly, if financing is a binding constraint, a positive shock to financing costs would be expected to entail growth biased in favor of sectors whose firms are more dependent on external financing.

Market Failures and Structural Transformation

Another way to look at constraints to growth in the framework of the decision tree is to move the issue down to the sector level and

[7] See World Bank, Investment Climate Surveys, http://www.enterprisesurveys.org/portal/.

ask why certain products that would be expected to be produced and exported by a country are not in its product and export basket. This method is used heavily in the country studies included in this volume. A starting point is to analyze the evolution of the stock of discoveries in each country's exports over time and see the extent to which their revealed comparative advantage is consistent with their income per capita (see Appendix B). The notion in this test is that an export basket associated with more underdeveloped countries is a sign of growth obstacles because countries "become" what they export (Hausmann, Hwang and Rodrik, 2005).

A refinement to this approach is to examine the potential for the export basket to transform itself into a better basket (the value of its "open forest"; see Hausmann and Klinger, 2006). The idea is that structural transformation in exports is not random, but follows patterns that are endogenous to the development process. Once a country has become competitive in a certain product or product group, there is a higher probability (based on patterns of world revealed comparative advantage) that it will become competitive in certain products but not in others. For example, competitiveness in grape exports is likely to lead to competitiveness in other fruits for which the complementary inputs are the same or highly similar (cold storage and transport, quality certifications), but highly unlikely to lead to competitiveness in information technology; competitiveness in computer chips may well lead to competitiveness in cell phone production. In other words, where a particular country is located in the world's product space and how well it is making use of the location that it has to advance in the sophistication of its product and export basket has been found to be positively correlated to overall economic growth. Some of the country studies in this volume assess growth potential based on this theory (for technical details, see Appendix B).

Methodological Limitations and Extensions

The application of the growth diagnostics methodology based on the above framework led to new insights in the countries studied.

Relative to cross-country regressions, it added the use of prices and other information-rich, country-specific knowledge to illuminate the problem, without imposing a structure that would filter out the specificity and nonlinearity of the growth process. Relative to growth and development accounting, it added deeper exploration of underlying determinants without reliance on the accuracy of capital stock estimations. By and large, conclusions are richer and in many cases embedded in a compelling narrative of the underlying syndromes in these countries. In fact, the posing of a syndrome that may be manifested in multiple findings discovered in the analysis lends credibility to the overall diagnosis. In practice, country studies did not conclude with a "silver bullet" or a set of binding constraints rendering most weaknesses irrelevant; rather they yielded a parsimonious prioritization of the importance of multiple constraints that vary substantially from country to country.

At the same time, the above framework was sometimes found lacking. The premise that binding constraints to growth are to be discovered in binding constraints to private investment overlooks the possibility that the investment level may be high and yet yield low growth. For example, investment may be misallocated across economic activities. Misallocation may result from misguided public investment or because public policy subsidizes private investment in the wrong places. Misallocation may also result from a segmented financial system in which some highly productive sectors may be left out, even when other less productive investment is being supported. Thus, it would be important to analyze investment as a heterogeneous phenomenon.

If investment tends to flow to sectors or activities with low spillovers or even worse, negative spillovers, misallocation would result even with undistorted markets. Several growth and development accounting exercises have consistently shown that total factor productivity (TFP) is the most important factor explaining long-run differences in growth rates and in income levels across countries.[8]

[8] See, for example, Prescott (1998); Hall and Jones (1999); Easterly and Levine (2001).

In the GDM framework, the effects of TFP on growth are detected through its indirect impacts on the investment rate. Since low investment may fail to signal weak TFP growth, a careful analysis of productivity issues is warranted, particular for economies in which investment is found to be strong, yet growth remains unsatisfactory.

In addition, the finding that a particular factor represents a binding constraint may be somewhat misleading. There may be some underlying reasons why a particular economy exhibits certain shortcomings, so that the binding constraint is not really what is manifested at the surface but rather at a deeper level. For example, in Guatemala, the lack of physical infrastructure and the low levels of human capital are found to be binding constraints to investment and growth. At a deeper level, however, the authors find that the inability of the economy to supply infrastructure and human capital is due to the extremely low tax burden, one of the lowest in the region and much lower than would be expected based on the country's per capita income level. But why can't the tax burden be raised? Here is the real binding constraint: the resistance to tax increases on the part of those who are in a position to do so successfully.

Finally, binding constraints should not be looked at in isolation. They may very well compound each other. It may be more accurate to speak of low-growth syndromes, in which several constraints play a role. For example, low levels of self-discovery may coexist with, or in some cases be due to, severe financial intermediation problems, so that small and medium-sized firms have very inadequate access to financial resources outside the firm.

Obstacles to Investment and Growth: What the Studies Show

General Conclusions

The thirteen country studies that were undertaken for this research endeavor allow some conclusions to be made with regard to the binding constraints on growth in Latin America and the Carib-

bean.[9] The major constraints identified by the country studies are shown in Table 1.6.

A number of generalizations can be drawn from the studies. First, not surprisingly, there is no single constraint that dominates all others across countries. The problems of competitiveness and growth are very country-specific. The binding constraints take on very specific forms in each country. Second, every country seems to be afflicted by a syndrome, rather than by a single ailment. The basic motivation behind HRV does hold: not all shortcomings bite at the same time, and policymakers need to tackle constraints in a sequence rather than every problem at once. Nonetheless, in no single country is growth held back by a single constraint. Third, binding constraints can and do change over time.

Most of the studies conclude that the main constraints faced by the countries in the region refer to the branch of the tree of low appropriability of social returns, particularly to government failures, with an important contribution from market failures (coordination and self-discovery problems). Government failures are overwhelmingly in the category of weak institutions, although poor economic policies of various kinds, a specific form of government failure, also seem to play an important role. In a sense, these findings do not depart much from the conventional view of why countries do not grow: they are held back by poor governance or poor policies.[10]

Government failure, in the form of weak institutions, is the most important category of constraint overall and the leading constraint in ten of the thirteen countries for which country studies were prepared. Weak institutions cover a wide range of problems,

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[9] The study covers Argentina, Brazil, Chile, Colombia, Ecuador, El Salvador, Guatemala, Guyana, Mexico, Nicaragua, Panama, Peru, and Trinidad & Tobago. This volume presents the cases of Argentina, Brazil, Ecuador, Guatemala, Nicaragua, Peru, and Trinidad & Tobago. The rest of papers can be found at http://www.iadb.org/res/pub_List.cfm?pub_type_id=CSI

[10] Of course, poor policies may well be due to poor governance and to political-economy issues, which highlights one of the weaknesses of the HRV framework: many constraints are interrelated and arise due to more basic causes that are usually not included in the decision tree.

TABLE 1.6 Constraints on Investment Identified in the Country Studies

Constraint	Country study
I. Low returns	
1. Weak institutions	Argentina (property rights, fiscal) Colombia (property rights in conflict areas) Ecuador (several dimensions) El Salvador (crime) Guyana (several dimensions) Guatemala (property rights, justice) Nicaragua (property rights, corruption, government effectiveness) Panama (corruption) Paraguay (corruption, regulatory quality) Trinidad & Tobago (crime)
2. Economic policy failings	Argentina (fiscal sustainability) Brazil (high and distortionary taxes) Nicaragua (fiscal sustainability) Panama (labor regulations) Trinidad & Tobago (fiscal sustainability)
3. Coordination and self-discovery issues	Guyana Chile El Salvador Nicaragua Peru Trinidad & Tobago
4. Poor infrastructure	Argentina (oil and gas underinvestment) Ecuador (transport) Colombia (transport) Guatemala (transport) Nicaragua (transport, electricity, telecom) Paraguay (transport)
5. Low human capital	Brazil Chile (quality) Guatemala
II. High cost of finance	
1. Domestic finance	Brazil (financial segmentation) Colombia Ecuador Nicaragua

Source: National studies. http://www.iadb.org/res/pub_List.cfm?pub_type_id=CSI

from corruption and crime to weak political institutions and ineffective protection for property rights, either because they are not in themselves protected legally or because the judicial system does not work or is heavily politicized.

In what represents a departure from previous studies, market failures were found to play an important role in a significant number of countries. In fact, the second most important constraint is the weakness of coordination and self-discovery, as discussed later in this chapter.

Three additional sets of constraints highlighted by the country studies are inadequate human capital; to a lesser extent, infrastructure (in the branch of the decision tree concerned with low social returns); and poor local finance (in the branch that relates to the high cost of finance). However, these are by and large of a secondary order of importance.

The next section briefly summarizes some of the constraints that impede investment in the thirteen countries included in this project. Each constraint is discussed in its order of importance in the decision tree, as indicated in the country studies. The first three are the most often flagged by the country studies. Of the six constraints discussed below, the first five belong to the low returns branch of the decision tree, and only one (poor domestic finance) refers to the high cost of finance branch.

Government Failure: Weak Institutions

The major problem in most countries seems to be government failure. Business firms do not invest because investment is unduly risky owing to poor contract enforcement, shaky rule of law, political capture of the courts, government ineffectiveness, and corruption. The case studies show that this is a problem in ten of the thirteen countries: Argentina, Colombia, Ecuador, El Salvador, Guyana, Guatemala, Nicaragua, Panama, Paraguay, and Trinidad & Tobago.

In Argentina, the lack of respect for property rights appears to be a severe problem. The recent crisis of 2001 is an example of this.

The convertibility program, which fixed the price of the U.S. dollar at one peso and adopted a currency board as the exchange rate regime, encouraged agents to engage in financial transactions denominated in dollars. When the currency board had to be abandoned at the end of 2001 and the peso was allowed to float, the government decreed a transformation of dollar debts and deposits into pesos, using different exchange rates for different types of debt. As a result, some creditors transferred massive unanticipated amounts of wealth to some debtors. Since the economy had been subjected to other such transfers in the past, it is not surprising that the two studies undertaken for this project showed that economic uncertainty related to the unpredictable application of the rule of law was one of the major constraints to investment.

Significant changes in the rules of the game that do not respond to a clear economic rationale are a milder form of violations of contractual agreements. The price setting arrangements agreed to when public utilities and oil and gas were privatized called for tariff and price adjustments that were changed unilaterally by the government following the crisis of 2001. These changes have caused large price distortions that have been partially compensated by public subsidies on an ad hoc basis. As a result, oil and gas companies have not made the investments that would have been required to keep supply expanding with demand. Meanwhile, demand has grown more than it would have, had prices risen to reflect opportunity costs.

In Colombia, the protracted civil war with the guerrillas has affected property rights in conflict areas. This may have lowered the rate of investment not only in those regions but in others as well. To a very large extent, investment and growth are dependent on whether the government can eradicate the threat posed by the armed insurrection.

The study for Ecuador shows that the major constraint on investment is a complex combination of governance problems. The country's history has been characterized by extreme political instability, with very few presidents ending their constitutional term. In addition, frequent changes to the constitution conspire against the

stability of the rule of law that is required for dynamic private investment. In addition, government effectiveness is weak, the quality of regulation is poor, and corruption is a serious problem.

Guyana, Guatemala, and Paraguay exhibit problems similar to Ecuador. By contrast, in Panama, Trinidad & Tobago, and El Salvador, the weak institutions constraint appears to be more circumscribed. In Panama, corruption is a serious impediment to growth. In Trinidad & Tobago and El Salvador, crime is the most important governance problem. Other dimensions of the governance issue seem to be not that problematic in these last three countries. Crime, of course, represents an important government failure, since a society where it is as rampant as it is in El Salvador discourages investment and imposes costs in the form of private protection services that conspire against the competitiveness of firms.

Nicaragua is another case where the governance problem is multifaceted. The changes in the fundamental model of society that the country has experienced since 1979—from market-oriented and private property–based, to socialist and government-directed, and back—certainly do not favor private investment. Although the country appears to have reaffirmed its choice for a market-oriented system respectful of private property in 1990 with the return to democracy, this has not allayed fears regarding the security of private property. In addition, the protection of property rights is weak and subject to political interpretation by the courts. Corruption and government ineffectiveness are also serious problems.

The weak government constraint is not easy to lift. Policymakers cannot improve the way institutions operate by decree. If the courts are unduly swayed by political considerations, for example, it is for a reason: there are powerful actors who benefit from the current situation. There may be other reasons why governance is defective. Weaknesses in the quality of government may be the product of low wages in the public sector or simply of the low quality of education prevailing in the country.

None of these problems is amenable to quick fixes. One solution that some countries have embraced is to carve out areas of the

economy where governance works well. An example is the creation of export processing zones in the countries of Central America and the Caribbean. In these zones, certain governance problems that affect the economy at large are solved by: the elimination of the need to waste time and resources obtaining the multiple necessary permits (and thus the need to pay bribes); and insuring the supply of electricity, the quality of ports and roads for accessing ports, the quality of customs procedures (another important source of bribes), and even property rights. Some of the studies advocate this type of solution as an intermediate step to solving the problems in an economy-wide manner.

Government Failure: Poor Policies

Government failures related to poor policies take a number of forms. In some countries, fiscal policy is clearly problematic since the current fiscal stance could well lead to fiscal unsustainability at some point in the future. This may be the case in Argentina, which depends on taxes on foreign trade that are probably not sustainable to achieve fiscal balance. Nicaragua, likewise, has not made a significant correction in its fiscal policies. Its improved fiscal position is the result of multilateral and bilateral debt forgiveness, rather than tax reform or better use of fiscal revenues. Trinidad & Tobago is overly dependent on transitory revenues from oil and gas for fiscal sustainability.

That poor policies take many forms is also revealed by the studies. For example, very high tax rates are a constraint to growth in Brazil, which has a tax burden (between 35 and 40 percent of GDP) that is higher than those of some developed countries. A cascading sales tax, the lack of coordination of tax policy between state and federal authorities, a pension system in dire need of reform, and inefficient expenditures contribute to a fiscal policy constraint in Brazil. In the case of Panama, labor regulations that are particularly onerous to employers without necessarily protecting employees seem to discourage business investment in those segments to which they apply (all sectors except the Canal, the Colón Free Zone, and the

offshore banking facilities), but especially in manufacturing and retail commerce.

Market Failure: Coordination and Self-discovery Issues

Many of the 13 countries have not been able to discover new comparative advantages, as have, for example, the fast-growing Asian countries (Korea, Taiwan, Singapore, Hong Kong, Malaysia, Thailand and, more recently, China and Vietnam). The self-discovery obstacle involves two separate market failures that must be solved by collective action. One is the paucity of investments to build new comparative advantages, because of the externalities involved in successfully developing new products for exports. The other market failure is the absence of coordination needed to establish new activities. Any self-discovery requires the coordination of private sector activities (especially those producing non-tradables) and the provision of sector-specific public goods, without which those activities simply cannot occur. Many Latin American countries have not been successful in dealing with these two dimensions of policies to promote growth and competitiveness. In others, the primary constraint—often institutional—does not even allow them to try policies of this nature.

Why Latin American countries have been unable to solve these market failures and Asian countries have again harks back to political economy issues not dealt with directly in the HRV framework. Most indicators of governance tend to be better in the Asian countries that export manufactures than in Latin American countries, at least as measured by the widely used World Bank database constructed by Kaufmann, Kraay and Mastruzzi (2006). This is another source of interdependence between constraints that is difficult to disentangle and ultimately translate into useful policy prescriptions.

Self-discovery is not an easy problem to solve in countries that are poorly positioned in the world product space. That is, many, if not most, Latin American countries produce and export goods (primary commodities with little processing or low-value garments assembled

with imported parts) that require a set of public goods (infrastructure, quality control, technological services, phytosanitary regulations, even specific forms of property rights) and suppliers of non-tradable inputs that are not very useful for the production of other goods. Put another way, the production and export of goods and services that are not being produced at present require a different set of public goods and non-tradable inputs than exists now, which renders the coordination problem a particularly difficult one to solve. In order to move to other sectors where they might develop a comparative advantage, these countries have to start building institutions and investing in sector-specific public goods basically from scratch.

Accepting the conclusions of Hausmann and Klinger (2006), the capacity of countries to engage in vigorous self-discovery ought to be positively correlated with where they are located in the product space. In other words, those countries whose production and export baskets are close to a large number of other goods that have a high value (that is, they are goods exported by higher-income countries), and that avail themselves of the opportunity to learn to produce and export those goods, ought to experience significant self-discovery and high growth rates (unless, of course, their growth is constrained by some other factor).

This is captured by the notion of "open forest," which is the number and "value" of the goods that are not being exported by a country but which are "close" to those that are already in the country's export basket. Proximity is measured by the fact that, in the international economy, countries exporting a particular good have a high probability of also exporting a set of specific other goods. The notion of "value" of any such good is measured by the weighted per capita incomes of the countries that do export those goods (PRODY).

The number and value of the products in the open forest in the countries included in this volume are shown in Table 1.7, which also includes a comparison of per capita GDP in purchasing power parity (PPP) terms and EXPY. This latter variable is the "value" of a country's export basket, where each commodity (at the four-digit level) is weighted by the average per capita GDP (in PPP terms) of

TABLE 1.7 Per Capita GDP (in PPP terms), EXPY, and Open Forest, Latin America and Selected Benchmark Asian Countries, 1980 and 2000
(in year 2000 US$; value of open forest in thousands of year 2000 US$)

	1980				2000			
	Per capita GDP (PPP)	EXPY	Open forest Number	Open forest Value	Per capita GDP (PPP)	EXPY	Open forest Number	Open forest Value
Countries in project								
Argentina	8,928	8,938	100	1,015	12,095	10,155	123	1,548
Brazil	6,752	7,774	129	1,370	7,154	11,307	144	1,833
Chile	4,776	6,254	60	584	9,132	8,160	82	1,006
Colombia	3,828	4,457	68	670	5,974	8,715	99	1,228
Ecuador	5,128	5,940	32	288	3,230	7,005	56	651
El Salvador	4,148	4,530	75	739	4,597	6,327	43	499
Guatemala	4,266	5,445	89	878	4,048	5,775	57	661
Guyana	2,389	4,999	27	251	3,922	6,355	23	256
Nicaragua	2,754	5,156	58	562	3,131	5,404	38	430
Panama	5,356	7,693	64	625	6,048	9,559	82	985
Paraguay	3,600	4,858	34	310	4,165	6,598	60	721
Peru	5,377	6,481	70	679	4,724	7,713	90	1,097
Trinidad and Tobago	10,128	8,164	21	204	9,092	9,103	30	355
Asian benchmarks								
China	873	7,436	157	1,677	3,940	11,864	144	1,890
Hong Kong	13,461	8,706	132	1,365	26,214	12,171	116	1,460
Korea, Rep.	5,394	8,844	163	1,721	16,149	13,909	133	1,663
Malaysia	4,553	5,505	55	547	8,573	13,138	80	1,001
Singapore	10,433	8,874	113	1,172	23,594	14,495	82	1,067
Thailand	2,873	5,182	106	1,063	6,321	12,157	137	1,725

Source: Hausmann and Klinger (2006) database and WDI.
Note: EXPY is a measure of the productivity level associated with a country's export basket.

the countries exporting that commodity. A finding of the literature is that countries with index values for the level of productivity in their export basket (EXPY) that are greater than their per capita GDPs tend to grow more rapidly than those with relatively low EXPYs.

How do the countries studied for this project stand in this respect? The first thing that should be noted is that the Asian countries were in a much denser part of the product space in both 1980 and in 2000. Both the number of products in the open forest and the value of the open forest were much larger than for the Latin Ameri-

can countries. That means that businesses in the Asian countries must have found it easier to jump to new products that they were not producing in either 1980 or in 2000. Second, with the exception of the more developed Hong Kong and Singapore, the other Asian countries exported a higher-value basket relative to their per capita GDPs than their Latin American counterparts.

In respect to individual Latin American countries, the situation is very heterogeneous. Argentina, Brazil, and, to a lesser extent, Colombia enjoy a favorable location in the product space, with open forests that approximate those found in Asia, both in number and value. Moreover, their open forests have been increasing in terms of the number of products and their value over time. Thus, these countries have considerable unexploited potential for self-discovery that they are not utilizing to foster growth.

The situation is quite different for Chile, Ecuador, Guyana, Peru, and Trinidad & Tobago, countries that are located in a considerably less favorable place within the world product space. Exports in these countries are concentrated in primary products, with few links to other export goods that could promote more rapid long-term growth. Therefore, the efforts at self-discovery will have to be more determined in these countries. And the risk of making costly errors (in terms of public investments in sector-specific public goods that prove to not stimulate private investment) is also larger than for other countries with more diversified export structures.

Something similar can be said for the Central American countries included in the study (El Salvador, Guatemala, and Nicaragua), which appear to be located in a very sparse region of the product space dominated by few, low-value products: in particular, the assembly of low-value garments. Moreover, this group of products is coming to be dominated by China and other lower-cost Asian producers.

Low Levels of Human Capital

Human capital appears to be a binding constraint only for Brazil, Chile, and Guatemala. In the first two countries, the problem is basi-

cally the scarcity of skilled labor; in the case of Chile, this shortage is clearly associated with the low quality of education. In Guatemala, the problem seems to be one of both quality and quantity. Guatemala has very low school enrollment levels, which are more like those in low-income countries than in the lower-middle income group to which the country belongs. The same can be said about the average years of schooling in the labor force.

The findings of the country studies are broadly consistent with the results that can be found in the vast literature on returns to education. Table 1.8 shows the returns to an additional year of education (obtained from Mincer equations) drawn from Bils and Klenow (2000) and from Hausmann and Rodrik (2006). The latter also report data on returns to completing primary, secondary, and higher education. Bils and Klenow's (2000) data are for 1988/89, and Hausmann and Rodrik's (2006) are for 1998. Guatemala exhibits the highest returns to education by any measure, making human capital scarcities a primary candidate for *the* most binding constraint. It is closely followed by Ecuador and Brazil.

TABLE 1.8 Returns to Education

	One additional year of education		Finishing (Hausmann and Rodrik, 2006)		
Country	Bils and Klenow (2000)	Hausmann and Rodrik (2006)	Primary	Secondary	Higher
Guatemala	0.142	0.136	0.841	1.347	1.991
Ecuador	0.098	0.135	0.681	1.310	1.833
Brazil	0.154	0.132	0.622	1.138	1.922
Paraguay	0.103	0.129	0.665	1.181	1.662
Peru	0.085	0.129	0.474	0.990	1.459
Chile	0.121	0.123	0.341	0.761	1.458
Colombia	0.145	0.119	0.449	0.908	1.668
Panama	0.126	0.116	0.483	1.015	1.559
Nicaragua	0.097	0.110	0.574	0.860	1.636
El Salvador	0.096	0.105	0.557	1.027	1.482
Argentina	0.107	0.091	0.422	0.789	1.127

Source: Bils and Klenow (2000); Hausmann and Rodrik (2006). Data from Bils and Klenow are for 1988/89, and from Hausmann and Rodrik are for 1998.

Even though it may not be a binding constraint today, if a country succeeds in accelerating growth, it is likely to come up against a human capital constraint. Therefore, investments in education appear to be a must in all countries that want to sustain growth beyond the spurt that lifting the current binding constraint can give them.

Poor Infrastructure

Argentina, Colombia, Ecuador, Guatemala, Nicaragua, and Paraguay could accelerate their rate of capital accumulation if they were to build more and better infrastructure. The absence of good roads and ports are a serious constraint to investment in all of the countries mentioned, with perhaps the exception of Argentina. Underinvestment in oil and gas appears to be an important constraint to future growth in Argentina.

Some of these countries, particularly Nicaragua, have serious difficulty supplying electricity to their populations and business firms. Since the shortages have occurred as a result of government policies of fixing electricity rates (at a time of rapid increases in international energy prices), the shortfalls in energy supplies are in part an economic policy and a governance problem and are related to weak institutions, the first category of constraints.

Poor Domestic Finance

As noted, the findings of the country studies indicate that, by and large, access to finance, or even the cost of finance, is not a binding constraint to private investment. Given the importance that the development literature gives to this subject, an attempt was made to corroborate this finding by looking at the World Bank's Investment Climate Surveys (ICS), available for almost all of the countries.[11] These surveys, which cover between 450 and over 1,000 firms per country, and in some countries have been administered in two or

[11] See http://www.enterprisesurveys.org/portal/.

more different years, contain a list of 18 obstacles to investment. The interviewees are asked to rank them from 0 to 4, depending on the degree to which the obstacles are effective constraints to their firms' investment decisions.[12]

The findings based on the ICS largely corroborate our country studies. Finance is not uppermost in the minds of respondents as an obstacle to investment (see Table 1.9). Respondents are apparently more concerned with other more immediate obstacles. When finance is listed as an obstacle (that is, it appears on the list of the first three most important obstacles), it is more likely to refer to cost rather than access.

In Brazil, Guyana, and Nicaragua, business people are worried about the cost of finance and place this issue among the three most important obstacles to investment. As regards access to finance, only in Ecuador and El Salvador was this as an important issue for business people, and only back in 2003. By 2006, it had disappeared from the list of the top three obstacles in these two countries.[13]

The relative unimportance of finance is perhaps not surprising in a period like the past few years, in which most countries have enjoyed ample access to external finance at favorable terms. These conditions may have hidden the shortcomings of domestic savings and financial intermediation, which may resurface in a less favorable

[12] The list of obstacles is the following: 1. telecommunications; 2. electricity; 3. land; 4. taxes; 5. tax administration; 6. customs and trade regulations; 7. labor regulations; 8. inadequately educated labor force; 9. licensing and permits; 10. access to finance; 11. cost of finance; 12. political instability; 13 macroeconomic instability; 14. economic and regulatory policy uncertainty, 15. corruption; 16. crime, theft, and disorder; 17. anticompetitive or informal practices; and 18. legal system/conflict resolution. Beginning in 2006, the cost of finance was dropped as a specific obstacle and was subsumed in a general category of access to finance.

[13] The case of Brazil illustrates an important limitation of the ICS. The survey was conducted in 2003, a year of extraordinary uncertainty due to the political transition that was primarily reflected in a large hike in country risk, interest rates, and a depreciation of the exchange rate. Thus, while interest rates are generally high in Brazil, the responses in 2003 are likely to be influenced by this extreme event. Given that the surveys are not available on an annual basis, it is very difficult to draw strong conclusions from the survey in this case.

TABLE 1.9 Access and Cost of Credit as Obstacles to Investment

	Access to credit		Cost of credit	
Country and Survey Year	Average score	Rank	Average score	Rank
Argentina 2006	1.637	5	—	—
Brazil 2003	2.579	5	3.253	2
Chile 2004	1.123	4	1.020	5
Chile 2006	1.145	6	—	—
Colombia 2006	1.528	6	—	—
Ecuador 2003	1.811	3	1.800	4
Ecuador 2006	1.433	5	—	4
El Salvador 2003	1.361	3	1.359	4
El Salvador 2006	1.367	6	—	—
Guatemala 2003	1.632	6	1.890	4
Guatemala 2006	1.193	6	—	—
Nicaragua 2003	2.227	4	2.443	2
Nicaragua 2006	1.240	4	—	—
Panama 2006	0.753	6	—	—
Paraguay 2006	1.536	4	—	—
Peru 2002	2.013	4	2.428	3
Peru 2006	1.333	6	—	—
Guyana 2004	1.361	5	2.380	1

Source: World Bank, *Investment Climate Surveys*, http://www.enterprisesurveys.org/portal/

Note: Answers to the question: To what extent are access and cost of credit obstacles to investment? Scores are: not an obstacle (0), a minor obstacle (1), a moderate obstacle (2), a major obstacle (3), or a very severe obstacle (4). Rank refers to ordering of the obstacle in a list of 18 obstacles (17 for 2006).

— not available

external financial environment, as explicitly noticed in the Brazil study.[14] It could also be that finance will become a binding constraint if and when investment picks up.

This issue, like most of those discussed in this book, is a complex one. When a study comes to the conclusion that a country's problem is one of self-discovery, this could be for a very large number of reasons: the exchange rate does not favor investment in new tradables, coordination problems have not been solved, or firms and

[14] As of the time this book was being edited, the prospect of a global financial and economic crisis makes the return of a binding financial constraint in most countries in the region a distinct possibility in the short term.

individuals with good ideas do not have access to financing. This is another example of possible interactions between binding constraints, something GDM does not explicitly take into account.

Finally, the financial constraint is relative. All firms in all economic environments are potentially constrained by their access to external financial resources. The pioneering articles of Stiglitz and Weiss (1981) and Fazzari, Hubbard, and Petersen (1988) put this issue on the table. For Latin America, Schiantarelli and Galindo (2003) showed the multifaceted nature of the problem. Therefore, the finance problem should be framed in terms of the extent to which business firms in a particular environment, given their degree of financial development, are constrained in investing by a lack of access to financial resources from outside the firm. In addition, the question to ask is, who in that environment is financially constrained and to what extent? Since small and new firms are the ones likely to engage in self-discovery, the finding that these firms experience greater restrictions in their access to finance could be important in explaining why there are, generally, such low levels of self-discovery activity in most developing countries. In other words, small firms in all countries are probably finance-constrained, with adverse consequences for economic development.

References

Agosin, M., and Huaita, F. 2008. "Why Emerging Economies Should (Still) Concern Themselves with Capital Inflows." Working paper No. 268. Santiago, Chile: Department of Economics, Universidad de Chile.

Berg, A., Ostry, J.D. and Zettelmeyer, J. 2008. "What Makes Growth Sustained?" Working paper No. 08/59. Washington, DC: International Monetary Fund.

Bils, M. and Klenow, P. 2000. "Does Schooling Cause Growth?" *American Economic Review*. 90: 1160–83.

Blyde, J., and Fernández-Arias, E. 2005. "Why Latin America is Falling Behind." In: E. Fernández-Arias, R. Manuelli, and J. Blyde, editors. *Sources of Growth in Latin America: What is Missing.* Washington, DC: Inter-American Development Bank.

Blyde, J., Daude, C. and Fernández-Arias, E. 2008. "Output Collapses and Productivity Destruction." Working paper No. CSC-08-003. Washington, DC: Inter-American Development Bank

Easterly, W. and Levine, R. 2001. "It´s Not Factor Accumulation: Stylized Facts and Growth Models." *World Bank Economic Review*. 15: 177–219.

Fazzari, S.M., Hubbard R.G., and Petersen, B.C. 1988. "Financing Constraints and Corporate Investment." *Brookings Papers on Economic Activity.* 1:141–95.

Hall, J. and Jones, C., 1999. "Why Do Some Countries Produce So Much More Output per Worker than Others?" *Quarterly Journal of Economics*. 114: 83–116.

Hausmann, R. and Klinger, B. 2006. "Structural Transformation and Patterns of Comparative Advantage in the Product Space." Working paper No. 128. Cambridge, MA: Center for International Development, Harvard University.

Hausmann, R. and Rodrik, D. 2003. "Economic Development as Self-discovery." *Journal of Development Economics*. 72: 603–33.

———. 2006. "Doomed to Choose: Industrial Policy as Predicament." Cambridge, Massachusetts: John F. Kennedy School of Government, Harvard University. Unpublished document.

Hausmann, R., Hwang, J. and Rodrik, D. 2005. "What You Export Matters" . Working paper No. 123. Cambridge, Massachusetts, United States: John F. Kennedy School of Government, Harvard University.

Hausmann, R., Rodrik, D. and Velasco, A. 2005. "Growth Diagnostics." Cambridge, MA: John F. Kennedy School of Government, Harvard University.

Kaufmann, J., Kraay, A. and Mastruzzi, M. 2006. "Governance Matters V: Governance Indicators for 1996–2005." Policy research working paper No. 3450. Washington, DC: World Bank.

Klenow, P., and Rodríguez-Clare, A. 2004. "Externalities and Growth." Working paper No. 11009. Cambridge, MA: National Bureau of Economic Research.

Prescott, E.C. 1988. "Needed: A Theory of Total Factor Productivity." *International Economic Review*. 39: 525–52.

Rajan, R., and Zingales, L. 1998. "Financial Dependence and Growth." *American Economic Review*. 88: 559–86.

Schiantarelli, F. and Galindo, A., editors. 2003. *Credit Constraints and Investment in Latin America*. Washington, DC: Latin American Research Network, Inter-American Development Bank.

Stiglitz, J.E., and Weiss, A. 1981. "Credit Rationing in Markets with Imperfect Information." *American Economic Review*. 71: 393–410.

UNCTAD, *Handbook of Statistics, 2007*. (http://stats.unctad.org/Handbook/TableViewer/tableView.aspx?ReportId=1687).

World Bank. Various years. Investment Climate Surveys. http://www.enterprisesurveys.org/portal/.

World Bank. Various years. *World Development Indicators*. Washington, D.C.: World Bank.

World Bank. Various years. *World Development Report*. Washington, D.C.: World Bank.

CHAPTER 2

Identifying the Most Binding Constraints to Growth and Competitiveness in Argentina

Gabriel Sánchez and Inés Butler[*]

Current and Past State of the Economy

Argentina in the Medium Run

Argentina's growth performance in the medium run has been very poor, especially since 1974, when it started to diverge from world trend growth, as proxied by the United States per capita growth (see Figure 2.1). While world trend growth has been an average of 0.4 percent a year per capita since then, Argentina's growth has fluctuated at much lower levels.

As a result, Argentina has increasingly fallen behind many relevant comparator countries, including some in Latin America.[1]

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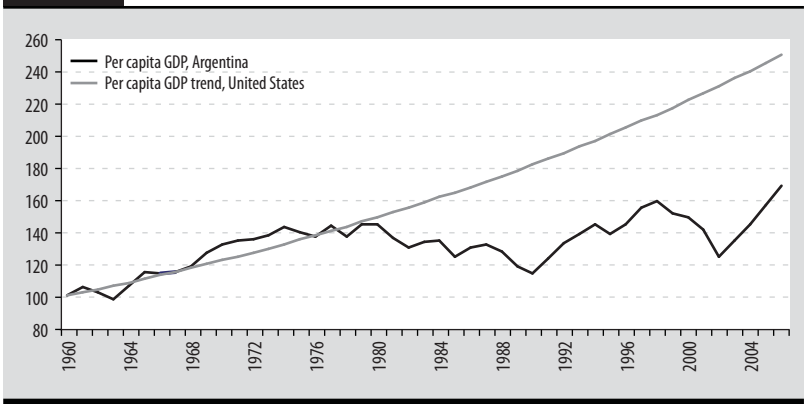
[*] Gabriel Sánchez and Inés Butler are with IERAL (Instituto de Estudios sobre la Realidad Argentina y Latinoamericana)-Fundación Mediterránea. The authors are very grateful to Joaquín Berro-Madero, Delfina Cavanagh, Ignacio Fernández-Dussaut, Guadalupe González, and Eliana Miranda for their research assistance, and to María Laura Alzúa for her useful advice and suggestions on human capital and econometrics issues. Mauro Alem was a key contributor to the analysis of financial constraints. The authors also thank Christian Daude, José María Fanelli, Eduardo Fernández-Arias and the participants at the IDB Workshops on Competitiveness and Growth in Latin America for their useful comments and suggestions.

[1] While Argentina's per capita GDP in 1960 was 60 percent that of the United States, and much greater than the per capita GDPs of Japan, East Asia (excluding

FIGURE 2.1 Real Per Capita GDP and the Long-run Trend, Argentina versus World, 1960–2006
(1960 = 100)



Source: IERAL based on Ministerio de Economía.

This divergence from world growth is contrary to what has been observed for most countries (Klenow and Rodríguez-Clare, 2005). While Argentina's slowdown in productivity since 1975 has been shared by most Latin American economies, except for Chile and the Dominican Republic (Solimano and Soto, 2004), Argentina's slowdown has been more pronounced.

Argentina in the Short Run

Not only has trend growth been very low since 1974, but there has also been remarkable volatility in short-run growth. Between 1960 and 2002, Argentina has had 18 years of growth crisis (defined as years of negative growth by Solimano and Soto, 2004). Fourteen of those crises took place between 1975 and 2002.

At times, Argentina has managed to ignite brief periods of recovery to potential trend output (as defined by U.S. trend growth).

China), Latin America, and the world, by 2006 per capita income had fallen to 30 percent relative to the United States, 44 percent relative to Japan, 53 percent relative to East Asia, and had lost very significant relative ground vis-à-vis Latin America and the world (World Bank, World Development Indicators, WDI).

However, these takeoffs have never materialized into bigger trend growth or sustained growth accelerations. Using the metrics defined by Hausmann, Pritchet and Rodrik (2004), this study identifies two unsustained accelerations in the past few decades: 1960–74, and 1991–98.[2] The second acceleration was followed by the 1999–2002 collapse, when per capita income fell 27 percent. Following this collapse, another acceleration began in 2003. It remains to be seen whether it will be sustained, with per capita GDP growing at an average annual rate of 7 percent and per worker GDP growing at 3 percent on average.[3]

Hausmann, Pritchet and Rodrik (2004), Jones and Olken (2005), and Solimano and Soto (2004) have identified the roles played by different variables in triggering growth accelerations and in making them sustainable regime shifts toward greater trend growth. A comparison of the growth episodes in Argentina with those analyzed by these authors suggests that Argentina's growth spurts appear to have been short-run fluctuations around a low medium-run trend caused by changes in the terms of trade, financial liberalization, global financial shocks, and domestic adjustments to fiscal and external imbalances (see Table 2.1).[4] These triggers are typical of the

[2] Hausmann, Pritchet and Rodrik (2004) define "growth accelerations" as episodes where growth is greater than 3.5 percent per year for eight years, and accelerates by 2 percent per year or more on average (relative to the previous six or eight years on average). Additionally, post growth output must exceed the pre-episode peak. They also distinguish between sustained and unsustained accelerations.

[3] Growth exceeded 3.5 percent per year from 2003 to 2008. The growth acceleration has been 8.5 percent per year for 2003–06 (7 percent growth on average), compared to –1.6 percent growth on average for 1994–98. The pre-episode peak (in per capita terms) of 1998 was surpassed by the end of 2006.

[4] The onset of the 1991–98 episode featured a current account reversal from a large surplus (that financed a big capital outflow) during 1988–90, together with positive terms of trade and global financial shocks. The continuing presence of a large current account deficit during this period, together with a worsening fiscal deficit and a fixed exchange rate, increased the probability of a new current account reversal, which finally occurred after 1999 in a context of contagion from similar reversals in neighboring countries and negative global financial shocks. Growth resumed in 2003 after the large fiscal and external adjustments of 2001–2, when Argentina was also favored by positive terms of trade and global financial shocks.

TABLE 2.1 Quantities and Prices of Potentially Binding Constraints on Investment, 1991–2006

	1991–98		1999–2002		2003–06		1991–2006
I/GDP (%)	Average period	19.0	Average period	16.0	Average period	18.4	18.1
	Avg (1988–90)	16.7	1999	19.1	2002	11.3	
	1991	15.9	2001	15.8	2003	14.3	
	1998	21.1	2002	11.3	last available	21.7	
National savings/GDP (%)[a]	Average period	16.4	Average period	15.6	Average period	21.4	17.3
	Avg (1988–90)	—	1999	13.6	2002	20.1	
	1991	—	2001	14.2	2003	19.7	
	1998	16.1	2002	20.1	last available	23.7	
Public investment/ GDP (%)[a]	Average period	1.58	Average period	1.16	Average period	1.72	1.48
	Avg (1988–90)	—	1999	1.67	2002	0.73	
	1991	—	2001	1.11	2003	1.21	
	1998	1.63	2002	0.73	last available	2.23	
Real exchange rate	Average period	1.03	Average period	1.17	Average period	1.88	1.28
	Avg (1988–90)	2.32	1999	0.88	2002	2.03	
	1991	1.22	2001	0.88	2003	1.87	
	1998	0.97	2002	2.03	last available	1.85	
Current account/ GDP (%)	Average period	–3.0	Average period	0.0	Average period	3.8	–0.5
	Avg (1988–90)	3.5	1999	–4.2	2002	8.9	
	1991	–0.1	2001	–1.4	2003	6.4	
	1998	–4.8	2002	8.9	last available	3.8	
Capital account/ GDP (%)	Average period	4.9	Average period	–1.4	Average period	–0.5	1.9
	Avg (1988–90)	–3.1	1999	4.9	2002	–11.6	
	1991	4.0	2001	–2.0	2003	–2.5	
	1998	6.1	2002	–11.6	last available	–2.7	
Total external debt/ export (%)	Average period	508.9	Average period	619.3	Average period	393.0	507.5
	Avg (1988–90)	598.2	1999	653.9	2002	609.7	
	1991	528.3	2001	624.8	2003	556.9	
	1998	558.4	2002	609.7	last available	235.9	
Fiscal result/ GDP (%)	Average period	–1.0	Average period	–2.2	Average period	1.7	–0.6
	Avg (1988–90)	–3.1	1999	–1.7	2002	–1.5	
	1991	–0.4	2001	–3.2	2003	0.5	
	1998	–1.4	2002	–1.5	last available	1.8	
Credit to non financial private sector/GDP (%)[b]	Average period	17.5	Average period	20.8	Average period	8.6	16.1
	Avg (1988–90)	—	1999	23.3	2002	15.8	
	1991	11.2	2001	21.3	2003	8.4	
	1998	21.4	2002	15.8	last available	9.7	

(continued on next page)

TABLE 2.1 Quantities and Prices of Potentially Binding Constraints on Investment, 1991–2006

	1991–98		1999–2002		2003–06		1991–2006
Credit (excluding consumption)/ GDP (%)[c]	Average period	17.6	Average period	17.8	Average period	6.9	13.4
	Avg (1988–90)	—	1999	20.2	2002	13.7	
	1991	—	2001	18.0	2003	7.3	
	1998	18.7	2002	13.7	last available	7.2	
Labor income/ GDP (%)[a]	Average period	38.5	Average period	39.5	Average period	36.3	38.3
	Avg (1988–90)	—	1999	40.7	2002	34.6	
	1991	30.8	2001	42.1	2003	34.3	
	1998	38.3	2002	34.6	last available	38.6	
Real active interest rate	Average period	9.3	Average period	18.7	Average period	0.2	9.4
	Avg (1988–90)	—	1999	11.6	2002	23.9	
	1991	—	2001	27.5	2003	4.3	
	1998	9.6	2002	23.9	last available	–3.5	
Net interest margin[d]	Average period	3.4	Average period	6.9	Average period	4.4	4.8
	Avg (1988–90)	—	1999	3.2	2002	10.9	
	1991	—	2001	10.5	2003	8.7	
	1998	3.2	2002	10.9	last available	2.5	
Country risk	Average period	718.0	Average period	2160.8	Average period	3463.4	2579.4
	Avg (1988–90)	—	1999	718.3	2002	5713.4	
	1991	—	2001	1542.6	2003	5572.4	
	1998	718.0	2002	5713.4	last available	2721.5	

Source: IREAL-Fundación Mediterránea based on Statistics Insitute (INDEC) and Central Bank of Argentina (BCRA).
— not available
RER = real exchange rate WL = labor income
a. 1993–2005. b. 1991–2006. c. 1997–2006. d. 1994–2006. e. 1998–2006.

unsustained liberalizations identified by Hausmann, Pritchet and Rodrik (2004). None of these accelerations displayed the increases in investment, total factor productivity (TFP) growth, trade, and manufacturing that are associated with sustained accelerations and regime shifts.

For instance, during the 1991–98 unsustained acceleration, the investment rate rose only 9 percent compared to the previous four years, much less than the 16 percent benchmark in Hausmann, Pritchet and Rodrik (2004). In addition, the trade share increased only 5.6 percent relative to the previous growth phase, much less

than the average 13 percent increase that Jones and Olken (2005) find in the immediate five years after the regime break.

The current episode is still characterized by insufficient increases in trade relative to GDP (1.7 percentage points, pp), in manufacturing and in the investment rate (15 percent) to qualify as a typical sustained acceleration. In addition, it was triggered by a combination of a positive terms of trade shock, a global financial shock, and the boost to domestic savings given by the real exchange rate devaluation and public debt restructuring, which countervailed the backlash on reform and a partial reversal in financial liberalization. The expansion is currently being led by highly procyclical fiscal and monetary policies, which may undermine the availability of savings. Hence it still looks more like a typical unsustainable acceleration.

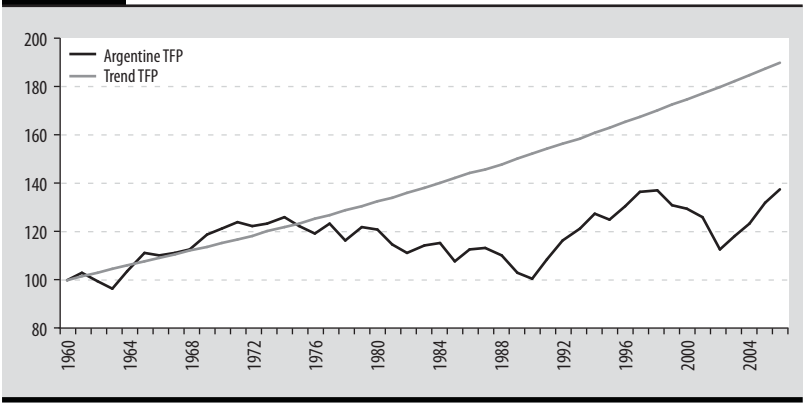
Sources of Growth

A growth accounting exercise yields the observation that the very poor per worker GDP growth between 1960 and 2006 (0.8 percent per year) was driven mostly by a very low TFP growth (which accounted for 85 percent of growth), with a very modest contribution of investment per worker.[5] Indeed, TFP shows a growing divergence from the world technology frontier (proxied by U.S. TFP) since the mid-1970s (see Figure 2.2). Argentina has experienced a huge productivity slowdown: productivity in 2006 was only 8 percent greater than in 1974 and 63 percent greater than in 1960.

Since 1980, a trend decline in capital per worker has occurred (see Figure 2.3). This made a negative contribution to growth during the mediocre growth era of 1991–2006. During this period, 120

[5] The contribution of TFP is reduced to 33 percent of per worker output growth if the growth of human capital per worker is introduced to the sources-of-growth analysis. Human capital per worker is calculated using $H = hL = \exp(\phi s)L$, where $\phi = 0.085$ is the Mincerian return to schooling estimated by Psacharopoulos and Patrinos (2002), and s is the years of schooling for the population 25 and older, obtained from Barro and Lee (2000).

FIGURE 2.2 TFP and Long-run Trend, Argentina versus United States, 1960–2004
(1960 = 100)



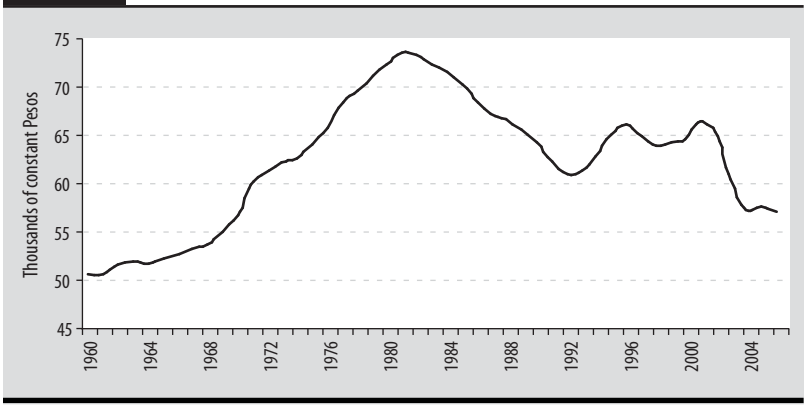
Source: IERAL based on Mecon.

percent of per worker growth was explained by the sluggish TFP growth—which did not suffice to compensate for the observed reduction in capital per worker.[6]

During the recent growth and collapse episodes, changes in factor utilization have played a leading role in explaining the growth fluctuations, whereas TFP growth—and, especially, investment—played a much lesser role than in the growth regime transitions identified by Jones and Olken (2005) and Solimano and Soto (2004). For instance, during the shift from the 1999–2002 collapse to the current growth acceleration, the increase in TFP growth explains 46 percent of the growth acceleration, while the decline in capital per worker accounts for –46 percent. Increased capital and employment utilization jointly explain 100 percent of the growth acceleration. This does not fit the finding of Jones and Olken (2005) that in the short run (five years after the regime shift), increased TFP growth explains 83 percent of a typical sustained acceleration, while capital per worker accumulation explains only 7 percent. These findings are consistent with the observed insufficient increase in productivity-

[6] When an adjustment is made for human capital per worker, TFP growth during 1991–2006 declines to 1.16 percent per year.

FIGURE 2.3 Capital per Worker, 1960–2006
(thousands of constant pesos)



Source: IERAL-Fundación Mediterránea based on Mecon.

enhancing activities (trade and manufacturing) compared to the typical sustained accelerations.

Hence this study is concerned with identifying the most binding constraints on investment and on productivity-enhancing activities that hinder the shift to bigger trend growth regimes both in the short and the medium runs.[7] Whether the biggest payoffs for growth will come from boosting investment or productivity-enhancing activities or both is also analyzed.

Identification of the Most Binding Constraints on Growth

The approach in this study differs from Hausmann, Rodrik and Velasco (2005) in that these authors focus on the role of investment in a neoclassical growth model with exogenous technical change. Here the analysis is based instead on a Schumpeterian growth model with endogenous technological change, such as the ones proposed by Howitt (2000) and Klenow and Rodríguez-Clare (2005), in which

[7] Argentina was not alone in this lackluster investment and TFP performances. Solimano and Soto (2004) find a decline in capital accumulation in 1980–2002 in all Latin American countries except Chile. They also find that most of the decline in growth in Latin America during that period is associated with declining TFP.

investment in physical capital and in the accumulation of knowledge are distinct, but complementary decision variables chosen to optimize long-run welfare. Hence there is a need to consider separate trees for productivity-enhancing activities. The latter include: structural transformation of exports toward activities with greater income content (as defined by Hausmann, Hwang and Rodrik, 2005) and/or greater technological convergence possibilities (as defined by Hwang, 2006); and research and innovation.

Binding Constraints on Investment

Research shows that the most binding constraints on investment are poor infrastructure and low appropriability of returns arising from both government and market failures. If these constraints were alleviated and investment was to increase significantly, then two latent constraints would become binding: low access to international finance and poor financial intermediation.

Infrastructure

Argentina faces binding constraints on investment in the areas of generation, transportation and distribution of energy, and transportation infrastructure. By contrast, telecommunications and information infrastructure, while lagging behind developed country standards, are ahead of most Latin American countries—although the sluggish investment in this sector since devaluation in 2001 is worrisome.

Transportation infrastructure

Argentina fares relatively well vis-à-vis other Latin American countries in terms of indicators such as paved roads per km^2, railroad lines per km^2, port efficiency, and airfreight per capita. However, South American countries fare very poorly relative to developed countries and to middle-income European countries (see De Ferranti et al., 2002). In addition, Argentina has significantly less paved roads and railroads per km^2 than larger surface industrialized countries such

as the United States.[8] If the "price" of transportation is proxied by the average international transport costs (proxied by the ratio between CIF and FOB prices that the International Monetary Fund proposes), De Ferranti et al. (2002) show that Argentina's transportation costs are 24 percent lower than the South American average, but 77 percent higher than the developed countries average. While a large part of these high transportation costs can be attributed to distance (Argentina is the Latin American country that is farthest from major markets), its transportation costs are 63 percent higher than for Uruguay, which is almost as far from major markets as Argentina but has much more efficient ports (see De Ferranti et al., 2002). Hence transportation infrastructure appears to be "scarce." Further support for the conclusion that transportation infrastructure is currently scarce in Argentina can be found in the investment/amortization ratio of Argentine public offer firms in the area of transportation services, which has fallen from 406 percent in 1998 to less than 100 percent since 2003, and reached a minimum of 10 percent in 2006.

Information and telecommunications infrastructure

Argentina exceeds the South American average for information and telecommunications (ITC) infrastructure (telephone mainlines per capita, cellular phone lines per capita, personal computers per capita), but lags behind the average of developed countries. The cost of access to internet broadband services (the proxy used in this study for the "price" of telecommunications infrastructure) is cheaper than, or at least as cheap as, in the rest of Latin America. When the different indicators of quantity and prices of ITC infrastructure for different countries are plotted, Argentina's indicators are better or equal than

[8] For instance, Argentina has only 0.17 km of paved roads per km^2, more than large-surface Latin American countries such as Brazil (0.11) but less than Mexico (0.6), and much less than France (1.81), the United Kingdom (1.54), Spain (1.32), or the United States (0.67), which has a much larger surface. Additionally, Argentina only has 0.97 km of railroads per km^2, more than Brazil (0.4), but less than Mexico (1.4), and significantly less than France (5.4), the United Kindgom (7.06), Spain (2.74), the United States (1.51), and Turkey (1.11) (World Bank, World Development Indicators).

those expected for its level of development. However, the investment/amortization ratio of Argentine public offer telecommunications firms has been below 50 percent since 2003, much less than the 102 percent observed in 1998, raising concerns about the future availability of an adequate telecommunications infrastructure.

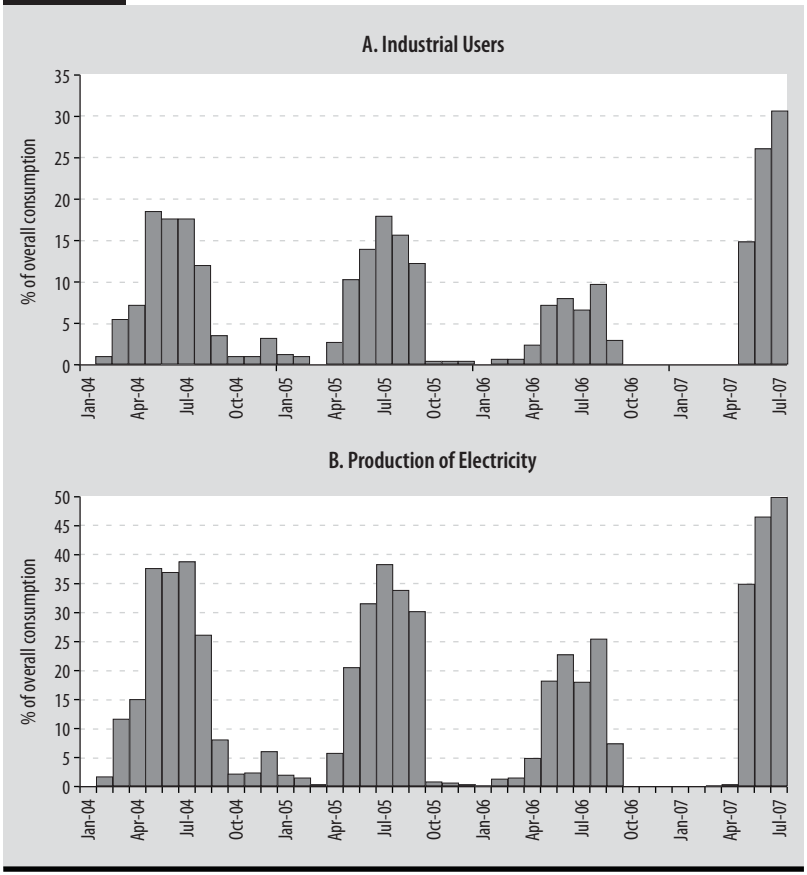
Energy

Argentina faces bottlenecks at the levels of production, transportation, and distribution of energy (electricity, natural gas, liquid fuels)—especially liquid fuels, which have generated shortages in the supply of energy to business firms. Figure 2.4 illustrates the very large demand rationing for natural gas that occurs during demand peaks. While prices of energy to manufacturing firms have been rising, energy prices in Argentina are still distorted by various policies. Energy prices do not reflect the true scarcity of this factor and have promoted overuse. For instance, in 2004 Argentina had the cheapest electricity of the entire region, even though it has frequently imported electricity from Brazil and Paraguay.[9] The price distortion is reflected in the conspicuous decline in the investment/amortization ratio for public-offer firms in the energy sector since 2002. This is especially true for the electricity companies, whose investment/amortization ratios have fallen from 264 percent in 1998 to less than 75 percent since 2003.

The distortions in energy prices subsidized investment by manufacturing firms between 2003 and 2005, but the discretionary increases in these prices for industrial activities since 2006, together with frequent energy rationing, have changed the subsidy to an implicit tax. As a result, there has been a reversal in the pattern of investment across manufacturing industries. While more energy-intensive industries expanded their capacity to a greater extent in the 2002–06 period, since 2006 the restriction on energy use had become

[9] According to OLADE (Organización Latinoamericana de Energía), the price of electricity for industrial firms in Argentina (US$3.07 per KWh) was the lowest in Latin America: lower than in Paraguay (3.92) and Brazil (4.42), and much lower than in Chile (5.75), Mexico (7.46), and Peru (7.49).

FIGURE 2.4 Natural Gas Demand Rationing, 2004–7
(percent of overall consumption)

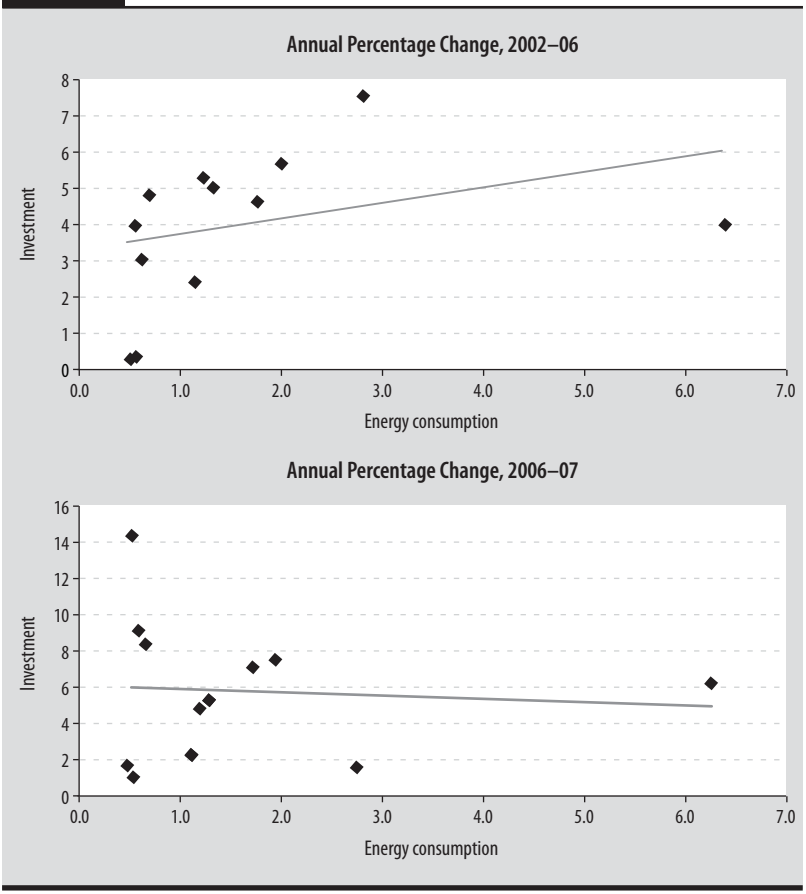


Source: IEREAL-Fundación Mediterránea based on RD-Consultores.

binding and those industries have expanded their capacity less (see Figure 2.5). Hence while energy infrastructure was not binding until 2005, it has become a binding constraint since then.[10]

[10] This is reflected in the shortages in the provision of natural gas and electricity to the manufacturing sector during the winter of 2007. Shortages are likely to recur at times of extreme temperatures. For instance, these shortages led to a significant manufacturing production slowdown during July 2007, when output grew only 2.3 percent year-on-year, much less than in the first half of 2007 (6.4 percent) and the second half of 2006 (8.8 percent). This slowdown was greatest for energy-intensive activities such as the production of chemicals and automobiles.

FIGURE 2.5 Investment and Energy Consumption by Industry



Source: IERAL-Fundación Mediterránea based on MIPAr-97 and INDEC.

Infrastructure was not a binding constraint during the unsustained acceleration of 1991–98 and did not cause the 1999–2002 growth collapse. Privatizations and massive investments in this area during that decade contributed to an adequate provision of infrastructure. However, infrastructure was a binding constraint on growth during the 1980s, when energy shortages were frequent and public utility companies were run by the government, and prices were set in a distortionary fashion using political-economic criteria in an attempt to tame inflation (see Givogri, 1990).

Low Appropriability

The other most binding constraint on investment is the inability to appropriate the private and/or social returns to investment adequately because of microeconomic risks arising from government failures and because of market failures.

Microeconomic risks

Institutional failures that introduce covert and discretionary taxes on capital and reduce the ability of private firms to appropriate the private returns of their endeavors are a binding constraint to investment in Argentina. This result is supported by the comparison of international indicators of institutional quality. It is also supported, although indirectly, by econometric analyses of two factors. The first is the negative effects on investment of the "regime change" that followed the abandonment of the convertibility regime and its associated rules and institutions. The second is the limited ability of Argentine firms to capture a greater market value from their investment in intangible assets and the negative impact of this low pass-through on their investments in physical assets. Narrative analytics based on the literature of institutional development of Argentina also lend support to this hypothesis, and suggest that poor institutional design is at the root of both macroeconomic and microeconomic risks.

Argentina has always scored very low in institutional quality indicators such as the World Bank Governance Indicators of rule of law and control of corruption, which are usually found to be strong predictors of growth. Its relative standing has deteriorated significantly since 2002 (see Table 2.2). Argentina also scores very poorly in respect to most of the institutional quality indicators of the Heritage Foundation's Economic Freedom Ranking, and especially the property rights indicator.

This unfavorable change in ranking is consistent with the contract violations and discretionary changes in policies and institutions during the 2001–02 crisis and recent years, which have included

TABLE 2.2 Governance Indicators, 1998 and 2005

Country	Rule of Law						Control of Corruption					
	2005			1998			2005			1998		
	Est.	S.E.	N.	Est.	S.E.	N.	Est.	S.E.	N.	Est.	S.E.	N.
Argentina	–0.56	0.13	15	0.06	0.18	11	–0.44	0.14	12	–0.29	0.19	10
Brazil	–0.41	0.13	15	–0.17	0.18	12	–0.28	0.14	11	0.03	0.19	11
Chile	1.20	0.13	15	1.18	0.18	11	1.34	0.14	12	1.13	0.19	10
China	–0.47	0.13	15	–0.35	0.19	10	–0.69	0.12	12	–0.20	0.17	9
Colombia	–0.71	0.13	16	–0.72	0.18	12	–0.22	0.14	13	–0.67	0.19	11
India	0.09	0.13	14	0.13	0.18	11	–0.31	0.12	12	–0.24	0.16	11
Spain	1.13	0.14	12	1.33	0.20	10	1.34	0.15	10	1.52	0.21	9
United States	1.59	0.14	11	1.66	0.20	10	1.56	0.15	10	1.89	0.21	8

Source: World Bank, Governance Indicators, 2006.
Est. = estimate
S.E. = standard error
N = number of sources

price controls, deposit freezes, the "pesification" of public and private debts with domestic residents,[11] discretionary distortionary changes in labor market regulations, reneging on contracts in the area of public utilities, and uncertainty regarding court decisions related to work-related illnesses and accidents. Some of these risks of low appropriability may be endogenous and associated with macroeconomic instability, but others arise from poor institutional design and may be binding constraints at all times.

This study also constructed a market-based measure of the degree of appropriability of returns to investment in Argentina, which is based on the literature on the market valuation of research and development (R&D) and investment in other intangible assets by individual firms (Cockburn and Griliches, 1988; Hall and Oriani, 2004). This literature derives a regression equation for the market valuation of a firm (Tobin's Q) as an increasing function of its investments in R&D and in other intangible assets relative to its investment in tangible assets. In this framework, a low market valuation

[11] By executive decree billions of US dollar-denominated bank deposits were converted into pesos.

of the investment in R&D signals a low appropriability of the social returns to this activity arising from poorly functioning intellectual property rights and other spillovers. Low appropriability of private returns arising from government failures will also reduce the market valuation of the investment in intangibles such as trademarks, licenses, patents, and advertising. In the case of Argentina, separate data are not available for capitalized R&D expenditures and other intangible assets. The estimation in this study thus provides a joint measure of low appropriability due to microeconomic risks and market failures.[12]

This equation was estimated using a panel of public offer firms with yearly data for 1990–96. A very small elasticity (0.014) of market valuation to intangible assets was found: much smaller than the elasticities estimated for several European Union (EU) countries by Hall and Oriani (2004), which range from 0.11 to 0.36. Hence appropriability of the returns on investments in intangible assets appears to be small in Argentina. The elasticity was bigger and statistically more significant in 1991–2001 than in 2003–06. This result reveals that appropriability was low before the 2001–02 macroeconomic crisis, and even lower after that.

Since data on "prices" of appropriability are not available, econometric analysis was used to measure the impact of low appropriability on investment in physical assets. This is a complicated challenge, as a panel data set is not available that includes both investment by Argentine firms or industries and the exogenous appropriability shocks or threats of expropriation that these firms face. Hence more indirect procedures were used to gauge the effects of low appropriability on investment.

In the time series regression analysis of the determinants of aggregate investment during 1993–96, the hypothesis of a structural

[12] The exercise involves estimating the following regression equation: $\log(q_{it}) = \lambda_t + \mu_i + \delta\log[K_{it}/A_{it}]$, where q_{it} is firm i's Tobin's Q, A_{it} is tangible capital, K_{it} is intangible capital and δ is its shadow value, λ_t is an overall market index, and μ_i is a firm-specific component. The Tobin's Q is measured as [(total assets – capital stock) + market capitalization]/total assets].

break after the first quarter of 2002 cannot be rejected. This would support the view that there was a regime change for the behavior of investment. The introduction of a 2003–06 dummy variable in the time series regressions that proxies for this regime change yields a negative, significant, and robust coefficient, which is also very significant in economic terms. Holding everything else constant, the investment rate could now be up to 28 percent higher than it is currently if the regime change had not occurred. While this dummy variable could be capturing a lot of different things, its effect is nevertheless consistent with the observed changes in the perceived protection of property rights, rule of law, market valuation of intangibles, and other institutional quality indicators.

Next consider the effect that the degree of appropriability of the returns on intangible assets (elasticities of market value to investment in intangible assets) has on the investment in fixed assets by public offer firms.[13] This approach requires first estimating how appropriability varies by sector (introducing industry and size dummies), and then constructing hedonic measures of Tobin's Q for each public offer firm, which is the Tobin Q that can be expected based on the ability to capture returns on intangible assets and the size of these rents.[14] The impact of the hedonic Q was then estimated on investment at the firm level. It has a positive and significant coef-

[13] The ability to appropriate the returns from investing in entrepreneurial assets differs by industry and/or by size because of reasons related to political economy, market structure, and technology. These coefficients may differ because of the different mechanisms through which the rents that these assets generate can be effectively protected and appropriated by the firm (Rumelt, 1984; Villalonga, 2004). These mechanisms include the ability to introduce barriers to entry (technology, scale, branding, patents), to lobby for favorable policies (or the ability to protect the firm from expropriation or unfavorable discretionary policies), or to avoid the diffusion of industrial secrets. As such, matters like the legal system, industrial organization, firm size, technological characteristics of each industry, and political economy considerations may affect appropriability differently by sector.

[14] These hedonic Q measures are obtained by fitting the estimated regression equation using the observed intangible to tangible asset ratios for each firm and the sector to which it belongs, and the estimated coefficients. (For the derivation of this estimation procedure, see Villalonga, 2004.)

ficients for the hedonic Q measures, signalling that the bigger the appropriability, the bigger the investment. The result holds for both the hedonic Q's that are based on industry differences and on size differences. Hence low appropriability reflected in this synthetic measure of microeconomic risk and market failures is seen to bring down investment.

Institutions and government failures in Argentina

Several authors, using empirical analysis, or narrative analytics, or both, have found that Argentina lacks the right institutions that would secure sustainable growth and insulate the society from the voracity of politicians and rent seekers, and that institutional failures in Argentina go beyond what would be predicted by the usual determinants (Della Paolera and Gallo, 2003; Spiller and Tommasi, 2003; Mody and Schindler, 2004).

Spiller and Tommasi (2003) point out that Argentina started with an early history of wars, and peace and confederation came at the expense of overrepresentation of small jurisdictions, which generated a first instance of inadequate checks and balances. These inadequate arrangements have persisted, and in recent decades the legislature, judiciary, and bureaucracy have been ineffective in providing checks and balances.

According to these authors, no single feature of the political system can be singled out to explain distortionary policy outcomes in Argentina, which result from past historical instability, constitutional provisions, and the evolution of constitutional practices that led to an amateur legislature, an ineffective judiciary, and a weak bureaucracy. Weaknesses in the bureaucracy have arisen from the lack of long-term perspective in the bureaucracy, which has led to unclear accountability, a parallel bureaucracy that is installed by each new executive through the nomination of large numbers of political appointees, and a high turnover through frequent rotation at the ministerial and secretarial levels. As a consequence, unchecked unilateral moves by the president alternate with periodic impasses in a system where provincial governors exercise considerable veto power.

These weaknesses have been exacerbated by the transitions between military and civilian governments and the high rate of turnover of key decision makers, leading to policies that are characterized either by excess volatility or by a high degree of rigidity. In this setup, professional politicians are beholden to provincial governors, and become amateur legislators who rarely invest in the skills and knowledge required to fashion laws effectively.

An important issue is to what extent the microeconomic risks are associated with economic crises (and hence would be eliminated with macroeconomic stability) or are a more permanent feature of the Argentine economy that gets exacerbated at times of crisis. The analysis of institutional development suggests that an inadequate institutional design is at the root of both recurrent instability and expropriation risks.

Latent Constraints on Investment: The Cost of Finance

Investment in Argentina is currently financed by domestic savings, which is not a binding constraint, as there is a significant slack between both variables (the country is running fiscal and current account surpluses). However, if investment were to overcome other binding constraints and increase significantly, then domestic savings would become binding, as international finance is currently not accessible. It is also possible that domestic savings would decline because future export prices might decline and/or fiscal results might deteriorate. Should this occur, the level of domestic savings would become a binding constraint on the current investment levels.

Moreover, financial intermediation is very poor, and investment is being self-financed in the largest firms with internal funds. While real interest rates are relatively low because demand for credit is currently low, this study finds evidence that firms are financially constrained (investment is highly responsive to firms' profits and liquidity). Hence if investment were to rise significantly and/or firms' internal funds were to decline, poor financial intermediation would become a binding constraint.

Domestic Savings

Taylor (1998) shows that investment in Argentina was highly correlated with domestic savings during 1960–90 (the correlation was 0.95), and that savings were a highly binding constraint on investment, which was reflected in a high relative price of capital. During the 1990s this correlation declined to a much lower level (0.54) than during the previous three decades, thanks both to Argentina's own financial liberalization and to the increased financial globalization that started in the late 1980s. However, the correlation has returned to close to unity since 2003, associated both with the Argentine debt crisis and with the large boost in domestic savings experienced since 2002.

Low national savings appear to have been a truly binding constraint between 1991 and 2001, when high positive real interest rates and current account deficits coexisted with growing foreign indebtedness, and a growing fiscal deficit (see Table 2.1). This constraint was especially binding during 1999–2001 and lowered investment when foreign savings ceased to be available and forced a current account reversal. Low national savings appears to have ceased being a binding constraint after 2002, when domestic savings were boosted by a combination of a positive terms of trade shock, devaluation, and debt restructuring. Since then, the country has had negative real interest rates (for depositors) and low interest rates (for creditors), together with a current account surplus and a fiscal surplus.

The importance of the boost to domestic savings for improving investment is confirmed by a time series regression analysis of the determinants of aggregate investment and of investment in machinery and equipment in 1993–2006, which shows that the fiscal result has a positive, robust, and significant effect on both types of investment, while the terms of trade have a positive and significant effect on investment in machinery and equipment.[15] A counterfactual analysis

[15] There are two mechanisms through which external prices may feed into savings. First, the permanent income theory of consumption suggests that positive temporary shocks to the terms of trade would not be consumed, hence leading

using the coefficients estimated in this regression analysis reveals that if the fiscal result reverted to its 1993–2001 level, investment would decline from 21.7 percent of GDP in 2006 (at 1993 prices) to 18.5 percent of GDP. In the same vein, a reversal to the 1993–01 average terms of trade would lower the machinery and equipment investment rate by 1 percentage point (12 percent).

However, the future prospects of domestic savings are uncertain. On the one hand, public debt restructuring sizably reduced the future interest burden and financing needs, which favors future public savings. Moreover, the large complementarity with fast-growing Asian economies introduces the expectation of sustained high export prices.[16] On the other hand, all the institutional features that have generated fiscal crises in the past (lack of checks and balances on the executive branch, and the combination of fiscal decentralization with overrepresentation of smaller jurisdictions, together with large dependence of local governments on central funds and a large autonomy to borrow) remain in place, facilitating procyclical public spending that may jeopardize future fiscal sustainability and the maintenance of a depreciated real exchange rate.

International Finance

Access to foreign savings was not a binding constraint during 1991–98, when the country was running capital account surpluses (see Table 2.1). The cost of international finance (proxied by the sovereign country risk) was neither too high nor too low during this

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to greater savings. Second, the combination of higher export prices with the introduction of export taxes in 2002 generated a new source of public revenues for the central government, which are not shared with the provinces and which contribute to more than half of the primary public surplus.

[16] The average financing needs of the central government amount to 5.6 percent of GDP for 2008–09, and then decline to 4 percent for 2010–12, 2.2 percent for 2013–18, 0.5 percent for 2019–31, and 0.3 percent for 2032–45. On the other hand, the average interest payments on public debt represent 1.5 percent of GDP for 2007–10, and then decline to less than 1 percent of GDP after 2012, continuously declining until they become nil around 2040.

period, reaching its minimum value during the second half of 1997 (see Table 2.1). Poor access to foreign finance became a binding constraint during 1999–2001 when capital inflows started to decline and reverted in 2001. The country risk premium stayed high during 1998–2000 and skyrocketed in 2001.

This constraint appears to not be binding at present. Today's declining capital outflows more likely result from a low demand for international finance than from an increase in its supply. As a result, the sovereign country risk has fallen significantly since the 2001–02 debt crisis (see Table 2.1). However, this country risk is relatively expensive, as Argentina sovereign bonds face larger spreads than Brazilian and Mexican bonds.

Additionally, Argentina has always had a very high external debt/export ratio, which has made foreign financing relatively expensive (see Table 2.1). This ratio declined significantly after the foreign debt restructuring in 2004, but is still rather large, which puts a relatively high ceiling on the cost of international finance.

According to the 2007 Banco Central de la República Argentina (BCRA) statistics on private sector foreign debt, the relative importance of international finance for the private sector in Argentina has been declining steadily since 2002. Between the end of 2001 and the end of 2006, the stock of net external private debt fell by 40 percent, from 0.7 percent of GDP to 0.2 percent of GDP. The BCRA report reveals that this decline in the relative importance of private external debt is largely due to a large debt restructuring process that took place mostly in 2004. The report also shows that while Argentine firms have been mostly paying back and refinancing their outstanding debts since 2002, they are currently seeking new international financing. Foreign financing remains relatively low.

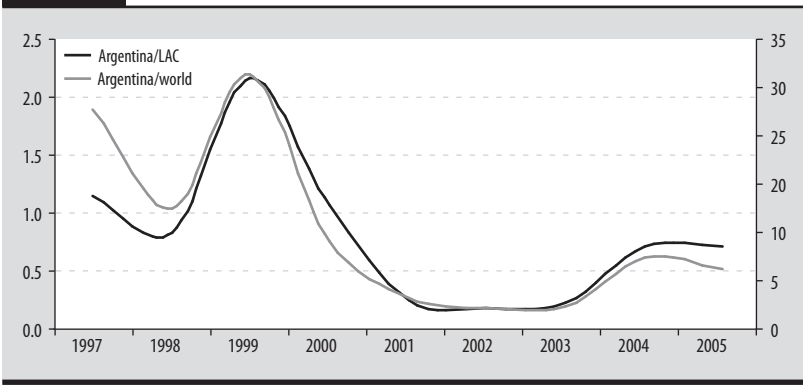
Foreign direct investment (FDI) has fallen as a share of total investment, and Argentina's shares in FDI flows to the world and to Latin America have declined significantly (see Figure 2.6).[17] This

[17] FDI relative to total investment in Argentina declined from 23 percent in 2000 to 12 percent in 2006.

is a potentially binding constraint, as Taylor (1998) has shown that FDI, together with international corporate bond equity issuance, have become the predominant forms of international financing since the 1990s.

Taylor (1998) documents how Argentina's financial autarky between 1910 and 1990 has been one of the largest hindrances to economic growth for this country. This autarky was caused by "unwilling foreign creditors in the 1910s and 1920s, capital controls in the 1930s and 1940s, capital price distortions in the 1950s and 1960s, and wayward monetary policies in the 1970s and 1980s." Taylor claims that the financial liberalization in Argentina in the 1990s, together with the financial globalization of that decade, would have helped Argentina escape from this autarky trap. However, since 2002, a backlash against Argentina's financial liberalization has occurred, with the reintroduction of capital controls, the still unsettled debt with private and sovereign creditors (some $20 billion in nonrestructured debt with private bondholders and $6 billion in outstanding debt with Paris Club members remains unsettled), and other market unfriendly interventions in financial and goods markets.

FIGURE 2.6 Argentina's Participation in FDI Flows to the World and to Latin America, 1997–2005
(percent)



Source: IERAL-Fundación Mediterránea based on Mecon.

Poor Financial Intermediation

From a quantity point of view, financial intermediation in Argentina would appear to be rather poor. Banking credit to the nonfinancial private sector and stock market capitalization are very low from an international perspective (see Table 2.3).[18] What is more, banking credit to the nonfinancial private sector is significantly smaller than it was during the 1990s, when it was already low by international standards.

TABLE 2.3 Domestic Credit, Claims on Private Sector, 2005

Countries	% GDP, 2005
Argentina	11.4
Colombia	21.1
Brazil	32.7
India	41.2
United States	57.9
Chile	70.1
Korea. Rep. of	93.5
China	112.2
Spain	146.0

Source: IERAL-Fundación Mediterránea based on IMF, International Financial Statistics.

However prices tell a different story. Argentina is experiencing very low (even negative) real interest rates and very low interest margins (see Table 2.1), suggesting that access to finance would not appear to be a binding constraint on investment currently, and that the very low intermediation results mostly from a low demand for credit. Indeed, Argentine firms' cash flows between 2003 and 2005 were historically large, helping them self-finance their investment.[19] By contrast, during the 1990s Argentina faced a rather high cost of credit (large real interest rates and net interest margins), suggesting that this was a binding constraint on growth (and probably that firms' cash flows were relatively small). This was especially true for 1999–2002.

[18] The stock market valuation in Argentina was 72 percent of GDP in 2001 and 33 percent in 2005. On the other hand, market capitalization in 2005 represented 60 percent of GDP in Brazil, 118 percent in Chile, and 136 percent in the United States.

[19] The corporate income/capital stock ratio in Argentina was 14.5 percent in 1998, 11.3 percent in 2002, and 15.5 percent in 2006.

Econometric analyses of the determinants of investment at the aggregate, industry, and firm levels yield either no effects or negative effects of the stock of credit on output from 1993 to 2006. This is consistent with the possibility that the large and expensive stock of debt (possibly greater than the optimal levels of indebtedness) that manufacturing firms had accumulated in the predevaluation period generated very large financial costs that prevented the allocation of internal funds to the financing of investment. Under this interpretation, the devaluation and pesification of corporate debts in 2002 (which has since generated a large decline in the credit/GDP ratio) may have yielded significant financial relief to manufacturing firms, which facilitated the self-financing of their investments in the short run.

On the other hand, all the regression analyses of this study show a positive and significant effect of current sales and profits on investment, which is usually associated with financial constraints on investment. Hence this study tested formally for the possible existence of these financial constraints. To this end, panel data regressions were run for the determinants of investment in net fixed assets using annual data from financial statements of public offer firms for 1990–2006. The regressors include, in addition to variables related to profit maximization, financial variables such as cash flow or leverage in the investment equation, as proposed in Fazzari, Hubbard and Petersen (1988).[20]

Capital market imperfections can come from various sources, such as information asymmetries, costly monitoring, and contract enforcement problems. Thus in a financially constrained context,

[20] Based on Gilchrist and Himmelberg's (1998) set up, and assuming quadratic and persistent adjustment costs as in Love (2003), an investment equation of the following form can be obtained:

$$I_{it}/K_{it} = \beta_1 (I_{it-1}/K_{it-1}) + \beta_2 \mathrm{MPK}_{it} + \beta_3 (\mathrm{FIN}_{it-1}/\mathrm{K}_{it-1}) + \beta_4 (\mathrm{LEV}_{it}/K_{it}) + f_i + \mathrm{d}_t + \varepsilon_{it},$$

where i denotes the firm; t, the year; I, investment; K, capital stock; MPK, marginal productivity of capital; FIN, a proxy for liquidity; LEV, leverage; f, a firm-specific effect; and d, a time dummy.

the signs of profit and liquidity variables in the equation should be positive. The sign for leverage cannot be determined a priori. The standard proxies for liquidity, cash flow or stock of liquidity (current assets minus current liabilities), are used. A specification was also estimated that tests the interaction of profits, liquidity, and leverage for different periods and stratifies by firm size to capture whether financial constraints have tightened in recent years and if they are particularly relevant for smaller firms. Both fixed effects and GMM estimations were undertaken.

The results confirm the premise that firms in the sample face financing constraints, as the estimated coefficients for the proxies for both profits and liquidity are significant and positive in each of the alternative model specifications, particularly for the smaller firms in terms of assets. The coefficient for leverage is significantly negative under the GMM estimation and under OLS for smaller firms. This is consistent with most of the previous empirical literature, indicating that very indebted firms do not get credit easily,[21] or that very indebted firms prefer to invest less, as the resulting profits would end up in creditors' hands rather than being distributed as dividends.

The coefficient on profits is augmented in the 2002–06 period under the GMM estimation, which suggests that firms are facing more stringent financing constraints in the growth environment experienced in the last five years. When the sample is stratified by firm size in terms of assets, results under both estimation methods point out that the relatively smaller firms seem constrained by insufficient liquidity (cash flows) or overindebtedness. Larger firms seem to face constraints against keeping their investment growing at the same rate as sales.

The results thus confirm that Argentine firms are financially constrained, and more so in the present, but that the larger firms have been able to circumvent these constraints with the greater availability of internal funds.

[21] See Gallego and Loayza (2000) and Devereux and Schiantarelli (1989), among others.

Binding Constraints on the Structural Transformation of Exports

The structural transformation of exports toward more sophisticated activities with greater possibilities for technological convergence affects growth positively through two complementary channels. First, it favors investment by opening new opportunities that offer higher returns than the traditional production and export activities. Second, it relocates resources to activities that contribute to greater TFP growth via technological catch-up and generates more attractive opportunities for research and innovation. Hence the binding constraints on this productivity-enhancing activity are analyzed separately. The potential constraints are in two areas: low social returns to export innovation (caused by poor accumulated capabilities and opportunities for structural transformation); and low appropriability of the social returns to this activity, caused either by market failures (coordination and information externalities) or by government failures (anti-export bias of domestic trade policy, inadequate opening of foreign markets).

The main findings are that structural transformation has been scarce in Argentina, resulting in relatively low levels of sophistication of exports and specialization in activities that appear to offer relatively little scope for technological catch-up to the world frontier. This lack of transformation cannot be attributed to insufficient or inadequate accumulated capabilities for discovering new exports. Instead the most binding constraints are the market failures (coordination and information externalities) that hinder the discovery of modern export activities. Domestic and foreign trade policies do not favor this discovery process, but are not the most binding constraints.

Structural Transformation of Exports in Argentina

Hausmann, Hwang and Rodrik (2005) estimate that the more sophisticated the country's export basket vis-à-vis its per capita income, the greater its subsequent growth. The sophistication of the export basket is measured as the income content of the products exported

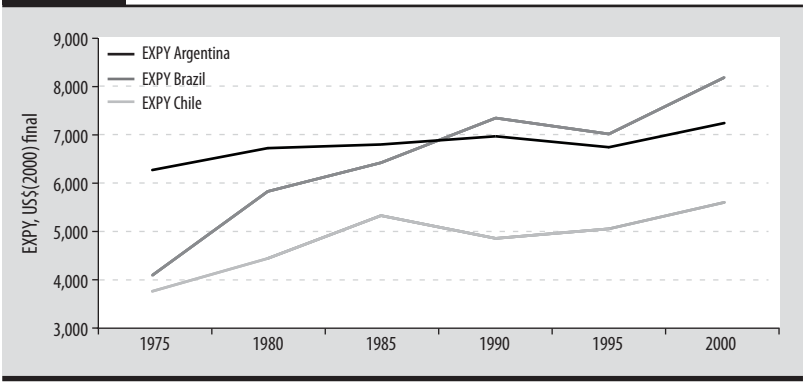
by a country.[22] Hausmann, Hwang and Rodrik attribute the positive growth effect of export sophistication to the associated learning economies or potential catch-up effects a nation gains by specializing in sets of goods similar to those of more advanced countries. However, they do not test for this effect at the microeconomic level and obtain the result in a black box fashion. Hence the growth effect of greater export sophistication could be capturing other growth-friendly effects of exporting a rich country's export basket, such as the greater stability in the terms of trade that is usually associated with the export of more sophisticated manufacturing goods, which face more stable world demand. In either case, greater export sophistication is bound to have significant growth-enhancing effects.

Hwang (2006) finds that fast-growing developing countries thrive by widening the pattern of specialization toward goods that are produced initially at a relatively low quality vis-à-vis a distant world technology frontier, hence gaining access to bigger catch-up possibilities. He also finds that increasing convergence possibilities is greatly facilitated by greater export diversification, a greater similarity to the export structure of advanced countries, and by greater export sophistication (as defined by Hausmann, Hwang and Rodrik, 2005). The distance between the quality of the domestic good being exported and the international quality frontier is proxied by the distance between the unit export prices for that good in the country of interest and in the OECD countries.

Argentina has had a lackluster growth in the sophistication of its exports, measured as suggested by Hausmann, Hwang and Rodrik. The income content of Argentine exports has grown only 15 percent between 1975 and 2000, and Argentina's current per capita income lies above its export sophistication, suggesting that its current export

[22] The measure of snophistication of country's export basket in Hausmann, Hwang and Rodrik (2005), EXPY, is calculated as the share weighted average of the PRODY of each component of country's export basket, where PRODY measures the productivity associated with the good, calculated as the revealed comparative advantage (RCA) weighted average of the level of income per capita of the countries that export that good.

FIGURE 2.7 Export Sophistication Relative to Per Capita GDP, Selected Countries, 1975–2000



Source: IERAL-Fundación Mediterránea.

basket will not offer a positive contribution to growth. During the same period, the income contents of the exports of Brazil and Chile grew 100 percent and 50 percent, respectively (see Figure 2.7).

Focusing on the quality upgrading of Argentine exports, proxied by the evolution of unit export prices, it is clear that while Argentina's exports rose sevenfold between 1986 and 2006, most of this growth was explained by a rise in quantity, with only a negligible contribution from changes in export value. Hence, Argentina does not appear to have experienced a quality upgrading of its exports. Table 2.4 further shows that there was little quality convergence of Argentine exports to the OECD frontier between 1994 and 2005, as proxied by the evolution of relative unit export prices vis-à-vis the OECD prices for the same export baskets. This relative unit price of exports actually declined during this period. On the other hand, the unit price of new exports relative to the frontier was smaller than that of traditional exports, and rose relative to the frontier. However, this growth was very small (0.46 percent per year).[23] Results are

[23] To identify new exports at the six-digit level of the Harmonized System (HS) that emerged between 1993–94 and 2003–04, the following criteria were used. Exports should have grown at least 300 percent during this period—so as to

TABLE 2.4 Relative Export Prices, Argentina to OECD, 1994 and 2005

	Overall and new exports						
	Total	Total without NE	NE	MOA	MOA NE	MOI	MOI NE
1994	0.866	0.871	0.817	0.853	0.808	0.854	0.779
2005	0.809	0.799	0.855	0.757	0.805	0.786	0.787

Source: IERAL-Fundación Mediterránea based on World Bank, World Integrated Trade Solution (WITS).
MOA = agriculture manufactures
MOI = industrial manufactures
NE = new exports

similar with respect to traditional and new exports of industrial manufactures.[24] Hwang (2006) also shows that in 1989–91 Argentina had a relatively high unit price for its manufacturing exports to the United States (much bigger than the unit export prices of Brazil, China, the Dominican Republic, Hong Kong, Korea, Malaysia, and the Netherlands), which helps explain its relatively low per capita GDP growth, in international perspective, from 1991 to 2004.

Argentina has one of the most diversified export structures in Latin America with a Herfindahl index for exports of 2.9 percent (De Ferranti et al., 2002). It is also much more diversified than the average of the Hwang (2006) sample of 117 countries for 1984–2000, whose Herfindahl index is 23 percent, compared to 77 percent for Argentina. Its export structure is also much more similar to the

include sectors that have increased beyond average export growth (154.7 percent) and median export growth (263 percent). The exports also must have reached a minimum level of at least US$10 million in the average of 2003–04 and a maximum level of US$1 million in the average of 1993–94. This criterion yields only 87 products that meet all the requirements (out of 4,198 products at this level of disaggregation that showed positive exports in 2004).

[24] There has been divergence in quality in the case of processed foodstuffs, both for total exports and for new exports (although less for new exports). This is the opposite of what Hwang (2006) finds for a cross-section of countries. In the case of industrial manufactures, there was also quality/price divergence for total exports, despite the small convergence for new industrial exports (unit prices grew 0.1 percent per year vis-à-vis the frontier). New industrial exports started with a lower relative price than traditional exports of industrial manufactures.

OECD structure than the average of Hwang's sample.[25] This means that the problem does not lie in the extent of diversification but in the likelihood that Argentina has diversified its exports toward activities with low catch-up possibilities, which is consistent with the lack of export sophistication.

Hence, while there have been important changes in the composition of exports between 1993 and 2005, with a significant increase in the importance of new export activities (87 new goods at the six-digit level, now representing 20.9 percent of all exports), these new exports have offered very little improvement in sophistication and in possibilities for technological convergence.

Hausmann, Hwang and Rodrik's (2005) econometric estimations suggest that if the export sophistication of Argentina had been 60 percent higher at the onset (so as to the replicate the ratio of export income content to per capita income of Brazil in 1975), its GDP growth rate for 1975–2000 would have been 3 percentage points higher than the observed level. This finding is consistent with Hwang's (2006) estimates, which suggest that a 60 percent increase in the income content of Argentina's exports would yield a bigger catch-up space (the distance between its unit export prices and those of the OECD), which would improve the rate of growth of export prices by 6 percentage points per year and per capita GDP growth by 2 percentage points. Hwang's estimates also show that Argentina's catch-up space in 1994 predicted a 0.26 percent per capita GDP growth per year. Instead, if Argentina's catch-up space had been similar to that of Brazil, its per capita GDP growth rate would have been 2 percentage points higher.

Capabilities and Opportunities for Structural Transformation

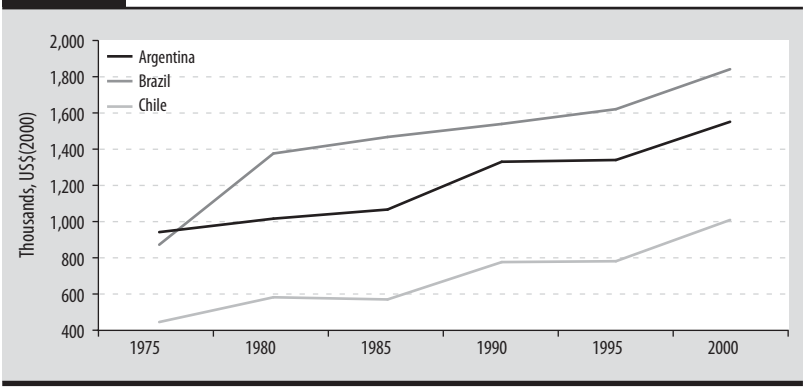
Thus, the lack of structural transformation cannot be attributed to inadequate accumulated capabilities and opportunities for develop-

[25] The export similarity index takes a value of 0 when there is no overlap and 1 if a country exactly matches the OECD's distribution of export shares. While the Hwang sample average index is 0.14, Argentina's index is 0.29.

ing new valuable exports. Indeed, the "open forest" measure of option value for structural transformation developed by Hausmann and Klinger (2006) is not unfavorable for the acquisition of greater export sophistication.[26] Argentina's open forest has been growing over time at rates comparable to those of Brazil and Chile (see Figure 2.8). Additionally, Argentina had a bigger initial open forest and per capita GDP than these other two countries, which nevertheless managed to increase their export sophistication significantly over time. Hence it does not appear that Argentina's initial open forest was an impediment for export sophistication growth. Indeed, if the coefficients econometrically estimated by Hausmann, Hwang and Rodrik (2005) for the effects of open forest are used on subsequent export sophistication growth, Argentina's initial open forest should have led to a 22–37 percent increase in export sophistication between 1975 and 2000, much greater than the increase actually observed (15 percent), and similar to levels predicted for Korea using the same estimated coefficients. In addition, Argentina's open forest in 2000 was not significantly smaller than it was for China, Finland, India, or Indonesia.

[26] Hausmann and Klinger (2006) found that the capability of structural transformation depends negatively on the distances between the products in which the country has a revealed comparative advantage and those products that are not being exported. These authors measure distance between two products as the minimum probability that each of these products will be exported conditional on the other being exported as well. They use these measures of distance to construct measures of "density" for each product that a country is not currently exporting, which aggregate the distances between each of these products and the goods that the country is currently exporting. These density measures capture the capabilities for structural transformation. These authors additionally measure the attractiveness of structural transformation by evaluating the "price" of the products that are close (in the Hausmann and Klinger sense) to current exports. This price is measured by the productivity associated with the good, calculated as the revealed comparative advantage (RCA) weighted average of the income per capita of the countries that export that good. The prices and densities of the nonexported goods are aggregated into a variable called "open forest," which measures the option value of structural transformation. Intuitively, the closer and pricier the nonexported goods are, the bigger the attractiveness of, and capability for, structural transformation toward a more sophisticated export basket.

FIGURE 2.8 Open Forest Dynamics in Argentina, Brazil, and Chile



Source: IERAL-Fundación Mediterránea.

Hausmann and Klinger (2006) 's econometric analysis at the product level finds that the likelihood of jumping to a new export good is positively affected by the distance between the value (income content) of the new good and that of the current export basket (sophistication). They also find that "density" (their measure of the probability of exporting the good conditioned by the current export basket) has a positive and significant effect on the probability of jumping to new goods. When Hausmann and Klinger's estimations are replicated for the individual case of Argentina, "density" or proximity is found to be a stronger determinant of discovery than it was for the average country in the Hausmann and Klinger sample. In the individual case of Argentina, the income content of the new goods has a significant but very small impact on structural change. This suggests that proximity is more important than value for discovering new goods, which is consistent with the finding of no growth in the unit prices of Argentine exports and little growth in the sophistication of Argentine exports.

This finding is further supported by product-level analysis of the roles played by proximity and attractiveness in shaping recent discoveries and conditioning future new exports. This analysis shows that newly discovered exports between 1993 and 2005 have a productivity or income content that is 50 percent greater than that

of traditional exports. These discoveries have already exploited the small quality convergence possibilities that they had at the onset (see Table 2.4). Higher income content than that of traditional exports has played some role in the discovery of new exports, but these new activities did not contribute significantly to improve export sophistication because they represent a small share of total exports. In addition, these goods were located close to the previous export basket in the product space, suggesting that proximity played a key role in developing these new exports.

On the other hand, while the open forest is, on average, favorable for structural transformation, the 25 most attractive goods (in terms of greater income content and/or quality convergence possibilities) not yet exported are relatively far away in the product space, suggesting that the capabilities for discovering new valuable exports are good but not great.

The Role of Trade Policies

Domestic trade policies that change the domestic relative price in favor of import substitution will discourage the discovery of new exports in the presence of fixed costs of entry into new markets and coordination and information externalities. In addition, discriminatory foreign trade policies reduce the expected profits of discovery, especially in the case of differentiated goods with downward sloping foreign demands, and also reduce the ability to converge to higher levels of quality if the markets for higher quality are closed.

Relatively low tariff discrimination by members of the North American Free Trade Area (NAFTA) and the European Union (EU) appears to have facilitated recent discoveries of new exports, as these exports face lower NAFTA and EU trade restrictions than any other group on average—although they face relatively high tariff peaks. East Asia and Latin America are natural markets for new goods. However, tariff discrimination in these regions is relatively high and may have conditioned the attractiveness of the new

exports.[27] Domestic trade policy did not discourage these discoveries at the onset, either. This group of exports enjoyed relatively high protection at home, although at the time of the discovery they faced no export taxes (which were introduced in 2002), which resulted in a low relative price of import substitution (1.14). Since export taxes have been introduced, the relative price of import substitution has risen to a high 1.23.[28] This raises a potential problem of time inconsistency of trade policy that may discourage future discoveries.

The most attractive goods (in terms of income content and/or possibilities for technological convergence) not yet exported are not discriminated against by the average NAFTA and EU tariffs (although they face high tariff peaks in these blocs). They are, however, punished by relatively high East Asian and Latin American barriers to imports.[29] The discovery of this group does not appear to be discouraged by domestic trade policy, as it faces a low relative price of import substitution (similar to that enjoyed by new discoveries at the onset).

Hence current domestic trade policies do not appear to play a significant role in the lack of discovery of the most attractive potential new exports. However, the time inconsistency of domestic trade policy may be contributing significantly to insufficient structural transformation. NAFTA and EU tariffs are not too harmful for

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[27] Average tariffs on new Argentine exports were 1.2 percent in NAFTA countries, 3.6 percent in the EU, 10 percent in East Asian countries, and 8.9 percent in Latin America. The largest tariff peaks were those observed in NAFTA countries (43.5 percent) (WITS). For the importance of East Asian and Latin American markets for the exports of new differentiated goods, see Sánchez et al. (2007).

[28] The relative price of import substitution is computed as (1 + import tariff)/(1 – export tax). New exports face 14 percent average domestic import tariffs, zero initial export taxes, and 7.3 percent final average export taxes (with peak 26 percent final export taxes) (WITS).

[29] Average import tariffs in the EU and NAFTA countries for the goods with the most sophistication and/or best possibilities for convergence do not exceed 3.8 percent (except for the 13.5 percent EU import tariffs on the goods with largest technological frontier). Asian and Latin American import tariffs on these goods are in the range of 8.9–10 percent (except for the low 4 percent Asian tariffs on the goods with the largest technological frontier) (WITS).

structural transformation either. On the other hand, Asian and Latin American import tariffs discriminate strongly against the exports of all groups.

The Role of Market Failures

The findings regarding trade policies and capabilities suggest that information externalities and coordination failures are the most binding constraint on structural transformation. The case studies of new successful export activities in Argentina undertaken by Sánchez et al. (2007) provides some preliminary support to this hypothesis.[30]

This hypothesis was evaluated by analyzing whether the emergence of new export activities since 1993 more closely fits the case of widespread discovery and diffusion (in which case market failures are not very important) or the case of limited discovery and diffusion. The findings confirm that coordination and information externalities are indeed a binding constraint on structural transformation. Discoveries do occur, but mostly when the pioneer can introduce barriers to entry that block diffusion, and the discoveries tend to have relatively little value (income content or convergence possibilities). As a result, many activities where the pioneer cannot introduce barriers to entry and/or cannot, on their own, provide the required industry-specific public goods fail to be discovered.

[30] Sánchez et al. (2007) analyze a series of case studies where the emergence of new successful modern export activities in Argentina often occurs in sectors where the pioneer can capture monopoly rents (at least temporary) by introducing barriers to entry, thus compensating for the knowledge externality. Additionally, where coordination failures may be important, the pioneer tends to be a relatively large firm, with previous experience and scale in horizontally or vertically related activities, which can engage in vertical integration and/or self-provide the required industry-specific public goods, and self-finance this investment. This in turn leads to relatively small or slow diffusion. This suggests that there are many profitable activities that fail to be discovered because of the absence of targeted policies that facilitate experimentation (quite the opposite of Chile) and because the poor functioning of many trade-related institutions unduly raises the cost of experimentation.

Additionally, many discoveries of low value survive because of the privately generated protracted monopoly power.

There are several relevant stylized facts about discovery and diffusion in Argentina:

- The frequency of emergence of new export activities in Argentina during the past 15 years does not appear to be small relative to other countries.[31]
- The inter-industry pattern of investment in manufacturing activities since 2002 is negatively associated with the frequency of emergence of new exports by sector, suggesting a bias against investing in activities that are exposed to bigger coordination and information externalities. There is a –71.8 correlation between sectoral investment and frequency of discoveries
- The new export activities show very little diffusion.[32] The concentration of exports, proxied by the export share of the largest exporting firm, was very large at the onset, as one would expect, but it was even larger at the end.[33] This suggests that discoveries are associated with the private introduction of protracted barriers to entry and with the internal provision of industry-specific public goods.
- There is a negative correlation between discovery and diffusion at the sectoral level, signalling that discoveries emerge more frequently when entrepreneurs can introduce barriers

[31] Using the metrics of Klinger and Lederman (2004), 2 percent of the total number of Argentine exports at the HS six-digit level are new exports: the same percentage as in Chile and in China, and greater than Spain (1 percent) and the United States (0 percent), but less than Colombia, India, and Korea (3 percent), Turkey (8 percent), and Indonesia (9 percent).

[32] The largest exporter accounted for 69 percent of the total exports of each new good on average at the onset (1994), and 70 percent of total exports of each new good at the outset (2005).

[33] To measure export concentration at the product level, Customs Office data were used for firm-level exports by product (which can be disaggregated up to the eight-digit level) for 1994–2004.

to entry. To see this, this study computed different measures of the extent of diffusion per sector and estimated their correlations with the number and the frequency of new exports in those sectors. This was always found to be negative and very often statistically significant, especially regarding the number of discoveries per sector.[34]

The Argentine pattern of intermediate number of discoveries, very limited diffusion and low export sophistication growth and poor quality catch-up in the presence of a reasonable open forest and relatively large diversification is consistent with the lack of government intervention to compensate the coordination and information externalities, together with cross-industry differences in the ability of pioneers to introduce barriers to entry and self-provide the required public goods.

Binding Constraints on Research and Innovation

The most recent theoretical and empirical growth literature shows that most countries appear to grow at the same long-run growth rates, which are determined by world TFP growth, and that differences in investment and in research and innovation rates only

[34] The diffusion indicators computed include: a) the share of export growth explained by an increase in the number of local exporters, measured as the ratio between growth in the number of exporting firms per sector and the percentage growth in total sectoral exports (*dN/dX*) (the larger this indicator is, the bigger the diffusion); b) the change over time in the sectoral export share of the firm that had the largest export share in 1993 (*dsharepioneer*) (if it increases, there is more concentration); c) the export share of the largest exporting firm in 2004 (*share-endleader*); and d) the Herfindahl Index of concentration in the number of exporters in 2005. These indicators were compared to two indicators of discovery: the number of new exports by sector (#NE), and the number of new exports relative to the total number of exported goods by sector (%NE). All the correlations have negative signs. The largest ones are those between the number of new exports by sector and the contribution of new exporters to export growth (–0.49) and between the number of new exports by sector and the Herfindahl index for the firm concentration of exports (–0.52).

explain differences in long-run income (Howitt, 2000; Klenow and Rodríguez-Clare, 2005). In the proposed Schumpeterian endogenous growth framework, investment in physical capital and innovation are complementary activities, where innovation is defined as all the expenditure decisions geared toward tapping the world stock of knowledge with the goal of improving the country's own technology. World TFP growth results from the spillovers from the research undertaken by all countries.[35] Klenow and Rodríguez-Clare (2005) introduce the additional possibility that each country has its own technology frontier, which differs from the world frictionless frontier because of barriers to "engagement" (through FDI, trade, capital goods imports from technologically advanced countries, and quality of communication infrastructure). In this framework, domestic research determines the distance between the country's long-run productivity and its own frontier, with the technological frontiers for all countries growing at the same steady state rate as the frictionless rate. The closer the country is to its technology frontier, the smaller the social rate of return to innovation.

In this framework, divergence from world TFP growth, such as the gap observed in Argentina, would be due to transitional dynamics toward a new steady state with a bigger gap between the country's productivity and its own technology frontier, or toward a new steady state with a new and lower technology frontier.

The potential constraints are found in three main areas: low social returns to technological innovation (caused by low engagement in the world flow of ideas, low human capital, and low complementary investment); low appropriability of the social returns to this activity (caused either by market failures in the form of technological externalities, or by government failures, including R&D taxes and capital income taxes); and high cost of finance (low availability of venture capital and poor government financial support).

[35] Keller (2004) provides a summary of the compelling recent empirical evidence on the large extent of international technology diffusion and of the mechanisms through which it occurs.

Research and innovation activities in Argentina are relatively scarce from international and intertemporal perspectives. However, the social rate of return to these activities is very low, signalling that Argentina has a very low technological frontier and that its current technological knowledge is close to this frontier. Indeed, the divergence from world TFP growth between 1980 and 2000 can be fully explained by a decline in research intensity, which is caused to a large extent by an inadequate engagement in the world flow of ideas at a time when technological knowledge has become more global. This disengagement appears to be due to insufficient participation in FDI flows and imports of capital goods from knowledge-abundant countries and specialization in export activities with low technological frontiers, together with local inadequacies in the areas of human capital and information technology and telecommunications infrastructure. As a result, the technological frontier that Argentina faces has contracted. Poor indicators in the area of intellectual property rights also contribute to the low research intensity. Financing does not help either, but the other binding constraints are more important.

The Scarcity of Innovation in Argentina

Argentina's indicators of innovative activity are very poor relative to other relevant countries, in terms of either pure R&D intensity, which reaches a meagre 0.44 percent GDP (see Table 2.5), or total firm spending on innovation relative to sales.[36] R&D intensity has declined greatly since 1975–79, when it reached 0.94 percent of GDP—which at the time compared very favorably to other countries that have overtaken Argentina, such as Brazil, India, Ireland, Korea, and Taiwan. A disproportionately large share of the total research effort

[36] Sánchez, Nahirñak and Ruffo (2006) find that the average amount spent on innovative activities by Argentine firms relative to sales was 1.7 percent in 2001, much less than in Brazil (4 percent). The maximum amount spent by Argentine innovative firms was 2.15 percent of sales, much less than the maximum amount spent in Brazil, which reached 7.8 percent of sales.

in Argentina has been undertaken by the public sector.[37]

In order to gauge whether research and innovation are truly scarce, this study estimated their social rate of return (SRR) in Argentina by running a panel data regression of TFP growth at the industry level for 1991–2006 on the initial R&D intensity per industry.[38] The results show that R&D investment in the Argentine manufacturing sector has a negligible and insignificant social rate of return (0.1–0.6 percent)—much smaller than in the United States (25–35 percent), which is much closer to the world technology frontier.

TABLE 2.5 Innovation Indicators, Selected Countries, 2004

Countries	R&D spending as % of GDP
Argentina	0.44
Brazil	0.91
Chile	0.70
Colombia[a]	0.17
Spain	1.07
USA	2.66

Source: RICyT

a. Data for Colombia are for 2001.

This finding contrasts very starkly with the SRR that arises from the calibration of the Klenow and Rodríguez-Clare (2005) model of productivity and research for the year 2000, assuming that Argentina's frontier is the frictionless world technology frontier. In such case, Ar-

[37] Lederman and Saez (2005) show that in 1975–79, R&D expenditures relative to GDP in Brazil, India, Korea, Taiwan, and Ireland represented 0.61 percent, 0.43 percent, 0.53 percent, 0.83 percent, and 0.68 percent, respectively. In 1995–99, those expenditures relative to GDP had risen to 0.84 percent, 0.62 percent, 2.57 percent, 1.9 percent, and 1.34 percent, respectively. The R&D expenditures of the private sector in Argentina never exceeded 25 percent of the total R&D expenditures, whereas in Brazil they exceeded 35 percent, and in the other comparator countries they exceeded 50 percent (except in the case of India).

[38] See Jones and Williams (1998) for methodological discussions. This study made use of the National Innovation Survey (ENICT), which contains data on R&D and other types of innovation expenditures for a representative sample of manufacturing firms for 1992, 1996, 1998, and 2001. Labor productivity per industry was computed using the data from the Monthly Industrial Survey. As TFP data were not available, a regression was run of labor productivity growth at five-year intervals on the initial R&D intensity for each industry and on the growth of capital per worker, which was proxied by a time dummy. A panel data regression was run with T = 4, corresponding to 1992–97, 1996–2001, 1998–2003, and 2001–06. A distinction was made between investment in R&D and investment in innovative capital goods (with embodied technological knowledge).

gentina's own knowledge stock (proxied by TFP) would be 51 percent of the world frontier, and its SRR to innovation would be in the range of 46–100 percent, depending on the underlying parameter values. Hence the estimated low SRR can only be reconciled with the technological backwardness of Argentina if one allows for the possibility that Argentina has undergone a disengagement process such that its technology frontier is much lower than the world frictionless frontier, and that it has a relatively small gap vis-à-vis its own low frontier.

Indeed, when the productivity gap was calibrated relative to the own frontier that would be required to equate the calibrated and the estimated SRRs, the steady-state TFP relative to the own frontier would be 88.61–91.99 percent depending on the underlying parameter values. This would imply that Argentina's own technology frontier is 55–57 percent of the world frictionless frontier: a very low level.

Research, Investment, and Productivity Divergence

The steady state productivity gap in the Klenow and Rodríguez-Clare (2005) model is a decreasing function of: the country's research intensity; the country's steady state capital per effective worker; the marginal productivity of research; and the ability to capture the sources of technology diffusion from abroad that do not depend on domestic research efforts.

This model was calibrated to analyze whether the observed decline in the Argentine TFP distance vis-à-vis the frictionless world technology frontier can be a transition toward a new steady state gap caused by changes in the steady state capital per effective worker and/or in the research intensity. Between 1980 and 2000, the TFP distance to the frictionless frontier increased 13.8 percentage points (from 64 percent to 51 percent of the world largest TFP at each date). Capital per effective worker, as defined by Klenow and Rodríguez-Clare (2005), increased 5.6–9.9 percent depending on the underlying parameter values, while the recorded research intensity fell 0.52 percentage points (more than half) vis-à-vis 1975–79. The observed widening in the TFP gap relative to the frictionless frontier cannot

be explained by the change in the level of capital per effective worker alone, maintaining the 2000 research intensity unchanged—as in this case the slight capital deepening should have led to some small convergence. The model fits the actual gap in 1980 very precisely when the 1975–79 data are used for research intensity.[39] Hence it can be concluded that the decrease in the observed TFP relative to the world frictionless frontier was largely driven by the observed collapse in research intensity.

In the Klenow and Rodríguez-Clare (2005) framework, this collapse in research intensity can result from higher capital income taxes, lower R&D subsidies, and/or greater research spillovers that reduce the appropriability of the social returns to innovation, or from disengagement with the world flow of ideas that reduces the country's own technology frontier relative to the frictionless frontier.

Argentina's lackluster TFP growth since 1975 can be explained as the result of a reduction in engagement with world technology flows, leading to transitional dynamics toward a lower steady state technology frontier, and hence to a transitional decline in TFP vis-à-vis the world's frictionless frontier until the new steady state is reached. This also led to a reduction in research and innovation intensity to accommodate to the country's new lower frontier and to the decline in the SRR to R&D.

Technological Disengagement

The survey on international technology diffusion (ITD) by Keller (2004) reveals that inward flows of foreign technological knowledge are an increasing source of domestic productivity growth.[40] While in the past technology creation and diffusion was highly concentrated

[39] The authors consider the 1975–79 data to be more representative of the actual 1980 figure, given that the collapse in research intensity in 1980–4 was most likely driven by the 1982 debt crisis.

[40] For instance, between 1983 and 1995 the contribution of technology diffusion from G-5 countries was on average almost 90 percent of the total R&D effect on productivity in nine other OECD countries (Keller, 2001a).

on a geographic basis, there is compelling evidence that the rate at which knowledge spillovers decline with distance fell substantially between the mid-1970s and the 1990s (Keller, 2001a,b). There is an increasingly common pool of global technology, and countries that are not sufficiently integrated in terms of world trade and investment fall behind, having access to a smaller technological frontier. The delocalization of technological knowledge has favored those countries that have become more integrated since the mid-1970s.

International knowledge flows appear to be the result of deliberate activities geared toward learning and conforming to international standards via the interaction with foreigners and local efforts of technology adoption. The available empirical evidence reveals the following channels for international technology diffusion:

- Imports of capital goods with embodied technological knowledge originating in high- knowledge countries (Coe, Helpman and Hoffmaister, 1997; Xu and Wang, 1999; Eaton and Kortum, 2001; Blyde, 2004).
- Inward flows of FDI from high-knowledge countries that are combined with a relatively high absorptive capacity, as measured by the country's own R&D investments (Kinoshita, 2000).
- High quality information and telecommunications infrastructure that facilitate communication between geographically distant persons, and the transmission of codified knowledge as well as some tacit knowledge.

Keller (2001b) attributes more than half of the total international knowledge flows to imports, and the rest in equal parts to FDI and communication links. The available empirical evidence also reveals that the major determinants of successful technology diffusion from abroad include:

- The level of development. International knowledge flows from high-knowledge countries have stronger effects on growth

in the relatively rich countries compared to those they have in the poorer countries (Keller, 2001b).

- The abundance and quality of human capital (Eaton and Kortum, 1996; Xu, 2000; Caselli and Coleman, 2001).
- Indigenous adaptive R&D (Griffith, Redding and Van Reenen, 2000; Kinoshita, 2000).
- The pattern of specialization: the strength of international technology diffusion for certain types of high-tech products could be easily two to three times higher than for the average manufacturing good (Keller, 2004).
- Policies and institutions. Well-functioning markets and an undistorted trade and FDI regime are conducive to bigger learning effects (Keller, 2004).

The empirical evidence available for Argentina suggests that the country has failed to acquire the levels of trade and FDI integration with high-knowledge countries that are required to successfully tap the increasingly common global stock of technological knowledge:

- Argentina imports of capital goods relative to its GDP are below what is expected for its level of development. While the average developing country, with a PPP $1,800 per capita GDP, has a 5.92 percent capital goods import/GDP ratio, Argentina, with a PPP $4,470 per capita GDP, has a capital goods import/GDP ratio that reaches only 3.55 percent.
- While in 1995, 66 percent of all Argentine capital goods imports came from the EU and the United States, nowadays only 30 percent originate from those regions, while the share of imports from Brazil has risen from 10 percent to 32 percent. Some of this diversion was due to the formation of Mercosur in 1995 and some to the currency devaluation in 2002.
- FDI flows to Argentina are low compared to other Latin American countries (see Figure 2.6). Low FDI flows are combined with low local R&D intensity.

- The indicators for information and telecommunications (ITC) infrastructure are usually greater or equal than what would be expected for its level of development, although they are worse than those of industrialized countries.
- Argentina has specialized in export activities with low sophistication, as defined by Hausmann, Hwang and Rodrik (2005), and with a small frontier for technological catch-up, as defined by Hwang (2006).
- Argentina not only faces policy distortions that discourage capital goods imports from high-knowledge countries, but also distortions that affect efficient allocations in factor markets, and that prevent the displacement of obsolete jobs by new jobs in technologically upgraded activities (see Sánchez and Butler, 2004).[41] These authors found that creative destruction was constrained by the protectionist bias of trade policies and by rigid labor markets.

Hence the process of unilateral trade liberalization that took place in the late 1980s appears to not have been sufficient or adequate for large ITD toward Argentina. One important reason is that it has mostly signed regional trade agreements with low-knowledge countries (like those in Mercosur). Another important reason is that the policy and regulatory environment toward FDI shifted from unwelcoming in the 1980s to friendly in the 1990s and to less favorable in the aftermath of the 2001–02 crisis. This seesaw attitude toward FDI has limited the extent of progress in the telecommunications infrastructure after all the improvements in the 1990s. Moreover, while the 2002 currency devaluation appears to have been important in alleviating savings constraints, it has come at the price of raising the relative price of imported capital goods, promoting a switch to imports from low cost, low-knowledge countries.

[41] Haltiwanger et al. (2004) show that Argentina's gross reallocation of manufacturing between 1990 and 2000 was 14.1 percent: far smaller than in Brazil (32.1 percent), Chile (23.8 percent), Colombia (19.8 percent), and Mexico (27.9 percent), and higher only than in Uruguay (13.8 percent).

Human Capital

The available evidence reveals a relative scarcity of human capital for research activities in the business sector, which is reflected both in its price and quantity. This scarcity also contributes to the disengagement from the world flow of ideas.

Argentina has a relatively greater participation of researchers and graduates in engineering in its labor force (3.64 percent) vis-à-vis other countries that have a higher R&D intensity (Brazil, for instance, has only 1.91 percent of researchers and engineers in its labor force). However, only 10 percent of all Argentine researchers are in the business sector. By contrast, in countries with lower innovation-related human capital but higher R&D intensity, there is a much greater allocation of researchers to the business sector (19 percent in the case of Brazil, for instance).

The relatively high wages of university professors and chemical engineers vis-à-vis industrial workers in Argentina when compared to other relevant countries suggest that human capital could be a binding constraint on innovation in Argentina.[42] Nevertheless the relative abundance of public sector researchers could eventually be transformed into a relative abundance of business sector researchers, provided other binding constraints on innovation are alleviated first.[43] Thus far there appears to be a malfunctioning of the national innovation system that creates a wide gap between research activities in Argentina and the productive sector research needs.

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[42] For instance, the relative wage of chemical engineers vis-à-vis industrial workers is 2.02 in Argentina, 1.59 in China, 0.88 in the United Kingdom, 0.54 in Nicaragua, and 0.53 in Germany..

[43] When analyzing the emergence of biotechnology applied to human health as a successful new export activity, Sánchez et al. (2007) find that one of the keys for this success was the possibility of tapping into a relatively large endowment of life science researchers in the public sector and universities that had previously been devoted to academic research. While their suitability for the new activities was initially conditioned by their lack of experience in commercially oriented research, these scientists eventually adapted to commercial R&D, and Argentine expatriate scientists provided the required training.

Low Appropriability

Poor intellectual property rights (IPRs) are a highly binding constraint on research and innovation in Argentina, and regulatory and policy barriers to creative destruction (such as trade policies and labor market regulations) also have a deleterious effect on innovation. The potential important role of poor IPRs was also highlighted by the previous finding of a very low market valuation of intangible assets in Argentina.

This study explored the extent to which the currently low R&D effort can be due to low appropriability by conducting a cross-country econometric analysis for the year 2000 that is based on the prediction in Klenow and Rodríguez-Clare (2005) for the determinants of research intensity in steady state: capital income taxes, R&D taxes, the inability to appropriate the social returns to innovation (poor IPRs), and the stock of capital per effective worker. The software piracy rate from Business Software Alliance was used as a proxy for IPRs.[44]

The most significant explanatory variable is the software piracy rate, which has a significant and robust negative effect on research intensity. The very high piracy rate explains 98 percent of the Argentine below-average research intensity, and these poor IPRs matter much more for the Argentine low research intensity than in other research-poor countries such as Chile and Malaysia.

Finance

This analysis of binding constraints on investment revealed that Argentine firms are financially constrained for any kind of investment. In this vein, the National Innovation Survey (ENICT) for 1998–2001 reveals that financing was the main hurdle to research and innovation for 69 percent of all the Argentine manufacturing firms and for 75 percent of the small firms. By contrast, the IBGE Innovation

[44] Visit www.bsa.org

Survey in Brazil shows that financing was the main constraint on investment for only 60 percent of all firms and for 60 percent of the small firms.

The Argentine Growth Syndrome: A Ranking of the Most Binding Constraints

To identify the most binding constraints on growth, it is necessary first to analyze the potential contributions to growth that can be derived by eliminating constraints on investment and on productivity-enhancing activities, and then determine how feasible or costly it is to do so. The ideal thing would be to measure the size of the Lagrange multipliers for binding constraints on growth—which cannot be done. Instead this study undertakes a more heuristic approach that entails assessing how costly or feasible it would be to remove one constraint compared to how much it would contribute to higher growth.

To this end, a target for GDP per capita growth is set at 4 percent per year. This is the level that is estimated to cut poverty rates in half after 10 years using the methodology proposed by Bourguignon (2001).[45] Then the required investment rate and/or TFP growth rate is examined.

A growth accounting exercise shows that if the current investment rate (21.7 percent of GDP at 1993 prices) and TFP growth (1.3 percent per year) were sustained, then per capita GDP would grow at 2.9 percent per year. If TFP growth were not to improve from current levels, in order to raise growth to 4 percent per year, investment would be required to rise to 30 percent of GDP (see Table 2.6). In turn, domestic savings would have to rise from the current level of 23.8 percent of GDP to 32.4 percent of GDP (to accommodate the rise in the relative price of investment caused by the 2002 devaluation). This does not appear to be a feasible goal, given that the very high

[45] This estimation assumes that income distribution improves during this time span, until it recovers its best level in the past 20 years (the 0.45 Gini coefficient for 1993–95).

TABLE 2.6 Investment and TFP Growth Requirements for 4 Percent Growth Per Capita

Strategy	Investment rate (percent)	Savings rate (percent)	TFP growth (percent)	Feasibility/ desirability
Investment	30.0	32.4	1.3	3
Investment + TFP	24.2	26.1	2.0	1
TFP	22.0	23.8	2.4	2

Source: IERAL-Fundación Mediterránea.

increase in savings (from 16 percent of GDP in 2001) was caused by the combination of a large currency depreciation, sovereign debt restructuring, and the introduction of new distortionary taxes, and there is not much economic and/or social scope for further resorting to these instruments. Additionally, not much relief can be expected from international finance. Even at times of significant financial integration like the 1990s, international finance represented at most 5 percent of GDP, which would not be enough to finance the required increase in investment.

A more feasible scenario would involve elevating TFP growth to 2 percent per year, in which case the required increase in the investment rate would be only from 22 percent of GDP to 24.2 percent of GDP. This appears to be feasible in terms of the required increase in savings (from 23.8 percent of GDP to 26.1 percent of GDP), and can be more easily satisfied with modest access to international finance (see Table 2.6). A final possibility is that if investment were not to rise, then TFP growth would be required to rise to 2.4 percent per year. If one plausibly assumes that Argentina has already completed a transition initiated circa 1980 toward a new steady state with a bigger productivity gap (and/or with a lower technology frontier) and that TFP growth has a steady state component like the 1.3 percent currently observed, then one must determine what kind of improvement is required from productivity-enhancing investments to add an extra 0.7 percent TFP growth (or 1.1 percent).

This study finds that in order to generate the extra 0.7 percent (1.1 percent) of TFP growth, Argentina should increase its long-run

TABLE 2.7 Improvements in Productivity-enhancing Activities for Extra 0.7 Percent TFP Growth

	Improvement required			
	For extra 0.7% TFP growth	For extra 1.1% TFP growth	Required strategy	Feasibility/ desirability
Export Sophistication	16%	25%	Subsidy to self-discovery, provision of ISPG*, facilitation of experimentation, pro-export policies, foreign market opening	1
Distance to technological frontier	From 78% to 52%	From 78% to 41%		
R&D + innovation	From 0.41% to 0.68% GDP	From 0.41% to 0.97% GDP	FDI and trade with high knowledge countries, ITCs, export pattern, human capital, IPRs	1

Source: IERAL-Fundación Mediterránea.
ISPG = industry-specific public goods

productivity by 24 percent (39 percent) over a 30-year transition period. If this greater TFP growth were to come solely from more innovation, calibrating the Klenow and Rodríguez-Clare (2005) model, R&D intensity would have to rise to 0.68 percent (0.97 percent) of GDP from the current 0.41 percent of GDP (see Table 2.7).

If improved export sophistication were to be the only source of higher productivity growth, the required improvement can be calculated by using the coefficients estimated by Hausmann, Hwang and Rodrik (2005) in their panel data growth regressions. To generate the required 0.7 percent (1.1 percent) TFP growth increase, the median required improvement in export sophistication would be 15.8 percent (24.7 percent), which is not too large. However, such changes take some time to occur. For instance, in the case of Brazil, where export sophistication has been growing relatively quickly, the income content of exports on average rose 15 percent every five years between 1975 and 2000.

If instead the extra 0.7 percent (1.1 percent) TFP growth were to come from improving the technology frontier of Argentine exports, using Hwang's (2006) estimated coefficients, the required

structural transformation of Argentine exports is such that the unit export price relative to the OECD (the proxy for the quality/technology gap) becomes 57 percent (45.5 percent) instead of the current 87 percent (see Table 2.7). This may prove to be a more challenging task, as the top 25 goods that are closest in the product space have a rather poor technology frontier, while the goods with large technology frontiers are farther in the product space. Nevertheless, relatively small improvements (like improving the technological frontier to 71 percent) would provide half the required improvement in TFP growth.

Hence while greater investment can contribute to reaching the desired growth rate, relieving the constraints on domestic savings and international finance that would hamper the required increase in investment appears to be either too costly or unfeasible because of political economy considerations. It appears more promising to aim at marginally improving current investment (from 21.7 percent of GDP to 24.2 percent of GDP), which would secure a 3.3 percent per capita growth rate, and to get the extra kick from removing binding constraints on productivity-enhancing activities. Even if investment were to not rise from current levels, the desired greater growth could be achieved via improvements in technological and export innovations that are not too large, and hence are feasible. The intuition for this result is straightforward: the elasticity of output per worker to technological change is equal to 1, while the elasticity with respect to capital per worker is sizably smaller (about 0.45 in the case of Argentina). Hence the observed technological stagnation is more costly in terms of growth than the observed capital shallowing.

It is thus not advisable to rely on alleviating constraints on only one activity, especially given their complementary natures. Each of these channels (investment and the different productivity-enhancing activities) has diminishing returns when undertaken separately.[46] A bit of everything is advisable, but more is required

[46] Capital has the typical diminishing returns. Innovation has lower returns as an economy moves closer to the frontier (Klenow and Rodríguez-Clare, 2005).

from the activities that have fallen further behind: technological and export innovation.

Maintaining or marginally improving the investment rate demands improving appropriability and infrastructure, and taking care of the latent constraints associated with poor financial intermediation and poor access to international finance. There is no single bullet, as improving infrastructure without reducing the risk of expropriation (or vice versa) may not suffice by itself, although it would help to some extent. Nevertheless, the reliance on complementary improvements in productivity-enhancing activities reduces the sizes of the required improvements in infrastructure and appropriability.

The most binding constraints on research and innovation are the barriers to international technology flows (barriers to FDI and capital good imports from high-knowledge countries, and to developing new exports with large technology frontiers), and the poor IPRs. The current infrastructure in the area of information and telecommunications technology is not very favorable for tapping the world stock of knowledge, but it is not the most binding constraint. Finally, the most binding constraints for the structural transformation of exports are the market failures associated with coordination and information externalities.

Nonbinding Constraints

The current nonbinding constraints on investment include human capital and government failures, which lead to macroeconomic risks and volatility, high and volatile taxes, and high transaction costs.

Argentina ranks among the top countries in Latin America in terms of educational attainment, and its tertiary education attainment indicators are similar to those of Ireland and Spain and close

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Technological convergence at the product level slows as an economy gets closer to the frontier (Hwang, 2006). Capital accumulation and investment and complementary activities, and the steady state productivity gap, get smaller, the bigger the accumulated capital per effective worker becomes (Howitt, 2000; Klenow and Rodríguez-Clare, 2005).

to those of Australia. Argentina also presents relatively good educational quality indicators, as its students score better than those in most Latin American countries in Programme for International Student Assessment (PISA) tests, although these scores are still lower than in relevant OECD comparators. In addition, the Mincerian returns to education are lower in Argentina than in most relevant Latin American comparators, except for Uruguay. Hence human capital does not appear to be a binding constraint on investment. This is confirmed by this study's cross-country regressions for the determinants of investment at the firm level using the World Bank Doing Business Survey. The analysis shows that the coefficient for an inadequately educated labor force is negative, but statistically insignificant. Nevertheless it is still possible that human capital has low returns not because it is abundant but because there has not been a structural transformation toward more sophisticated export activities that demand greater skills.[47]

Uncertainty regarding macroeconomic aggregates (GDP, inflation, real exchange rate, terms of trade, interest rates, and the relative price of capital goods) may have a negative impact on investment through a variety of channels.[48] In addition, high macroeconomic volatility is likelier to lead to higher probabilities of contract breaches, drastic discretionary policy changes and government intervention in goods and factors markets, and high and variable taxes: that is, to a lower appropriability of the returns to investment. The econometric analysis of the determinants of investment finds direct evidence that terms-of-trade volatility appears to have been a binding constraint on investment in the past, but that this volatility is currently relatively low and does not seem to be a binding constraint. There is no direct evidence supporting a negative impact of other types of macroeconomic volatility. In any case, most types of macroeconomic

[47] Hausmann, Hwang and Rodrik (2005) find that human capital is positively associated with their measure of export sophistication.

[48] See Dixit and Pindick (1994); Greenwald and Stiglitz (1990); Appelbaum and Katz (1986).

volatility are currently low and certainly much lower than in the past.[49] However, the lack of institutional reforms aimed at addressing the ultimate political-economic sources of volatility make it unclear whether macroeconomic volatility has been permanently reduced in Argentina. This may rely on the circumstantial agenda set by the current government, together with new distortionary taxes and exceptionally high export prices.

The maximum statutory corporate income tax rate is in an intermediate position relative to other relevant comparator countries, although effective corporate income tax rates can differ significantly, depending on issues such as the treatment that each country gives to depreciation deductions, valuation of inventories, and the sources and cost of financing. The corporate income tax rates are 35 percent in Argentina, but can reach much higher levels because firms are not allowed to adjust their stocks with inflation (the tax rates on actual profits may reach up to 50 percent). On the other hand, many firms have been able to write off tax obligations with the big losses that they endured during the 2001–02 crisis. The discretionality of tax policies may be more harmful for investment than the level of taxation. The econometric analysis shows that tax burden volatility appears to have been a binding constraint in the recent past (2002–4), but this constraint seems to have been alleviated in the present. However, because of the discretionary nature of the policymaking process in Argentina and the lack of checks and balances for the executive branch, the possibility can not be ruled out of a return to more volatile taxation in response to a weakening of the fiscal result and/or distributive tensions.

Considering several indicators of transaction costs (such as time and cost to start a new business or to close a business, enforcing

[49] In the same vein, according to Mody and Schindler (2004), Argentina's low average growth rate during 1960–2000 can be explained in the context of a cross-country study as resulting from its high level of fiscal volatility. However, fiscal volatility in Argentina, as measured by these authors, appears to be declining over time and is currently below the Latin American average, hence suggesting that this is no longer an important constraint on medium-run growth.

contracts, and paying taxes), Argentina appears to be in a relatively favorable position vis-à-vis Latin America in some areas and in a less favorable position regarding others.[50] It compares relatively well with East Asian countries (except in the area of paying taxes), but ranks unfavorably vis-à-vis the OECD countries in all these indicators. The cross-section regressions for firm-level investment based on the World Bank Doing Business Survey yield negative but statistically insignificant coefficients for most transaction cost indicators.[51] Hence transaction costs appear to be a nuisance for investment, but not a binding constraint.

The nonbinding constraints on the structural transformation of exports include the capabilities and opportunities for developing new exports, proxied by the "open forest" measure of Hausmann, Hwang and Rodrik (2005), which were shown above to be somewhat favorable on average. Domestic trade policies do not seem to be unfavorable either, except for the time inconsistency of export taxes. Average EU and NAFTA tariffs on imports of the most attractive goods not yet exported by Argentina have not been binding constraints either (although there are sizable tariff peaks), but the high average tariffs imposed by East Asian and Latin American countries—more natural markets for new modern Argentine exports—could be more harmful.

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[50] For instance, starting a business in Argentina involves more procedures than in the average Latin American country, the OECD, and East Asia, but costs less (in terms of per capita gross national income) than in all these regions, except for the OECD. Paying taxes in Argentina is more costly, in terms of money and time, than in the average Latin American country, the OECD, and East Asia. On the other hand, enforcing contracts in Argentina involves less time and money and fewer procedures than the Latin American average, and more than in the OECD, and while it takes longer to enforce than in East Asia, it is cheaper to do so. Finally, closing a business in Argentina is cheaper and usually takes less time than in these other regions, except for the OECD. World Bank. *Doing Business Survey.*

[51] They only yield a negative and significant statistical and economic effect on private investment of the share of managerial time that is spent in dealing with government regulations. The average time spent in dealing with regulations is 13.7 percent of the managerial time. If this time were cut in half, the regressions suggest that investment would be boosted by 6 percent.

Lack of a venture capital market is a binding constraint on research and innovation, but this constraint is of a second order relative to poor intellectual property rights and low engagement in the world flow of ideas. Additionally, this insufficient private financing is partially substituted by government financial support programs like FONTAR and FONCYT.[52] The tax treatment of research and innovation is neutral. Lack of adequate human capital for business sector research and innovation may be a binding constraint to this activity. However, the presence of a relatively large stock of researchers and scientists in the public sector can be tapped to generate the required human capital, provided the other binding constraints are removed first. While this is not a trivial process, it can be done—as has been shown in the case of the development of the biopharmaceutics export industry (see Sánchez et al., 2007).

Conclusion and Policy Recommendations

Argentina's growth problems involve a very low trend growth and an inability to turn its periodic growth accelerations into a sustained shift toward bigger trend growth. These factors have led to a divergence from world income and productivity growth during the past three decades. Both low investment and poor TFP growth arising from insufficient structural transformation of exports and research and innovation have contributed to this outcome. This study suggests that the biggest payoffs for greater growth come from maintaining or marginally improving the current investment rate and from undertaking relatively small, and easier to finance, improvements in productivity-enhancing activities.

Relieving binding constraints on all the sources of growth is advisable, but more is required from the activities that have fallen further behind: technological and export innovation. This recom-

[52] FONTAR (Fondo Tecnológico Argentino) finances innovation projects. FONCyT (Fondo para la Investigación Científica y Tecnológiica), finances scientific and technological research.

mendation follows from the facts that investing in capital accumulation and in technological knowledge acquisition are complementary activities, and that each of these investments has diminishing returns on its own. Argentina's observed technological backwardness has higher growth costs than capital shallowing because of the greater elasticity of output to TFP than to capital. In addition, while greater investment, by itself, could contribute to reaching the desired growth rate, generating the domestic savings and access to international finance to finance the required increase in investment appears to be either too costly or unfeasible because of political economy considerations.

Modestly increasing investment rates demands preserving macroeconomic stability (so as to reduce the probability of discretionary policies and expropriation shocks), providing adequate infrastructure, and taking care of the latent constraints associated with poor financial intermediation and poor access to international finance. The removal of the more permanent sources of low appropriability that result from poor institutional design may prove very difficult, at least in the short run.

Regarding infrastructure, the priorities for investment appear to be in the area of energy generation, transportation, and distribution, followed by transportation. There is an obvious tradeoff between direct government investment in infrastructure and maintaining fiscal sustainability (a requirement for macroeconomic stability). Hence greater private sector investment in infrastructure is recommended. Improving financial intermediation requires maintaining macroeconomic stability and would benefit strongly from the continuation of government-supported financing products aimed at alleviating the credit market imperfections that generate financial constraints, especially on small and medium enterprises. Programs aiming at providing tax relief can also help by enhancing the availability of internal funds to finance investment. More emphasis should be given to targeting these programs toward financing investments in new, sophisticated, export-oriented activities. Taking steps toward creating deeper capital markets and especially toward

improving access to international financial markets are also highly recommended.

The small required improvement in research intensity would demand policy and regulatory changes that enhance Argentina's engagement in the world flow of ideas (more capital good imports and FDI from high-knowledge countries, better ITC infrastructure, relocating researchers from the public sector to private firms) and that improve appropriability (through better protection of intellectual property rights). While this strategy promises large payoffs, it nevertheless demands a sizable coordination effort for the provision of the required public goods, adequate design of the programs to subsidize and/or finance research and innovation (and information gathering), and macroeconomic sustainability.

The attraction of more FDI from high-knowledge countries is conditioned by the local investment climate and by the nature of the preferential trade agreements of the particular country. Increasing capital good imports from high-knowledge countries is contingent on the nature of the international trade agreements and also on the real exchange rate. The reallocation of public sector researchers to the private sector demands improving the functioning of the national innovation system allowing and promoting steps such as getting researchers involved in internships in business firms, undertaking consulting, and creating their own commercially oriented spin-offs.

Since this is an activity that is fraught with externalities, sizable government intervention would be required. When designing programs that support R&D and innovation, special care should be given to evaluating the technological frontier of the supported projects (for instance, the initial quality gap with the exports of industrialized countries), and to promoting better access to, and use of, information and telecommunications technology infrastructure (an important source of access to world knowledge flows). These programs should also promote the incorporation of public sector researchers to private sector endeavors, and evaluate the sensitivity of the projects to intellectual property rights. A lot can be learned

from the experience of countries like Israel that actively promoted research and innovation through support programs and institutions that used tournaments to choose among competing projects.[53]

Finally, the promotion of the development of more sophisticated exports with bigger technological frontiers requires policies and institutions that address the coordination and information externalities that hamper them. The policy agenda for dealing with these market failures may include direct government involvement—as in the case of Fundación Chile, which got involved in public-private joint ventures to "discover" the salmon and berries sectors in Chile—or through targeted contingent subsidies and financing. This agenda may also involve dealing with coordination failures through the direct provision of industry-specific public goods or through the coordination of their provision by the private sector.

The choice of projects to support should take into account the export sophistication and technological frontier involved, the adequacy of the underlying accumulated capabilities, and the barriers to access foreign markets, as well as the nature of the externalities involved (whether they are related to local costs of production, foreign demand, and/or best commercialization strategies, or the provision of industry-specific public goods). These factors will condition the expected growth effects of the projects, and also the choice of optimal support instruments.

One important issue is at what stage the government should promote these new exports: from scratch, or after some precompetitive investments by the private sector had shown great promise. The case studies analyzed by Sánchez et al. (2007) favor the latter view, showing how investment in experimentation, provision of industry-specific public goods, and diffusion could have been optimized through a timely government intervention after private entrepre-

[53] See Trajtenberg (2005) for an enlightening discussion of the hits and misses of the Israeli institutions and support programs for R&D. For instance, while the programs were very successful in furthering R&D and innovation in the information and telecommunications technology sector, they failed to foster technological change in the rest of the economy due to design problems.

neurs had discovered the profitability of the new export activity. In this vein, the design of tournaments that—based on accumulated capabilities and expected social returns—choose among competing projects that already have some precompetitive development could be an adequate mechanism for the required transmission of information to policymakers.

Beyond the possibility of establishing targeted support programs, there is a more basic and horizontal agenda that would help reduce the cost of experimentation: improving the functioning of government agencies that are involved with technical assistance to, and regulation of, agricultural and industrial activities, such as the food safety agency, the national industrial technology and agricultural technology institutes, and the metrology bureau. Different cases where these agencies' intervention has added incremental costs to the discovery process are illustrated in Sánchez et al. (2007). The discovery process would also be facilitated by avoiding time-inconsistent trade policies, reducing the anti-export bias of domestic trade policies, and gearing international trade negotiations toward opening markets for new sophisticated goods, rather than focusing exclusively on current exports. This last recommendation applies especially to regional trade agreements with Latin American and East Asian countries.

The policy agenda for promoting technological and export innovation is less straightforward than removing the binding constraints on investment (infrastructure, volatility, financing), as it entails substantial information gathering, capacity building, and resolution of coordination externalities. Hence perhaps a bigger constraint lies in the capabilities of policymakers and the time required to build these capacities.

References

Appelbaum, Elie and Katz, Eliakim. 1986. "Measures of Risk Aversion and Comparative Statics of Industry Equilibrium." *American Economic Review*. 76: 524–29.

Barro, R. and Lee, J. 2000. "International Data on Educational Attainment: Updates and Implications." Working paper No. 7911. Cambridge, MA: National Bureau of Economic Research.

Blyde, Juan. 2004. "Trade and Technology Diffusion in Latin Diffusion in Latin America." *The International Trade Journal*. 18(3): 177–197(21).

Bourguignon, F. 2001. "The Pace of Economic Growth and Poverty Reduction." Paper prepared for LACEA (Latin American and Caribbean Economic Association), Mimeographed document.

Caselli, F. and Coleman, W. 2001. "Cross-country Technology Diffusion: The Case of Computers." *American Economic Review Papers and Proceedings*. 91: 328–35.

Cockburn, I. and Griliches, Z. 1988. "Industry Effects and Appropriability Measures in the Stock Market's Valuation of R&D and Patents." *American Economic Review*. 78(2): 419–23.

Coe, D., Helpman, E. and Hoffmaister A. 1997. "North-South Spillovers." *Economic Journal*. 107: 134–49.

De Ferranti, D., Perry, G., Lederman, D., and Maloney, W. 2002. *From Natural Resources to the Knowledge Economy.* Washington, DC: World Bank.

Della Paolera, Gerardo and Gallo, Ezequiel. 2003. "Epilogue: The Argentine Puzzle." In: Gerardo Della Paolera and Ezqueriel Gallo, editors. *A New Economic History of Argentina*. Cambridge, England: Cambridge University Press.

Devereux, M. and Schiantarelli, F. 1989. "Investment, Financial Factors and Cash Flow: Evidence From UK Panel Data." Working paper No. 3116. Cambridge, MA: National Bureau of Economic Research.

Dixit, Avinash and Pindyck, Robert S. 1994. *Investment Under Uncertainty.* Princeton, NJ: Princeton University Press.

Eaton, J. and Kortum, S. 1996. "Trade in Ideas: Patenting and Productivity in the OECD." *Journal of International Economics*. 40: 251–78.

———. 2001. "Trade in Capital Goods." *European Economic Review*. 45(7): 1195–1235.

Fazzari, Steven M., Hubbard, R. Glenn and Petersen, Bruce C.. 1988. "Financing Constraints and Corporate Investment." *Brookings Papers on Economic Activity* 1: 141–95. Also published as Working paper No. W2387. Cambridge, MA: National Bureau of Economic Research.

Gallego, F. and Loayza, N. 2000. "Financial Structure in Chile: Macroeconomic Developments and Microeconomic Effects." Working Paper No. 75. Santiago, Chile: Central Bank of Chile.

Gilchrist, S. and Himmelberg, C. 1998. "Investment, Fundamentals and Finance." Working paper No. W6652. Cambridge, MA: National Bureau of Economic Research.

Givogri, Carlos. 1990. *La Productividad del Capital en Argentina*. Buenos Aires, Argentina: IERAL (Instituto de Estudios sobre la Realidad Argentina y Latinoamericana).

Greenwald, Bruce, and Stiglitz, Joseph. 1990. "Macroeconomic Models with Equity and Credit Rationing." In: R. Glenn Hubbard, editor. *Asymmetric Information, Corporate Finance and Investment.* Chicago, IL: University of Chicago Press, 15–42.

Griffith, R., Redding, S. and Van Reenen, J. 2000. "Mapping Two Faces of R&D: Productivity Growth in a Panel of OECD Industries." London, England: London School of Economics. Mimeographed document (November).

Hall, B. and Oriani, R. 2004. "Does the Market Value R&D Investment by European Firms? Evidence from a Panel of Manufacturing Firms in France, Germany, and Italy." Working paper No. 10408. Cambridge, MA: National Bureau of Economic Research.

Hausmann, R., and Klinger, B. 2006. "Structural Transformation and Patterns of Comparative Advantage in the Product Space." Working paper No. 128. Cambridge, MA: Center for International Development, Harvard University.

Hausmann, Ricardo, Hwang Jason, and Rodrik, Dani. 2005. "What You Export Matters." Working paper No. 11905. Cambridge, MA: National Bureau of Economic Research.

Hausmann, R., Rodrik, D. and Velasco, A. 2005. "Growth Diagnostics." Cambridge, Massachusetts, United States: John F. Kennedy School of Government, Harvard University (March).

Howitt, P. 2000. "Endogenous Growth and Cross-Country Income Differences." *American Economic Review*. 90(September): 829–46.

Hwang, J., 2006. "Introduction of New Goods, Convergence and Growth." Cambridge, MA: Harvard University. Mimeographed document.

Jones, B.J. and Olken, B.A. 2005. "The Anatomy of Start-Stop Growth." Working paper No. 11528. Cambridge, MA: National Bureau of Economic Research.

Jones, C. and J. Williams. 1998. "Measuring the Social Return to R&D." *Quarterly Journal of Economics*. 113(November): 1119–35.

Keller, W. 2001a. "Geographic Localization of International Technology Diffusion." *American Economic Review*, 92(1,March): 120–42.

———. 2001b. "Knowledge Spillovers at the World's Technology Frontier." Working paper No. 2815. London, United Kingdom: Centre for Economic Policy Research,

———. 2004. "International Technology Diffusion." *Journal of Economic Literature*. 42(3): 752–82.

Kinoshita, Y. 2000, "R&D and Technology Spillover via FDI: Innovation and Absorptive Capacity." Mimeographed document.

Klenow, P. and Rodríguez-Clare, A. 2005. "Externalities and Growth." In: P. Aghion and S. Durlauf, editors, *Handbook of Economic Growth,* Volume 1A, 817–61 (chapter 11). Amsterdam, The Netherlands: North-Holland. Also published as Working paper No. 11009. Cambridge, MA: National Bureau of Economic Research.

Klinger, B. and D. Lederman. 2004. "Discovery and Development: An Empirical Exploration of New Products." Policy research working paper No. 3450. Washington, DC:: World Bank.

Lederman, D. and Saenz, L. 2005. "Innovation and Development around the World, 1960–2000." Policy research working paper No. 3774. Washington, DC: World Bank (November).

Mody, A. and Schindler, M. 2004. "Argentina's Growth: A Puzzle?" Washington, DC: International Monetary Fund (February).

Psacharopoulos, G. and Patrinos, H. 2002. "Returns to Investment in Education: A Further Update." Policy research working paper No. 2881. Washington, DC:: World Bank.

Rumelt, R. 1984. "Towards a Strategic Theory of the Firm." In: B. Lamb, editor, *Competitive Strategic Management.* Englewood Cliffs, NJ: Prentice Hall.

Sánchez, Gabriel and Butler, Inés. 2004. "Market Institutions, Labor Market Dynamics and Productivity in Argentina during the 1990s." *Journal of Policy Reform.* 7(4): 249–278.

———. 2007. "Inversión en Argentina: Evolución reciente y perspectivas." Washington, DC: Inter-American Development Bank. Mimeographed document.

Sánchez, Gabriel, Nahirñak, Paula, and Ruffo, Hernán. 2006. "La innovación en las empresas argentinas una Mirada comparativa entre países." Documento de Discusión de IERAL. Buenos Aires, Argentina: IERAL (July).

Sánchez, Gabriel, Ruffo, Hernán, Butler Inés, and Rozemberg, Ricardo. 2007. "The Emergence of New Successful Export Activities in Argentina: Self-Discovery, Knowledge Niches, or Barriers to Riches?" Washington, DC: Inter-American Development Bank. Mimeographed document.

Solimano, Andrés and Raimundo Soto. 2004. "Latin American Economic Growth in the Late 20th. Century: Evidence and Interpretation." Working paper No. 276. Santiago, Chile: Instituto de Economía, Pontificia Universidad Católica de Chile.

Spiller, Pablo and Mariano Tommasi. 2003. "The Institutional Foundations of Public Policy: A Transaction Costs Approach

with Application to Argentina." *Journal of Law, Economics and Organization*. 19(2): 281–306.

Taylor, A. 1998. "Argentina and the World Capital Market: Saving, Investment and International Capital Mobility in the Twentieth Century." *Journal of Development Economics*. 57(1): 147–84.

Trajtenberg, M. 2005. "Innovation Policy for Development: An Overview." Paper prepared for Second Annual Meeting of the Latin America/Caribbean and Asia/PacificEconomics and Business Association (LAEBA), Buenos Aires, Argentina. Mimeographed document.

Villalonga, B. 2004. "Intangible Resources, Tobin's Q, and Sustainability of Performance Differences." *Journal of Economic Behavior & Organization*. 54: 205–30.

World Bank. Doing Business Surveys. http://www.doingbusiness.org/.

———. Governance Indicators, http://go.worldbank.org/D353HLMTO0

———. World Development Indicators. http://go.worldbank.org/IW6ZUUHUZ0.

———. World Integrated Trade Solution (WITS). Various years. http://wits.worldbank.org

Xu, B. 2000. "Multinational Enterprises, Technology Diffusion, and Host Country Productivity Growth." *Journal of Development Economics*. 62: 477–93.

Xu, B. and Wang, J. 1999. "Capital Goods Trade and R&D Spillovers in the OECD." *Canadian Journal of Economics*. 32: 1258–74.

CHAPTER 3

What Is Impeding Growth in Brazil?

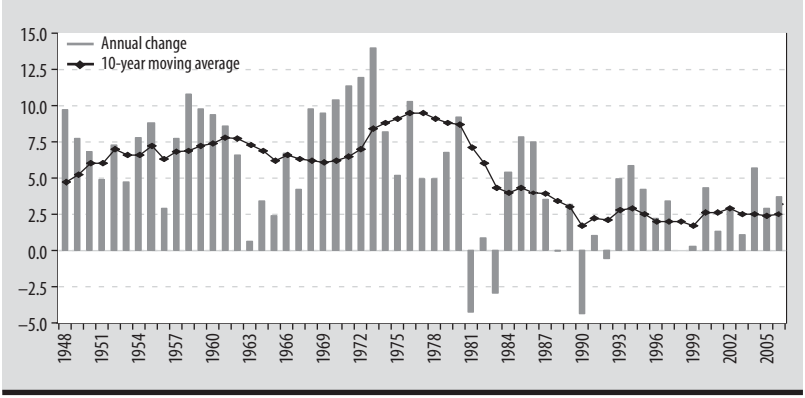
*Juan Blyde, Armando Castelar Pinheiro, Christian Daude, and Eduardo Fernández-Arias**

Overview of the Brazilian Economy

In the first eight decades of the twentieth century, Brazil had one of the highest growth rates in the world. From 1930 to 1980, in particular, it managed to reduce its per capita income gap vis-à-vis industrialized economies and seemed poised to escape underdevelopment early in the twenty-first century. However, this dream never materialized. Brazil's growth performance deteriorated sharply over the following quarter century, never fully recovering from the second oil shock and the foreign debt crisis (Figure 3.1). In this period, Brazil experienced much lower and more volatile growth, with its long-term annual growth rate (ten-year moving average) fluctuating in the 2 to 3 percent range, well below the 6 to 10 percent range that prevailed in 1950–80. Brazil reacted by embarking on reforms, from trade liberalization to changes in fiscal and social policies.

* Juan Blyde, Christian Daude, and Eduardo Fernández-Arias are with the Inter-American Development Bank. Armando Castelar Pinheiro is affiliated with the Instituto de Pesquisa Econômica Aplicada (IPEA) and the Instituto de Economia da Universidade Federal do Rio de Janeiro (IE-UFRJ).The authors are grateful to Peter Montiel and Mauricio Mesquita Moreira for helpful discussions and suggestions and to Maria Fernández-Vidal for excellent research assistance.

FIGURE 3.1 Real GDP Growth, 1950–2005
(percent)



Source: Instituto Brasileiro de Geografia e Estadística (IBGE).

Policies improved, especially after price stabilization in 1994, and, if anything, have been better than through most of the high growth period, but apparently to no avail. Something happened in this later period that prevented Brazil from regaining the rapid growth that it had exhibited previously. What might it have been?

The original slowdown of the Brazilian economy took place in a period in which other countries were also forced to lower their growth rates in adjusting to the second oil shock, the tightening of the U.S. monetary policy, and the ensuing debt crisis. Although not all countries were equally hurt by these shocks, with Chile and Korea being notable exceptions, world GDP growth declined quite considerably in 1981–94, dropping by a third from its 1951–80 level. Latin America suffered even more, with growth rates falling to less than half their previous average level. Brazil was even more intensely affected, with GDP growth declining by 5.4 percentage points, almost twice as much as the Latin America average and more than three times the drop in world growth.

The timing of Brazil's slowdown seemed to confirm that it stemmed largely from a high sensitivity to the performance of the world economy, exacerbated by its dependence on import substitution, industrialization, oil imports, and foreign savings. This view

was reinforced, with somewhat different undertones, by the failure to accelerate growth in 1995–2002, when Brazil suffered several shocks in financial markets, including Mexico's forced devaluation in December 1994, the difficult political transition in Brazil, the Asian crisis, Russia's default, and Argentina's complicated abandonment of the convertibility regime. In particular, this sensitivity to shocks in international financial markets seemed to confirm that growth in Brazil, as well as in most of Latin America, was hindered by its low domestic savings, which put it at the mercy of foreign savers' willingness to bank the country's large external financing needs.

However, given the performance of the economy in 2003–06, it is doubtful whether these externally based explanations can account for Brazil's failure to recover its past dynamism. Brazil, as well as the rest of the region, has especially benefited from the upswing in the world economy, which boosted the demand and prices of commodities. However, its GDP growth accelerated only slightly, and less than in the rest of the region and the world as a whole. Moreover, this period has witnessed a large expansion in international liquidity and in the appetite for emerging market risk. While Brazil has been able to tap international financial markets at a declining cost, it became a net foreign saver, with an average current account surplus of 1.5 percent of GDP in 2003–06, in contrast to a deficit more than twice as large in 1996–2002. This suggests that Brazil's poor economic performance stems from more than just a reaction to adverse external shocks, and that whatever was lost in the early 1980s had probably not been recovered by 2003–06.[1] In particular, this suggests that the current binding constraints on growth are more likely to be in the domestic side of the economy than in its interactions with the rest of the world.

[1] Incidentally, note the likeness between Brazilian and Mexican growth rates, which suggests that despite relatively divergent paths in the last decade, the two countries might face similar impediments to growth. In particular, their experiences coincide in suggesting that price stability, sound external accounts, and trade openness were not sufficient to bring growth back to the previous levels.

These constraints should be able to specifically account for Brazil's low rate of capital accumulation, which is responsible for a large share of the observed contraction in GDP growth (Table 3.1). Four-fifths of this contraction came from the sharp drop in labor productivity growth and the other fifth stemmed from lower employment growth. Using a Solow-type growth accounting decomposition, it is estimated that the slowdown in labor productivity from the 1961–80 to 1981–94 periods—that is, the slowdown in the expansion of GDP per worker in the more recent period—resulted in roughly equal parts from slower growth of capital per worker and the reduction in the growth rate total factor productivity (TFP). In turn, the partial recovery in 1995–2006 resulted entirely from the acceleration in TFP growth. This indicates that growth has been constrained primarily by a low rate of capital accumulation, which has failed to resume the pace it achieved before the foreign debt crisis—even after price stabilization, structural reforms, and expanded access to foreign financing.

The slowdown in capital accumulation reflected, in turn, the decline in the rate of investment. In current prices, the rate of investment plunged from 21 percent of GDP in 1968–78, the period of fastest GDP growth, to 16 percent of GDP in 2003–05 (16.8 percent of GDP in 2006). Because the relative price of investment goods vis-à-vis the price of consumption goods and services increased between these two periods, the real drop in investment was even

TABLE 3.1 **Decomposition of Growth in GDP per Worker**
(average annual change in variables, percent)

Variables	1947–60	1961–80	1981–94	1995–2006
GDP/worker	4.5	4.0	–0.2	0.5
Capital/worker	7.4	5.0	0.7	–0.7
TFP	1.0	1.7	–0.5	0.9
Labor	2.5	3.1	2.1	2.1

Source: Authors' calculations.

Note: The analysis uses a Solow decomposition with labor and capital shares of 0.531 and 0.469, respectively, estimated from average shares in value added in 2000–04.

more significant than suggested by the current price figures. When measured in "constant" 1980 prices, the rate of investment fell from 22.8 percent of GDP in 1968–78 to 13.3 percent of GDP in 2003–05. Half this decline resulted from the rise in relative prices, with the other half stemming from the contraction in the investment effort: that is, the rate measured at current prices.

Two stylized facts are worth noting about this contraction in the investment rate:[2]

- The decline in the rate of investment resulted essentially from a major contraction in public investment. The rate of investment of public administration fell by 2.3 percent of GDP between 1967–78 and 2003–05, while that of federal state-owned enterprises (SOEs) dropped by 2.9 percent of GDP in the same comparison.[3] By these accounts, the public effort to support investment faltered by more than 5 percent of GDP and would fully explain the decline. Although part of the decline in SOE investment stems from changes in classification, as a result of privatization, the bulk of it had already happened by 1990–94, before the peak of privatization in 1996–98. Indeed, the decline in public investment is underestimated, for it does not take into account the contraction in investment by state and municipal SOEs. The main consequence of this decline in public investment has been

[2] Data for the relative price of investment goods in 1987–89 and, to a lesser extent, in 1990–94, are apparently distorted, possibly due to measurement problems stemming from the very high inflation observed in this period. Due to the way investment and savings were estimated in that period—from investment at constant prices to investment in current prices, then equated to total savings, from which foreign savings were subtracted—this study abstains from analyzing these variables in these two periods.

[3] Gobetti (2006) and Afonso, Biasoto and Freire (2007) note that the decline in public investment has been even more significant than captured in the official statistics because part of the capital expenditures counted in one year are disbursed only in the following years. For the federal public administration alone, this meant that the actual investment in 2004–05 was 0.14 percent of GDP lower than shown in the national accounts statistics.

the deterioration in the quantity and quality of infrastructure, an issue discussed later in this chapter.[4]

- There was a major contraction in domestic savings from 1967–78 to 1995–2002, largely explained by the decline in public savings. In 2003–05 there was a substantial increase in private savings, which compensated for the decline in foreign savings, which in this recent period turned negative. Thus, while the rate of investment declined by 4.9 percent of GDP between 1967–78 and 2003–05, public savings dropped by 5.2 percent of GDP, foreign savings fell by 2.8 percent of GDP, and private savings rose by 3.1 percent of GDP. These figures suggest that there is a reasonable scope to finance an increase in the rate of capital accumulation by raising public and foreign savings, as long as they do not crowd out private savings.

Recent papers have linked the decline in public investment to the effort to generate large primary surpluses. Fay and Morrison (2005, p. 8), for instance, argue that in "most Latin American countries, public investment, particularly in infrastructure, bore the brunt of fiscal adjustment." Easterly and Servén (2003) make a similar argument and ask whether the strategy to sustain large primary surpluses is not self-defeating, since by compressing public investment, notably in infrastructure, growth decelerates and makes fiscal discipline more difficult to sustain. In this sense, the effort to cut down the fiscal deficit in the early 1980s may have prompted governments to lower public investment, including that of SOEs, a more politically palatable policy than cutting salaries, especially while the country was returning to a democratic regime; however, it is much harder to use the same argument to explain more recent cuts and, indeed, why public investment has not returned to previous levels. Between 1995 and 2003 current government revenues increased by 7.2 per-

[4] Indeed, the bulk of federal SOE investment in recent years has been in the oil sector, not infrastructure.

cent of GDP, whereas the primary surplus went up by 2.7 percent of GDP and investment came down by 0.8 percent of GDP. That is, the increase in revenues went well beyond what was needed to increase the primary surplus, yet public investment continued to fall. This pattern continued in the years that followed, with the tax burden reaching an estimated 35.3 percent of GDP in 2006 and the primary surplus 3.9 percent of GDP.

This expansion in current expenditures, on the back of continued increases in the tax burden and the lowering of public investment, might have compromised growth in different ways, including indirect channels such as the increase in informality discouraging productivity growth and human capital accumulation (McKinsey, 2004) and the burden of monetary policy as a policy instrument for economic stabilization, which would contribute to macroeconomic instability and boost interest payments on the public debt, thus discouraging investment and growth (Adrogué, Cerisola and Gelos, 2006). Ferreira and Nascimento (2005) estimate that the decline in public investment has diminished annual GDP growth by about 0.4 percentage points, while the rise in taxes, by substantially increasing the capital tax rate, reduced incentives to invest and lowered annual GDP growth by about 1.5 percentage points.[5] Not surprisingly, the World Bank's 2003 Investment Climate Survey (ICS) in Brazil reveals that firms rate the high tax burden as the most important obstacle to their growth and mention the high cost of finance as the second most important (World Bank, 2003).

Following this preliminary overview of the Brazilian economy, the next sections proceed to analyze these and several other hypotheses regarding the binding constraints on an acceleration of Brazil's GDP growth within the theoretical framework, or growth diagnostic

[5] See World Bank (2007a) for further evidence on the negative impact on growth of the rise in the tax burden and the changed composition of government spending. In particular, the study argues that "the long-run elasticity of per capita GDP with respect to the public capital stock is larger than of the private capital stock" (page 27) and that higher taxes reduce GDP growth by depressing private capital accumulation.

methodology (GDM), proposed by Hausmann, Rodrik and Velasco (2005). The interested reader can find a more detailed version of this research in the working paper version.

Hypotheses Testing: Low Returns to Private Physical Investment

Low Appropriability

Private physical investment and growth are limited by the inability of private investors to capture the totality of the social return produced. This study found evidence that high and inefficient taxation in Brazil imposes severe disincentives to investment and is a binding constraint on growth. However, contrary to alternative views, the diagnostics work did not find constraints in the so-called investment climate or impediments induced by the high level of informality to be severe. Furthermore, the analysis did not find noteworthy distortions in investment that would result in weaknesses in the patterns of economic structural transformation or innovation.[6]

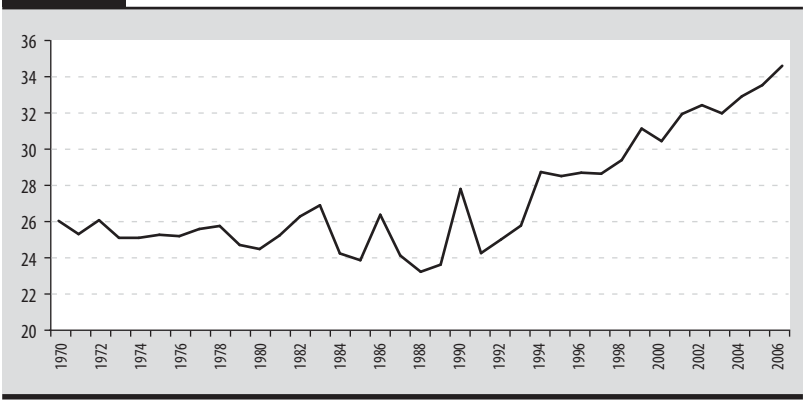
Distortionary Taxes

Complaints about the high tax burden in Brazil are generalized across the country. Figure 3.2 shows the evolution of the tax burden. While it was around 25 percent in the 1970s, 1980s, and part of the 1990s, it has been rising almost continuously since then. Starting in 1996, the tax burden has increased by around 1 percent of GDP every year. In 2006 it reached 34.5 percent, a very high rate by international standards. Figure 3.3 shows the tax burden for several developed and developing countries, together with the levels of GDP per capita.[7] Brazil's tax burden looks high for its level of income. A country with the income of Brazil would typically have a tax burden

[6] On the latter, the interested reader is referred to the working paper version of this study.

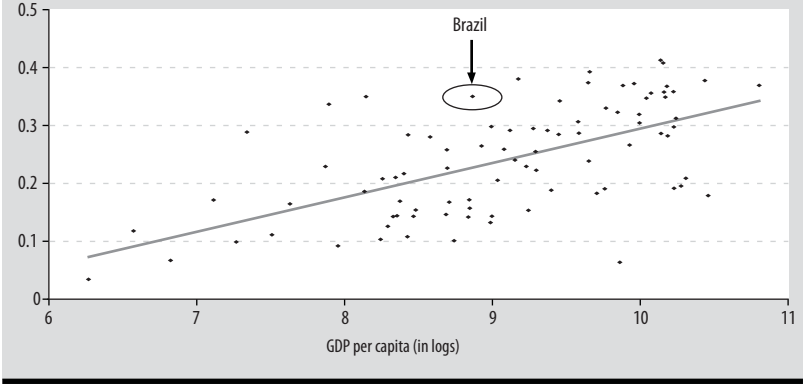
[7] Data range from 2002 to 2005.

FIGURE 3.2 Evolution of the Tax Burden in Brazil, 1970–2006



Source: IBGE and Instituto Brasileiro de Planejamento Tributario (IBPT).

FIGURE 3.3 Tax Burden, Selected Countries, 2002–5
(*percent of GDP*)



Source: IBPT, World Bank World Development Indicators (WDI), and Penn World Tables (PWT).

that is around 10 percentage points of GDP lower. The question then is whether this high tax burden is harming the country's economic growth.

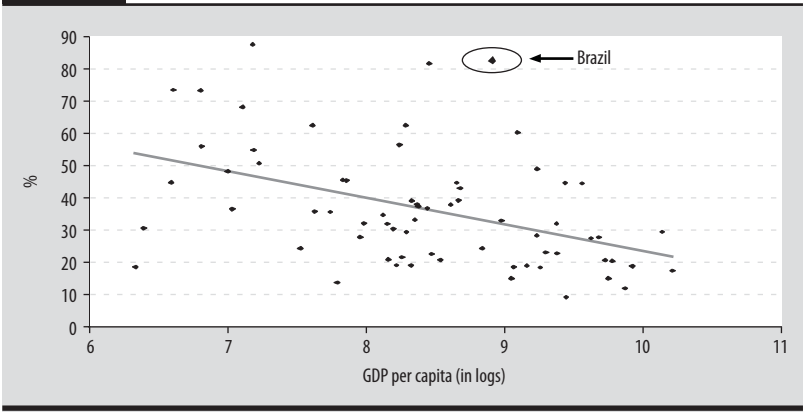
The endogenous growth theory provides the appropriate framework to link taxes and growth. Under this framework, a tax on capital income would lower its after-tax return, creating a disincentive to accumulate capital. Hausmann, Rodrik and Velasco (2005) (HRV) recognize that there is a high level of taxation in Brazil, but they tend

to downplay the disincentive effect on growth. Rather, they focus on the income effect of a very large part of national income being taxed away in order to finance the high levels of entitlements and social transfers. The central HRV story in this regard is a story of a macroeconomic distortion of low disposable income (there are not enough savings to invest due to the high tax burden on domestic income)—not one of a microeconomic distortion, in which high taxes reduce the incentives to invest because they depress the returns to capital. That is to say, they view the tax system as transferring funds from high-saving to low-saving agents, lowering aggregate savings, and in this way limiting investment levels.

The argument that taxes affect growth by reducing disposable income and thus constraining the available resources for investment is in principle plausible. For example, according to the Instituto Brazileiro de Planejamento Tributario (IBPT), if one adds the taxation incidence on wages (the employee's responsibility) to that on consumption, on average, 35 percent of the wage-earned incomes gets deducted at the source or included as taxes on the acquired products and services. The incidence on company earnings can be even higher. There is one factor, however, that weakens this hypothesis. If a country has full access to international capital markets, then the decisions for savings and investment should be independent from each other. As discussed later, this has not necessarily been the case for Brazil in the past, but since 2003, external financing conditions have not seemed to be a major constraint on economic growth. Therefore, the story of low disposable income from high taxation might be less relevant today than in the recent past.

The above argument does not imply, however, that taxes have ceased to be a constraint and are not affecting economic growth in Brazil today. To start, it is worth exploring how the high level of taxation may have significantly lowered the incentives to invest by affecting the private returns to capital. According to the Investment Climate Survey for Brazil, for example, entrepreneurs in Brazil view the high tax rate as the number one obstacle to firm's investment and growth. It is possible that the majority of firms in the country

FIGURE 3.4 Percentage of Firms Indicating "Tax Rates" as a Major or Severe Obstacle to Growth, Selected Countries, 2000–1



Source: Authors' calculations employing 68 Investment Climate Surveys.

view the tax rate as a very important limitation on growth simply because it is such a tangible factor relative to other obstacles included in the survey. If so, however, this would be observed for other countries, too. Figure 3.4 indicates that this is not the case. In some countries, the percentage of firms indicating that the tax rate is a major problem for growth is as low as 10 percent (far lower than many other factors). According to the figure, there is also a stable relationship where the higher the income of the country, the lower the percentage of firms in that country that complain about the tax rate, while Brazil is way above the curve, scoring second among the 68 countries surveyed.

One outcome of the uneven Brazilian tax system is the large variability in the tax burden that exists across sectors of the economy. The analysis that follows takes advantage of this variance to ascertain whether there is an association between the sector's tax burden and its economic performance. There is a negative relationship between the tax burden of the sector and the growth rate of its value added.[8]

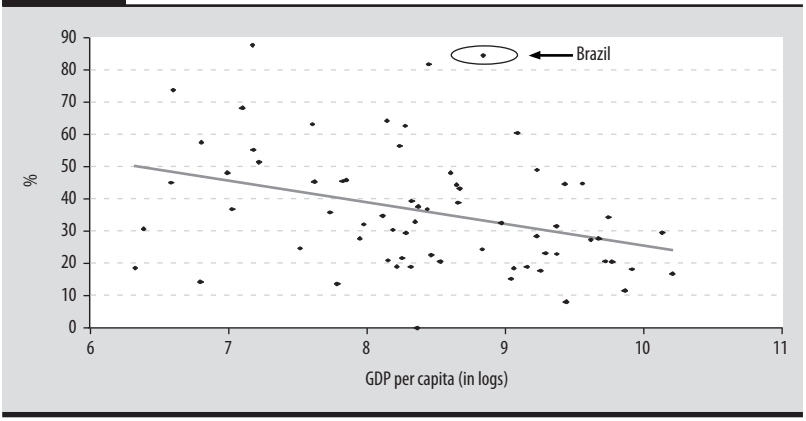
[8] The sector tax burden is calculated as a percentage of the sector's value added. Data is for the 2000–1 period. The source of this variable is Fundação Getulio Vargas. The growth rate for the sectoral value added is taken from IBGE.

(This relationship is statistically significant at conventional levels. While no causality can be alleged from this relationship, the result clearly is in line with the arguments made above.) A similar exercise was performed at the firm level. Using the Investment Climate Survey for Brazil, the firms responding that the tax rate is a major problem for growth were separated from the rest and the average growth rates of sales of the two groups was compared. The firms indicating that the tax rate is a problem grew on average 6 percentage points more slowly than their counterparts. This is not a major problem (the difference is statistically significant at the 1 percent level). This relationship also holds within sectors. In six of the nine sectors, firms indicating that the tax rate was a major problem grew on average more slowly than their counterparts within that sector. Once again, this is not a formal proof of the effect of taxes on firms' performance, but the evidence appears to support the hypothesis that the high level of taxation in Brazil lowers the returns to capital and thus the incentives to invest and grow.

The problems with the high tax rates are exacerbated if taxpayers must spend a considerable amount of time and effort paying the taxes. For instance, according to the IBPT, Brazil has 68 taxes and 3,200 tax codes, including laws, provisional measures, decrees, regulations, and institutions. There are also multiple tax rates and bases for calculation as well as several tax agencies. The high cost of complying with tax obligations in Brazil due to the existing tax complexities could be another factor hampering investment and growth. The amount of time that firms in Brazil spend on paying taxes and complying with tax regulation is not only the greatest in the entire sample of 173 countries, but also exceeds the sample average by more than seven times!

Figure 3.5 presents information from the Investment Climate Survey about tax administration (a reflection of the inefficiencies of paying taxes) as a constraint to growth. The percentage of firms indicating "tax administration" as a major obstacle to growth is once again extremely high, particularly when Brazil's level of income is taken into consideration.

FIGURE 3.5 Percentage of Firms Indicating "Tax Administration" as a Major or Severe Obstacle to Growth, Selected Countries, 2000–1



Source: Authors' calculations employing 68 Investment Climate Surveys.

A significant distortion in the Brazilian system relates to indirect taxes on goods and services, the most significant of which is the *imposto sobre circulação de mercadorias e serviços* (ICMS), a type of value-added state tax that has over 50 different rates. Within certain limits, each state is free to determine its rates. There is one tax code for each state (27), which complicates the tax administration of the entire system, particularly for contributors in more than one jurisdiction. Besides creating incentives for fiscal wars among states, the ICMS subjects interstate trade to many different and complex rules, probably limiting the free flow of inputs, goods, and services across the territory. Daumal and Zignago (2005), for example, show that market fragmentation in Brazil is high in comparison with other countries. For instance, a Brazilian state trades 11 times more with itself than with another Brazilian state. The equivalent figures in France, the United States, Canada, and Russia are 6, 4, 2, and 2, respectively.

This section has not presented a thorough evaluation of the impacts of Brazilian taxation on economic performance, which would go beyond the scope of this chapter. Rather, some simple benchmarks and associations have been presented to highlight the potential se-

verity of the problem. The hypothesis of a binding constraint cannot be proven, only rejected. Although a more complete investigation on the incidence of taxation in Brazil is required in order to fully grasp the microeconomic impacts of taxes on growth, the evidence presented does not allow one to reject the hypothesis that the size and complexity of taxes are binding constraints on economic growth in Brazil. More research on this point is warranted.

Other Less Important Investment Disincentives

Business environment. Recent studies highlight the importance of entry and exit dynamics of firms to promote growth and job creation in industrial and developing countries.[9] The key is to have an investment climate that promotes this process.[10] Countries can exhibit business environments in which it is costly to start up a business, costly to adjust employment, costly to close a business, and difficult to enforce contracts, among other things. These aspects tend to discourage investment and limit productivity growth. This section investigates whether Brazil has an inadequate business environment, and if so, whether this is a binding constraint on its economic growth.

Brazil does not rank well globally with respect to regulations and policies that affect the entry and exit of firms. In several indicators for starting and closing a business, for example, Brazil falls behind even the Latin American average. Brazil also performs poorly in terms of labor market flexibility, with recent analyses suggesting that job security could be a potential barrier to rapid labor reallocation, particularly during recessions. Enforcement of creditors' rights is another potentially important factor fostering market entry and performance. Countries with highly effective creditor rights normally

[9] See, for example, Bartelsman, Haltiwanger, Scarpetta (2004).

[10] "The investment climate is the set of location-specific factors shaping the opportunities and incentives for firms to invest productively, create jobs, and expand. Government policies and behaviors exert a strong influence through their impact on costs, risks, and barriers to competition" (World Bank, 2005).

show lower credit volatility, which is central to planning investment (Galindo, Micco and Suárez, 2004). There is still plenty of space to improve Brazil's creditor rights and, in general, the enforcement of contracts.

This preliminary assessment suggests that Brazil faces some limitations in its business environment that may be hindering competition and firm dynamism. The question is whether these limitations represent a binding constraint on economic growth today. One initial way to explore this question is to see whether Brazil's shortcomings are remarkably large relative to its level of development. To this end, business environment indicators were regressed on GDP and an assessment was made as to whether there is a Brazil gap. The first principal component of several "Doing Business" indicators from the World Bank were examined, along with a measure of the quality of regulation taken from Kaufmann, Kraay and Mastruzzi (2006), and a measure of the rule of law, also taken from the same authors. In all cases, these measures are associated with income. In each case, Brazil underperforms relative to what would be expected at its level of income, but the gap is not statistically significant.[11] This evidence suggests that there is probably a moderate weakness.

Another way to explore whether an inadequate business environment is an important constraint to growth is to look directly at the opinions of plant managers regarding the limitations to growth faced by their firms. The World Bank's Investment Climate Survey for Brazil was used to this end. One caveat to this exercise is that some distortions of the business environment might not appear as problems for the firms. For instance, entrepreneurs might not view distortions affecting creditors rights as problems because these distortions mostly affect creditors; however, they could have an indirect impact through the high cost of finance.

Table 3.2 indicates the percentage of firms that consider a particular obstacle to the expansion of their business as a "major"

[11] A test based on a linear combination of these three differences also turned out to be insignificant.

or "severe" constraint.[12] The table shows the results for the overall sample as well as for large firms and for a group including medium and small enterprises. According to the survey, obstacles related to the business environment are not at the top of the list. Labor regulations and anti-competitive practices are ranked 8th and 9th respectively. Concerns about the enforcement of contracts, which are related to the legal system and conflict resolution, are ranked 14th. A proxy for cost of entry is given by the difficulty of obtaining business licenses and operating permits. This obstacle is ranked 15th. Only "economic and regulatory policy uncertainty" appears high in the list, but the concern here seems to be centered on policies' "uncertainty" rather than on their contents. Only the high cost of financing could be related to problems in the business environment if they reflect, for instance, distortions affecting creditors' rights (as argued before).[13] According to this evidence, it seems that other obstacles, different from the government failure to provide an environment that facilitates competition and firm dynamism, might be more significant in limiting growth in Brazil today.

It should be pointed out that these surveys could exhibit some bias. That is, an inadequate business environment might have already limited the existence or growth of industries that are sensitive to this problem and thus they are not observed in the sample, while the ones being observed are the firms or industries for which this problem is not particularly important. For reasons of data availability, the exercise is focused on one particular area of the business environment: labor regulation.

There is a widespread notion that stringent labor regulations that increase the cost of hiring and firing affect firm dynamism in Brazil by limiting the possibility of adjusting employment when

[12] The precise question is "Please tell us if any of the following issues are a problem for the operation and growth of your business. If an issue poses a problem, please judge its severity as an obstacle on the following scale: 0 = No obstacle, 1 = Minor, 2 = Moderate, 3 = Major, 4 = Severe."

[13] The hypothesis of high cost of finance as a binding constraint is considered more thoroughly in the next section.

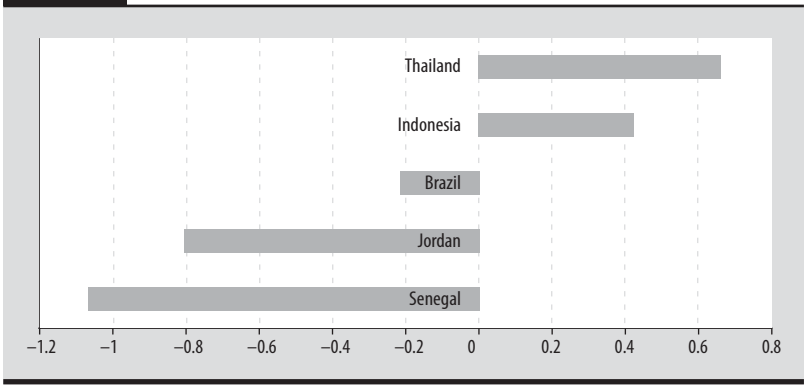
TABLE 3.2 Entrepreneurs' Perceptions of Obstacles to Growth, 2000–1
(percent)

Obstacles to growth	All firms	Large firms	SMEs
1. Tax rates	84.46	81.33	84.61
2. Cost of financing (interest rates)	83.18	81.33	83.27
3. Economic and regulatory policy uncertainty	75.90	70.67	76.15
4. Macroeconomic instability (inflation, exchange rate)	74.89	7.33	74.78
5. Corruption	67.20	45.33	68.25
6. Tax administration	66.14	60.00	66.43
7. Access to financing (such as collateral)	60.46	50.67	60.93
8. Labor regulations	56.87	57.33	56.85
9. Anticompetitive or informal practices	56.36	48.00	56.77
10. Crime, theft and disorder	52.23	40.00	52.82
11. Skills and education of available workers	39.61	29.33	40.10
12. Customs regulations	37.76	36.99	37.80
13. Trade regulations	34.78	34.72	34.78
14. Legal system/conflict resolution	32.84	30.67	32.95
15. Business licensing and operating permits	29.83	21.33	30.24
16. Electricity	20.29	18.67	20.37
17. Access to land	19.86	8.11	20.43
18. Transportation	19.26	25.33	18.97
19. Patents and registered trademarks (INPI)	16.09	9.33	16.42
20. Standards and quality (INMETRO)	15.89	8.33	16.25
21. Telecommunications	6.16	1.33	6.39

Source: Authors' calculations based on the Investment Climate Survey.

needed. To test this hypothesis, and at the same time to control for survey bias leading to underrepresentation of those firms (and/or industries) suffering from an inadequate business environment, an additional exercise was performed in the spirit of Rajan and Zingales (1998). There is considerable natural variation in the degree of labor turnover across industries (see Bartelsman, Haltiwanger and Scarpetta, 2004), which ought to interact with stringent labor regulation, leading to a disproportionate effect on industries that depend more on a flexible labor market. The question is whether Brazil is particularly underspecialized in those industries. This would be a sign that some aspects of the business environment—in this particular case, inadequate labor regulation—might be a significant

FIGURE 3.6 Estimated Coefficient on Country/labor Turnover Interaction, Selected Countries



Source: Authors' calculations.

distortion in factor allocation and therefore a significant constraint on growth in Brazil.

Estimates by Davis, Haltiwanger and Schuh (1998) of job creation and job destruction by industries for the United States were employed to construct a measure of industry-specific labor turnover. With this measure and with data for 38 countries and 19 industries (taken from UNIDO), the percentage of total value added of industry i in country c was regressed on industry dummies, industry dummies interacted with GDP per capita (to control for differences in the structure of production between developed and developing countries), the aforementioned measure of the industry's labor turnover, and the interaction between this variable and a dummy for the country of interest: in this case, Brazil.[14] The estimated coefficient on this interaction variable is negative but not significantly different from zero, indicating that there is no evidence to conclude that Brazil's labor markets are remarkably rigid and possibly a binding constraint on growth. Therefore, Brazil is not particularly underspecialized (or overspecialized) in industries that are prone to suffer more from rigid labor regulations.

[14] The country's dummy variable also enters in the regression without interaction.

For comparison purposes, the result for Brazil is presented together with the results for other countries where this effect turned out to be statistically significant. This is shown in Figure 3.6.

To summarize, this section has presented a battery of indicators and tests to analyze whether an inadequate business environment that limits competition and firm dynamism is a binding constraint on growth in Brazil. Based on the analysis, one can conclude that while Brazil's business environment is weak, it is not currently a binding constraint on its economic growth.

Informality. There are several channels through which informality could limit the prospects for economic growth. Informal firms engage in only limited investment to avoid becoming "visible." At the same time, because they cannot take advantage of scale economies, they tend to exhibit low productivity. Also, by avoiding taxes, ignoring product quality and safety regulations, and infringing copyrights, they can gain a cost-advantage and compete successfully with firms in the formal sector. This may lead firms in the formal sector to lose market share and invest at a suboptimal level. There is also a fiscal impact, as the presence of informal firms implies lower receipts (a macro problem) and higher taxes on the formal firms (a micro distortion problem). All in all, the overall efficiency in the economy would fall, contributing to a problem of low social returns.

Brazil's informal economy is around 39.8 percent of gross national income,[15] higher than the world average of 32.5 percent and well above other Latin American countries including Mexico (30.1 percent), Argentina (25.4 percent), and Chile (19.8 percent). Some studies suggest that Brazil's high level of informality imposes a major obstacle to the country's growth (see McKinsey, 2004). Assessing whether informality is really a binding constraint in Brazil requires an exploration of its types and causes.[16] Data on informal-

[15] According to the International Labour Organization (ILO).

[16] Indeed, it would be important to differentiate whether this is truly a binding constraint or is just the outcome of a binding constraint that may reside elsewhere.

ity are notoriously difficult to obtain. This study employs the 2003 survey of the "Urban Informal Economy" by the Instituto Brasileiro de Geografia e Estadística (IBGE) and McKinsey's studies (2004, 2006) of informality in Brazil and other countries.

According to the McKinsey report, close to 56 percent of the population employed in Brazil in 2002 was in the informal sector. However, informality in Brazil entails a substantial amount of workers in precarious situations with low human capital and no access to formal jobs. Even if the firms associated with these workers have a cost advantage by avoiding taxes and regulation, it is hard to imagine that they can compete successfully with their formal peers. At least part of the informality in Brazil seems to not be not a matter of choice but rather the option of last resort for otherwise low-skilled unemployed workers who enter the sector involuntarily while queuing up for salaried jobs.[17] Therefore, given the apparently low capacity to compete, it is not clear that the presence of informal firms in Brazil slows down the overall growth of the economy by disrupting incentives in the formal economy in any significant way.

More generally, evidence of aggregate growth effects of informality is scarce in the literature. For example, while some of the early studies, like Loayza (1996), found a negative relationship between informality and growth in cross-country regressions, they have been later criticized for not controlling for the relevant correlates of growth, such as regulation, human capital, and initial GDP per capita (Schneider and Klinglmair, 2004). Once these other aspects are considered, the estimated coefficients tend to be fragile (see World Bank, 2007c). The McKinsey report argues that there is a negative association between the extent of informality and the level of productivity at the industry level in Brazil. However, this correlation does not prove causality and is subject to the same criticisms made by Schneider and Klinglmair.

[17] Neri et al. (1997) show that there is a relatively high rate of transition from formal to informal jobs and vice versa. See also Reis and Ulyssea (2005).

In summary, although the presence of informal firms might be associated with some inefficiencies related to their small size, it appears difficult to argue that they significantly disrupt the incentives of the formal firms to invest and innovate. Therefore, one can rule out the hypothesis that informality, as reflected in the nature of labor contracts or the sheer size of companies, is a binding constraint on economic growth in Brazil.[18] At the same time, the data only allows an empirical assessment of informality focused on labor contracts, and thus fails to consider potentially more damaging types of informality, such as not paying taxes or not respecting product, workplace, and environmental regulations.

Structural transformation. Finally, this study analyzes whether lack of coordination and low self-discovery are constraints on growth in Brazil by considering the "stock" of discovered products from Hausmann, Hwang and Rodrik (2006) and its structural transformation over time. In the Hausman, Hwang and Rodrik framework, what a country exports matters for growth. A measure of the level of sophistication of the export basket of a country is given by EXPY, the income level associated with a country's export package.[19] Brazil has a high value of EXPY given its level of income, meaning that it has discovered a relatively high-valued export package.

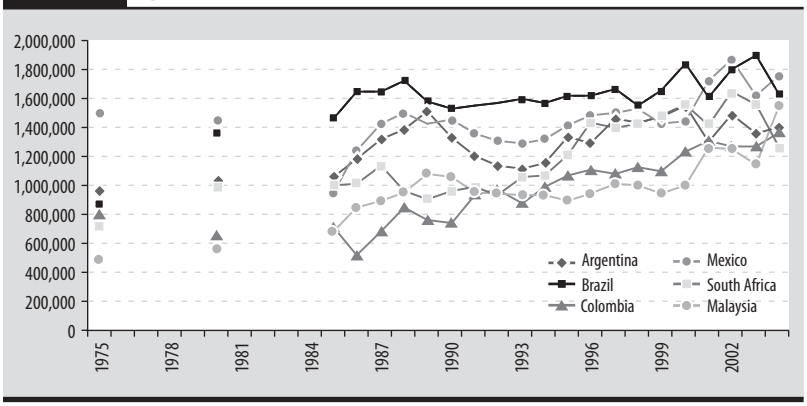
Besides measuring the level of sophistication of the export basket, this study also analyzes the concept of the product space in Hausmann and Klinger (2006) to examine Brazil's structure of production and the opportunities for future discovery and growth.[20] The application of this methodology suggests that the product space of Brazil is well configured for prompt growth through a

[18] In this regard, it is important to consider the definition of "informal" firm used in IBGE's 2003 survey (economic units consisting of the self-employed and employers with up to five workers), which on the one hand includes firms that are perfectly formal and on the other excludes medium and large informal firms.

[19] See Hausmann, Hwang and Rodrik (2006) for details on this variable.

[20] See Hausmann and Klinger (2006) for details.

FIGURE 3.7 Open Forest for Brazil and Select Countries



Source: Based on Hausmann and Klinger (2006).

process of structural transformation, mainly because it has successfully penetrated the industrial core. According to Hausman and Klinger, when a country is producing goods in a dense part of the product space, then the process of structural transformation is easier because the set of acquired capabilities can be redeployed to nearby products. Density of the product space, however, says nothing about how valuable the expansion opportunities are. A comprehensive measure of the degree to which the current export basket is connected with valuable new productive possibilities is the so-called value of the "open forest."[21] Figure 3.7 shows that Brazil's open forest compares very well with its Latin American peers and even with other countries like Malaysia. Therefore, the preliminary picture that emerges from this analysis is that Brazil has a relatively well-positioned pattern of comparative advantage and that the opportunities for future growth through structural transformation are open.

Thus the analysis indicates that Brazil's current export basket is relatively sophisticated, that the production structure has penetrated

[21] See Hausmann and Klinger (2006) for details on the construction of this measure.

the industrial core, and that it is well-positioned in the product space. This suggests that Brazil's current growth is not being held back by a lack of discovery of newer higher-value goods and that the binding constraints on growth lie elsewhere. This conclusion confirms that lack of innovation is not the key.

Low Social Returns

Apart from appropriability, the social returns to private physical investment are themselves constrained by a number of factors complementary to private investment. In this regard, convincing evidence was found to conclude that the stock of human capital is a binding constraint and that infrastructure, especially electricity and transformation, is a potentially strong constraint threatening growth sustainabililty.

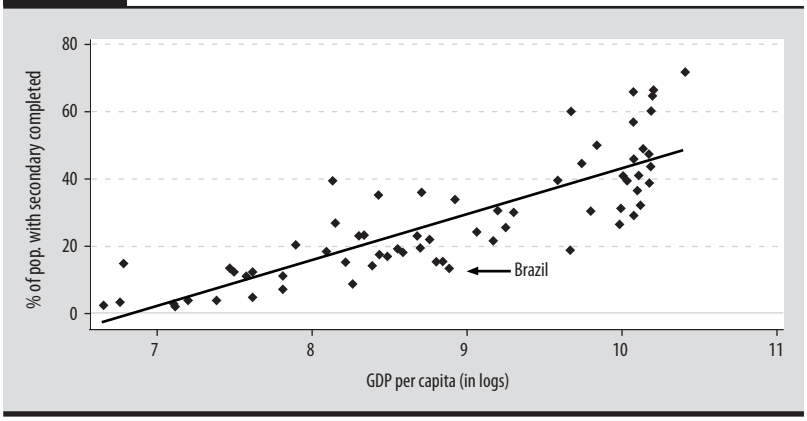
Human Capital

Human capital has long been recognized as an important engine for economic development.[22] According to the data set in Barro and Lee (2000), Brazil has a relatively low level of skilled labor when compared to other countries of the region, and is similar to that of Central American countries, which is an early indication that it might have a problem in this area. This section looks at several indicators to analyze whether the shortage of human capital is a binding constraint in Brazil today.

A high level of education in the majority of the population might not be feasible for many countries or adequate in several cases. For instance, Acemoglu, Aghion and Ziliboti (2006) argue that institutions and policies best suited to countries at the leading edge of the technological frontier need not be the right ones in less advanced places. In the case of education, the authors argue that the closer a country is to the frontier, the more growth depends on having a

[22] See, for example, Lucas (1988) and Mankiw, Romer and Weil (1992).

FIGURE 3.8 Secondary Education and Development



Source: Authors' calculations with data from Barro and Lee (2000) and WDI.

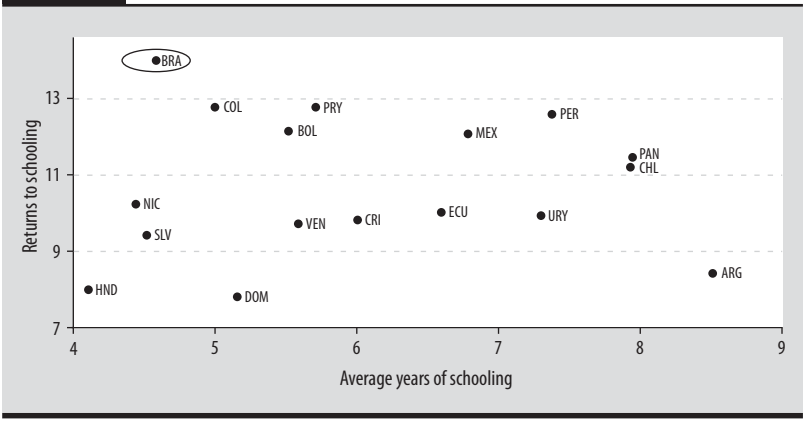
highly educated workforce. In fact, higher-income countries exhibit larger proportions of their populations with complete tertiary and secondary education.[23] In both cases, Brazil underperforms what would be expected at its level of income (see for example the gap in completed secondary education in Figure 3.8, which is statistically significant at the 10 percent level). This provides some evidence that even after controlling for level of development, Brazil still has some scarcity of skilled labor.

Another way to identify the scarcity of human capital is to analyze the returns to investment in human capital. High returns together with a low level of human capital would strongly indicate that the constraint is tight. Evidence is presented in Figure 3.9, in which Brazil is shown to be an outlier in the context of Latin American countries, using average years of schooling on one axis and returns to schooling on the other for the period 1996–97.[24] Judging by the high returns of the few who get educated, the figure indicates that the constraint of human capital is binding. The Brazil gap in terms of

[23] Education data are for the year 2000.

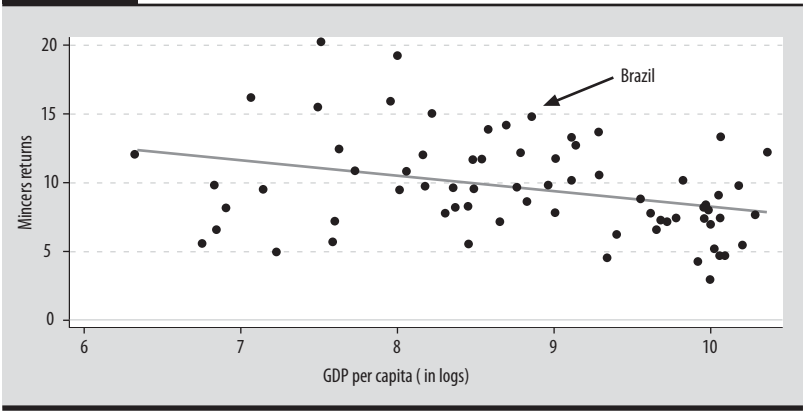
[24] The returns represent how much an additional year of schooling increases the real salary on average.

FIGURE 3.9 Returns to Education and Years of Schooling, Selected Countries



Source: Years of schooling of population age 25 and over are taken from the Barro and Lee (2000) dataset. Returns to education are taken from Menezes-Filho (2001).

FIGURE 3.10 Returns to Education and Development, Selected Countries



Source: Mincer returns are taken from Psacharapoulos and Patrinos (2002) and GDP per capita from WDI.

Mincerian returns to education[25] for 70 countries (for various years) is also significantly large (at the 10 percent level) after controlling for the country's level of income (Figure 3.10).

An additional way to explore the importance of human capital as a constraint on growth is to analyze how measures of investment

[25] In particular, the average change in real wages due to an additional year of education is reported.

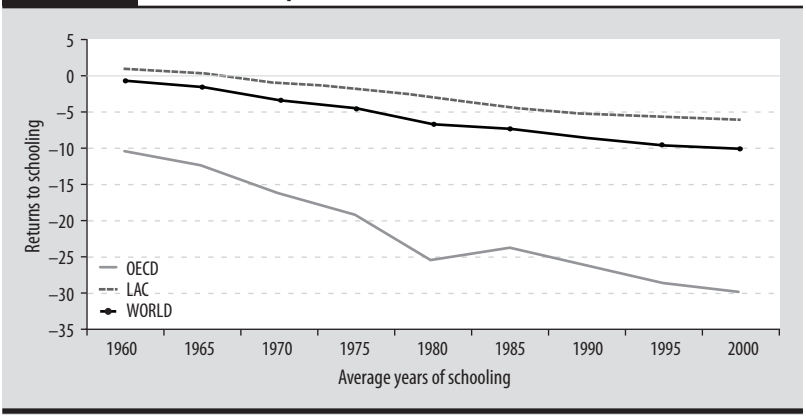
in human capital and their returns are evolving over time. Brazil's Mincerian returns to education for males (corrected for the cycle using a Hodrick-Prescott filter) fell from 1981 to 2000, which could actually be consistent with the relationship shown in Figure 3.10, as returns tend to fall with the level of development. Barros (2006) shows that the decline in the return to education has accelerated since early in this decade, falling to roughly 12 percent in 2004. Ulyssea (2007) shows that under a number of specifications, this trend had continued into 2005. The trend has been accompanied by an increase in the supply of human capital during the same period, which may have released pressure on the returns (Menezes-Filho, 2001). If the high returns signal a binding constraint but they are falling over time, perhaps the problem of low human capital is on its way to being corrected, following the long gestation period of knowledge accumulation, with no immediate policy implications.

To shed some light on this issue, the number of years that would be required for the returns to converge to the level predicted by the regression line in Figure 3.5 was calculated, assuming that they continue to fall at the current rate. It would take around 60 years for the returns to converge to the predicted line, assuming the GDP per capita of 2000, and more than 90 years if the GDP per capita is allowed to grow at an annual rate of around 1.5 percent.[26] Even accounting for the possibility that the decline in returns is accelerating, this best case scenario would still point to a minimum of one to three decades for the gap to disappear. Although these are only back-of-the-envelope calculations, they are indicative of the persistence of the problem if things were not to change more rapidly.

Another exercise to analyze this convergence issue is to look at the evolution of quantities, instead of prices, with respect to other countries over time. The benchmarks are the OECD countries (OECD), Latin America (LAC), and an overall group of 98 countries including developed and developing countries (WORLD). With the

[26] Note that the predicted level of returns falls with the level of income, so more years would be required to converge at the same speed.

FIGURE 3.11 Differences between Brazil and Benchmarks in Secondary Level of Education Completed, 1960–2000



Source: Authors' calculations, using data from Barro and Lee (2000) dataset.

exception of the share gaps in the stocks of primary level of education that seem to have stabilized during the 1990s, the initial differences in the stocks of secondary levels (shown in Figure 3.11) and tertiary levels of education have widened over time. This is true not only with respect to the OECD but also with the other benchmarks. This is another indication that human capital in Brazil is probably not increasing at a sufficiently rapid pace, despite the 27 percent rise in average schooling of workers in the last decade.

From the previous analyses it can be concluded that Brazil's lack of skilled labor is likely to be a binding constraint on growth.[27] In this sense, the scarcity of human capital may be putting a brake on the capacity of the economy to expand, which can be inferred from the high levels of the returns of the few that get educated. The returns are surprisingly high even for Brazil's level of development.

[27] Along the previous lines of reasoning, there is also some more anecdotal evidence that supports the view that human capital is a serious constraint on economic growth in Brazil. For example, a recent survey of the national industry confederation (CNI) shows that around 56 percent of firms consider the lack of skilled labor to be a problem.There is also an important variation across firms of different sizes, with small firms being more worried about the lack of skilled labor than large firms. Thanks to Wagner Guerra for suggesting this evidence.

Returns are decreasing, which is consistent with the gradual rise in the stock of human capital. However, this is taking place at a pace that may not relax the constraint any time soon.

Inadequate Infrastructure

In the growth diagnostics model framework, the quality of capital infrastructure affects the social return on private physical investment by influencing its productivity. For instance, good roads speed up the transportation of goods, allowing the same number of trucks to transport a larger volume of freight. They also lower depreciation and maintenance costs. Good telecom infrastructure allows transactions to be carried out with greater speed and reliability, and in many cases make personal contact unnecessary. Electricity supply is vital for most machinery and equipment to operate: when not provided by regular electricity companies, electricity must be generated by the firms themselves, at a higher cost and lower quality.

To what extent is infrastructure a binding constraint on growth in Brazil? The slowdown in economic growth coincided with a significant drop in the pace of expansion in infrastructure stock. Reforms clearly failed to reverse this process, except for telecommunications, which experienced a boom especially after the sector was opened to private investors (1996) and the former state monopoly privatized (1998). In electricity, the expansion of generation capacity accelerated slightly in 1995–2004 after the remarkable slowdown in 1981–94—but this only after the ruinous power shortage of 2001–02, which exactly reflected the failure of output capacity to accompany the growth of consumption.

This power shortage is the most eloquent example of how the slow expansion in Brazilian infrastructure stock can be a binding constraint on an acceleration of growth, a phenomenon that may recur, given the long implementation periods of power generation projects.[28]

[28] The Empresa de Pesquisa Energética (2005), the government institution in charge of planning the expansion of the electricity sector, estimates a 6 percent

Meanwhile, the private sector is penalized by the low quality of electricity supply with frequent brownouts and blackouts, which damage electrical equipment and stop production, keeping resources idle. According to the World Bank's 2003 Investment Climate Survey, losses due to power outages range from 0.8 percent of annual output in electronics to 3.5 percent in footwear (World Bank, 2007b). The same survey revealed that over 15 percent of the Brazilian firms use their own power generators to deal with these problems, a proportion that rises to 50 percent among large firms. Diseconomies of scale make this electricity much more expensive than that generated by large power plants.

The most significant slowdown occurred in the expansion of the road network, both regarding its total extension, which virtually stagnated, and the proportion of paved roads. In 2006, the National Confederation of Transport (CNT, Confederação Nacional dos Transportes) assessed the quality of roughly (the main) half of the paved roads in Brazil, classifying 25 percent as good or excellent, 38 percent as inadequate, and 37 percent as bad or very bad. In addition to causing hundreds of deaths every year, the poor condition and high congestion of Brazil's roads reduces the productivity of private investment. The World Bank (2007b) reports that this adds $US500 million a year in vehicle operational costs alone. Moreover, the Investment Climate Survey revealed that losses due to poor transportation infrastructure range from 2.2 percent of annual output in electronics to 4.7 percent in auto parts. Small and medium-sized firms in labor-intensive industries suffer the most from inadequate infrastructure services.[29]

After reaching 5.4 percent of GDP in 1971–80, when measured in constant 1980 prices, the rate of infrastructure investment dropped

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annual rise in the consumption of electricity for an annual expansion of 5 percent in GDP. Associação Brasileira da Infra-Estrutura e Indústrias de Base (ABDIB, 2006) points out that to grow 3.5 percent per year, Brazil needs to add 4,000 MW to its generating capacity, against an average estimated increment of only half that amount projected for 2006–12.

[29] See World Bank (2007b) for further evidence on the negative effects of Brazil's infrastructure on firms' productivity and competitiveness.

by a third in the following decade, and fell an additional 50 percent by the mid-1990s, when it reached just a third of the level recorded in the 1970s (see Table 3.3). This contraction in infrastructure investment reflected the retrenchment in public investment, including both the government per se and its companies, and the failure of the privatization cum regulatory reform to reverse this decline.[30] Because the private sector invested nearly nothing in infrastructure until the second half of the 1990s, the decline shown in Table 3.3 between the 1970s and 1995–96 can be entirely attributed to lower public sector investment. Public infrastructure investment declined further from 1999 onward, largely due to the reclassification of state enterprise investment as a result of privatization. In the telecom sector alone, investment fell by 0.8 percent of GDP with the sale of Telebras. Yet the further contraction in public investment in transport and electricity in 2002–03 cannot be attributed to accounting, since there have been virtually no privatizations in either sector since 2000.[31]

To foster private investment in infrastructure, substantial ownership and regulatory changes were implemented in 1996–2000. Yet the expansion in the stock of infrastructure continued at a slow pace. ABDIB (2006) estimates that in recent years actual investment covered only 65 percent of the needs for capital accumulation in the telecom sector, 45 percent in transportation, and 33 percent in sanitation. At least three factors contributed to these frustrating results. First, private investment in infrastructure in the 1990s was largely geared to buying the companies being privatized, not to expanding the existing capital stock; greenfield projects accounted for less than a quarter of the total volume of private investments in infrastructure (World Bank, 2007b). Second, in comparison to

[30] See Pinheiro (2006) for a discussion of the factors leading to the contraction in public infrastructure investment and the failure of privatization and regulatory reform to spur greenfield investment projects.

[31] In transport, in particular, privatization took place in areas that historically had seen little investment, such as railways, yet investment by the federal government in transport dropped from an average 1.44 percent of GDP in 1976–78 to a mere 0.13 percent of GDP in 2002–04 (Frischtak and Gimenes, 2005).

TABLE 3.3 Investment Breakdown
(as percent of GDP, in constant 1980 prices)[a]

Year	1971–80	1981–9	1990–4	1995–6	1997–8	1999	2000
Total	23.50	18.00	14.90	17.00	16.40	16.10	16.50
Residential building	4.95	4.71	4.03	3.99	4.24	3.97	3.60
Petroleum	0.95	0.88	0.39	.35	0.36	0.45	0.51
Public sector[b]	3.00	1.43	1.86	1.65	1.68	1.10	1.20
Infrastructure	5.42	3.62	2.16	1.79	2.77	2.70	2.58
Electricity	2.13	1.47	0.85	0.52	0.79	0.77	0.67
Telecommunication	0.80	0.43	0.50	0.66	0.98	1.17	1.07
Transport	2.03	1.48	0.69	0.48	0.68	0.56	0.63
Sanitation	0.46	0.24	0.07	0.13	0.32	0.20	0.21
Others	9.18	7.36	6.46	9.22	7.35	7.88	8.61

Source: Bielschowsky (2002, pp. 25–9).
[a]Does not take into account 2007 revision in national accounts.
[b]Public sector = nonfinancial public sector; excludes transport.

other countries within or outside Latin America, the participation of private investors in infrastructure in Brazil is relatively low (World Bank, 2007b). Third, ownership and regulatory reforms succeeded in increasing productivity and investment, but from low levels; investment in particular was largely concentrated on the rehabilitation and modernization of existing facilities. The only exception was the telecom sector, in which output capacity increased annually at double-digit rates.[32]

Ferreira and Nascimento (2005) estimate that the decline in public investment since the early 1980s, largely concentrated on infrastructure, lowered annual GDP growth by about 0.4 percentage points.[33] The authors conclude that a return of the public investment rate to its pre-1980 level would have sizeable effects on output growth.

[32] There are signs that this may be changing, typically in cases in which firms provide infrastructure services for their own use. In rail transportation, for instance, the rate of investment stayed around 0.06 percent from 1997–98 to 2002–03, but in 2004–05 rose to 0.14 percent of GDP, while going from being predominantly public to become entirely private (Frischtak and Gimenes, 2005). In ports, too, companies have started to invest more intensely (Estado de São Paulo, April 8, 2007).

[33] See World Bank (2007a) for further evidence in this regard.

According to Calderón and Servén (2003), 35 percent of the increase in the gap of GDP per worker between Brazil and East Asia since the early 1980s resulted from this slower accumulation of infrastructure capital. In another study, Calderón and Servén (2004) estimate that if the stocks and quality of Brazilian infrastructure rose to the level of Costa Rica, the country with the best infrastructure in Latin America, its annual GDP growth rate would rise by 2.9 percentage points.[34] Ferreira and Araújo (2006) find that in Brazil long-run output elasticities are especially large for infrastructure investments in electricity and transportation. Using data from the Investment Climate Assessment, Escribano et al. (2005) show that infrastructure is one of the main determinants of total factor productivity (TFP) in Brazil and other selected countries in Latin America and the Caribbean. Without necessarily subscribing to any one of these findings in particular, these pieces of evidence appear collectively compelling in identifying infrastructure as a potentially important binding constraint on economic growth in Brazil.[35]

However, there are three main arguments against this conclusion. First, different business surveys show that firms do not perceive infrastructure as the main factor constraining their competitiveness or limiting their expansion. In the World Bank's 2003 Brazil Investment Climate Survey, electricity, transportation, and telecommunications were three of the four least important obstacles to growth out of a list of 21 potential constraints: a fifth or less of the managers interviewed considered them a major or severe obstacle to growth.[36]

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[34] Income distribution would also improve substantially. Bringing Brazil's infrastructure to the standards observed in Korea (the median of East Asia and the Pacific) would increase its growth rate by 4.4 percentage points.

[35] Cited in World Bank (2007b). Similar, if less strong evidence, is reported by Subramanian, Anderson and Lee (2005).

[36] This micro evidence must be taken with a grain of salt, though. It is possible that firms react in this way because poor infrastructure affects them all in the same way and thus does not affect their ability to compete—unlike high taxes, ranked as the most important obstacle, which drive a wedge between the competitiveness of formal and informal firms.

Second, the stock of Brazilian infrastructure compares well with that of other countries in the region, and with emerging economies in general, with the noteworthy exception of the proportion of paved roads. The deficiencies in infrastructure become more evident, though, when Brazil is contrasted with Chile and Korea. Nevertheless, current stocks of infrastructure largely reflect the high investment levels dating back to the 1950–85 period. If it keeps the recent investment rates, Brazil's infrastructure is likely to lag behind that of other large emerging economies, such as China and India.

Third, there is no evidence that sectors that use infrastructure services more intensely have grown less than those that do not. In particular, there is no clear association at the sector level between the rate of sector growth in value added in 1996–2004 and the intensity of consumption of infrastructure services in 1995, measured as the ratio of consumption of public utility services to value added. There is no association for the consumption of public utility services, which basically reflects how intensely the sector uses electricity. Likewise, a regression of average sector growth (AVGGRO) against the consumption of communications, transport, and public utility services does not suggest that sectors that rely more intensely on these inputs grew less than those that do not depend so much on them:[37]

$$\begin{aligned} AVGGRO = {} & \underset{(3.65)}{2.05} - \underset{(-1.49)}{38.0} * Com - \underset{(-0.04)}{0.20} * FServ + \underset{(0.27)}{6.45} * Ins - \underset{(-0.02)}{0.06} * \\ & Putil + \underset{(3.14)}{12.5} * Transp - \underset{(-0.59)}{0.79} * Exp \end{aligned}$$

$R^2 = 0.194$

This study also examined whether, in 1997–2004, the GDP of municipalities further away from the state capital grew less than

[37] Based on data extracted from IPEADATA. Estimated using data for 42 sectors and least squares estimation, with White Heteroskedasticity-Consistent Standard Errors & Covariance. Variables defined as intermediate consumption as a proportion of value added. t-statistics are in parenthesis.

those nearer the capital, which in most cases are the largest markets. If this were the case, it could be an indication that Brazil's poor road conditions were hurting growth. No indication of such a negative influence was found: on the contrary, municipalities located further from the state capital performed better, on average, after controlling for initial per capita GDP and size (measured by population). Using an index reflecting the cost of transportation from the municipality center to the closest state capital yields a coefficient that is not statistically significant (see working paper for regression details).

In sum, to accommodate higher growth rates, Brazil needs to improve its transport infrastructure, enhance investment in electricity generation, and expand access to clean water and improved sanitation facilities, which would possibly most benefit the poor. But considering the preponderance of the evidence, the authors tend to share the view expressed in World Bank (2007b, p. 6) that although "evidence shows that higher infrastructure investments may lead to higher growth rates and better social indicators," it is not possible to uphold the claim that infrastructure is a binding constraint on higher sustainable growth rates in Brazil—especially when compared to high current expenditures and high levels and incidence of taxation. This is not to say, of course, that it may not become a binding constraint if infrastructure investment rates stay at their current low levels.

The High Cost of Finance

This section explores the factors that might act as a constraint on investment by increasing the cost of funding of investment projects rather than affecting the private return of these investments.[38] The section is structured in the following way. First, the "traditional" analysis of the cost of financing focuses on the private commercial banking sector, and shows that from this point of view Brazil is an outlier compared

[38] The hypothesis that returns are low because the price of capital goods is high was explored and discarded. The interested reader is referred to the full working paper version.

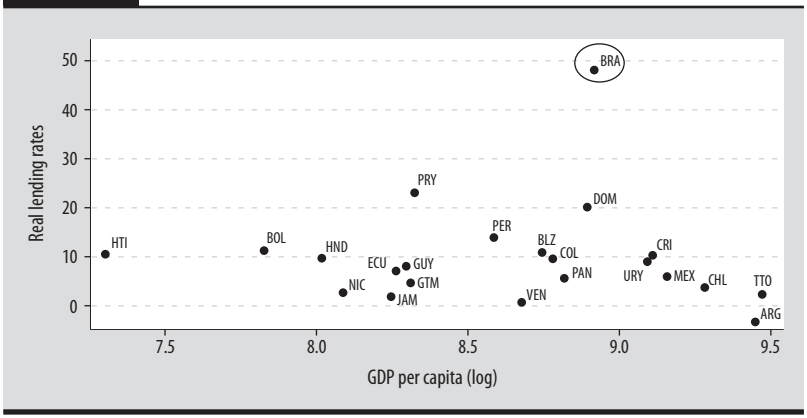
with other developing countries. The extremely high real lending rates in the banking sector make financing a prime candidate for a binding constraint on investment. A more comprehensive analysis of the cost of investment financing then looks in more detail at private bank credit as well as public banks and nonbank financing to show that high cost of finance is much less prevalent than it appears. While the high cost of financing may be relevant for a segment of the market and possibly induces distortions overall, it does not appear to be a key binding constraint on investment and growth in the aggregate.

The rest of the section is devoted to explaining why investment financing is expensive or not available to certain segments of firms. First, the argument of HRV (2005) that low domestic aggregate savings is behind the high cost of financing is explored. While such a constraint may have been active in the past, at a time when access to external financing was limited, evidence is presented showing that neither low domestic savings nor limited access to external finance is a binding constraint in the more recent period analyzed. Nevertheless, domestic savings are low and high growth may be impeded in the future if access to international financial markets deteriorates.[39] Therefore the high cost of finance remains a potential binding constraint threatening growth sustainability. Finally, the analysis turns to the financial intermediation costs that explain the observed high financing costs: both high risk premiums and intermediation spreads.

A good starting point for a discussion on investment financing cost in Brazil is the well-documented stylized fact of the Brazilian economy that real interest rates are extremely high, which has often been considered a major suspect, and culprit, for Brazil's lackluster growth performance. This feature shows up when considering lending rates by commercial banks (Figure 3.12). Even when compared to countries in Latin America and the Caribbean, which historically faced high interest rates, Brazil is an outlier with extremely high real

[39] The global financial and economic crisis that erupted in 2008, at the time of final writing, may reimpose this constraint in the short term.

FIGURE 3.12 Ex Post Real Lending Rates in Latin America and the Caribbean, 2005



Source: WDI, World Bank.

domestic lending rates. According to the data presented in Figure 3.12, real lending rates in Brazil were above 45 percent, more than twice the rates in Paraguay and Dominican Republic, which are also extremely high. The corresponding ex ante real interest rates, net of inflation expectations, have also been between 40 and 50 percent since 2001 (when data became available). This indicator alone makes financing constraints a likely candidate for being a major constraint to economic growth in Brazil.

Are financial constraints relevant? A way to explore the relevance of financial constraints for investment is a test in the spirit of Rajan and Zingales (1998) on whether industries that rely heavily on external financing are significantly smaller in Brazil compared to other countries. This hypothesis was tested using data from the UNIDO database and involve 20 sectors in 38 countries.[40] The evidence produced by this test casts doubt on finance being a binding constraint in Brazil.[41] Furthermore a simple correlation analysis using the time series of investment

[40] See Rajan and Zingales (1998) for more details on the external financing variable.

[41] However, a major limitation of the previous analysis is that it focuses only on the manufacturing sector, leaving out other industries, the services sector, and agriculture, which represent 11 percent, 64 percent, and 6 percent of total GDP, respectively.

and ex ante interest rates in Brazil yields a similar conclusion. The correlation is insignificant, contrary to the strong positive co-movement one would expect if financing were a binding constraint.[42] More details on these tests can be seen in the working paper version.

The discussion that follows examines several specificities of Brazilian financial markets that might mitigate the picture that emerges from Figure 3.12 regarding the high cost of financing faced by firms and explains why it may have limited overall relevance. In particular, some of these aspects show that the overall cost of credit that firms actually face may be much lower than is indicated by the initial analysis in the traditional approach, which is based on average interest rates.

The first potentially mitigating factor is the existence of a significant amount of directed credit, which still represents a large share of total credit in the economy (about one third).[43] A large share of these earmarked funds consist of compulsory savings collected by quasi-taxes, like the Fundo de Amparo ao Trabalhador (FAT) and Fundo de Garantia do Tempo de Serviço (FGTS), and development funds like the Fundo de Garantia para a Promoção da Competitividade (FGPC). The public sector—especially the national development bank, Banco Nacional de Desenvolvimento (BNDES)—plays an important role in the allocation of credit in the economy. In 2006 alone, the disbursements made by BNDES to the manufacturing sector amounted to almost US$12 billion, which represents more that 9 percent of the value added created by total manufacturing. Therefore, the presence of a large fraction of directed credit might actually make the previous analysis more informative regarding the presence of financial constraints.

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[42] However, Terra (2003) estimates investment equations at the firm level in Brazil and finds that firms in sectors classified as intensive in external financing by Rajan and Zingales (1998) are significantly more financially constrained than those in sectors that require less external funding. Thus, this micro evidence goes in the direction of confirming that financing might be a binding constraint.

[43] The data presented on interest rates in this section in general refers to credit operations regarding non-earmarked funds.

These compulsory savings are channeled to firms by public federal banks at the interest rate paid on these funds plus a spread that includes a risk premium and administrative costs.[44] Although an average rate is not available for these lending operations, there are certain caps for the risk premium (currently 4 percent per year) and other associated costs. A reasonable approximation of the overall spread is 4.5 percent on top of the funding rate. Therefore, the Taxa de Juros de Longo Prazo (TJLP) has always been significantly below the policy target rate, SELIC (Sistema Especial de Liquidação e de Custódia). While the SELIC rate is currently around 12 percent, the TJLP is only 6.5 percent. Given that inflation expectations are currently around 3.7 percent for the next 12 months, the latter implies a real interest rate of 2.7 percent. If the estimated 4.5 percent spread on these operations is included, the resulting interest rate firms pay for these funds would be about 7 percent, way below the prevailing rates for credit from private banks discussed above.[45]

It could be argued that subsidized credit lines are infra-marginal and therefore not relevant when considering the marginal cost of finance as a restriction to investment in Brazil. However, this argument is valid only in the absence of market segmentation. Thus, while not all borrowers, particularly small and medium firms, have unlimited access to these funds, most medium and large firms, which account for the bulk of investment in Brazil, do. Although the distribution of investment by company size is itself endogenous, and could be a consequence of limited access to finance by smaller companies, the evidence of excess funds in BNDES in recent years indicates that there is insufficient demand for credit at the current rates. This leads to the conclusion that at least in that segment, rates for financing investment are not particularly costly.

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[44] The relevant funding rate is the long-run interest rate Taxa de Juros de Longo Prazo (TJLP), which is computed following the National Monetary Committee's inflation target for the next 12 months plus a premium.

[45] Clearly, this low rate of funding implicitly carries a subsidy.

Moreover, most of the credit that firms receive from banks goes to finance working capital and current operations rather than investment in physical capital, which represents only around 6.9 percent of total bank credit to firms. Thus, the non-earmarked funds available in the banking system are allocated only marginally to investment. This also implies that the share of subsidized credit represents a dominant share of investment credit (85 percent)—much larger than the one third considered above (although some financing for working capital may hide investment financing to small firms).

An additional indicator that is useful in evaluating the financial environment of firms is the way their working capital is financed. In theory, in the presence of information asymmetries, the pecking order for investment financing would be first to use internal funds, then debt, and finally equity. In addition, tax treatment issues might make comparisons of investment financing difficult to interpret across countries. However, in the case of working capital, whenever information frictions in credit markets induce the pecking order with regard to investment funding, firms would want to rely on external funding to finance working capital. Thus, a comparison of the fraction of working capital financed with retained earnings and other internal funds could be very informative regarding the relevance of financing constraints. This indicator is reported by the Investment Climate Surveys of the World Bank for a group of 100 countries (see working paper version for details). Brazilian firms at all size levels rely relatively little on internal funds to finance working capital compared to other countries with similar levels of development. The share of internal funds is well below that expected for Brazil's GDP per capita and ranks best among countries in Latin America for small, medium, and large firms. Thus, this information again provides evidence that financing constraints currently do not seem to be a major constraint on average for Brazilian firms. In addition, there are no significant differences by firm size in the case of Brazil for this latter indicator.

Furthermore, focusing on the banking sector, the Brazilian system is relatively underdeveloped, with credit to the private

sector representing around 35 percentage points of GDP in recent years. This level of financial development in the banking sector is slightly below that of the average country in the region and compares especially poorly to Chile, where credit to the private sector is around 70 percent of GDP. However, capital market development indicators do not show such a poor picture. In terms of the size and liquidity of the stock market, market capitalization and turnover of equity, Brazil is above the average level in the region and is also comparable to East Asia and the Pacific—the region that is, by far, the most financially sophisticated among developing and emerging economies. This evidence also shows that relying only on information from the banking sector leaves out an important part of the sources of finance for firms.

Summing up, traditional indicators suggest that financing constraints are binding and hold back economic growth in Brazil, but more detailed analysis casts doubts on whether the high cost of financing is a binding constraint overall, at the aggregate level. At the same time, it may be very relevant for certain segments of firms with limited access to finance. The discussion now turns to an examination of the factors underlying the high cost of finance where it exits.

Low Domestic Savings and Access to International Finance

The starting point is the analysis in HRV on Brazil. HRV point out that Brazil's growth performance moves pari passu with the tightness of the external constraint through the cost of financing channel. HRV see the Brazilian case as a prototypical example of a savings-constrained country; they argue that ameliorating a number of other problems that harm the Brazilian economy, such as a more pro-business fiscal stance (lowering taxes, for example), will at best be innocuous and at worst further depress overall savings and consequently growth. The discussion that follows revisits these issues with the benefit of writing after the Brazilian economy adjusted to the 2002–03 political transition, international liquidity

expanded significantly, and the national accounts revision improved the quality of savings and investment statistics.

Aggregate savings. Brazil's saving rate over the last ten years has been significantly below its expected level, given its level of development. In particular, while gross national savings represented an average of only 14.7 percent of GDP, countries with similar levels of development in East Asia like Korea, Malaysia, and Thailand saved more than 30 percent of their GDP on average.[46] Thus, Brazil ranks low regarding domestic savings. However, this does not necessarily imply that low domestic savings is currently a binding constraint on investment in Brazil.

Although there is plenty of evidence that Brazil continues to be a low savings country for the reasons raised by HRV, the same is not true of their contention that the country's growth performance is bound by its low availability of savings. A clear indication that low savings is currently not binding is the fact that from 1999 to 2006, the savings rate increased from a mere 12 percent of GDP to 17.6 percent, mainly due to a rise in private savings. Meanwhile, fixed investment has increased by merely a percentage point to 16.8 percent in 2006. As a result, currently Brazil has excess national savings that are being invested abroad.

Access to international finance. In theory, access to international capital markets is very important for developing countries, given that external financing allows the country to allocate resources to investment without necessarily inflicting the pain of reducing current consumption to induce savings to finance these investments internally. This means that if a country has full access to international capital markets, savings and investment decisions are independent from each other. Given that Brazil is currently exporting capital, despite its low level of overall investment, it must be the case that returns

[46] While Brazil compares favorably to Latin American countries, those countries in general exhibit low domestic savings.

are low or that the financial sector is incapable of absorbing these additional savings and channeling them efficiently to the firms with the most profitable investment projects.

Even if domestic savings were not excessive, they could be a binding constraint on investment only in the presence of impediments to tapping foreign savings. In the context of an open economy, the domestic saving rate determines the equilibrium value of the real exchange rate, given the external real interest rate facing the country. For any given real interest rate, there is a real exchange rate that makes that level of the real interest rate consistent with the goods market equilibrium at full employment. Holding real output constant at its potential level, a sustained reduction in domestic saving must give rise to a more appreciated real exchange rate so as to sustain the equilibrium of the goods market. Viewed from a saving-investment perspective, the key point is that the real exchange rate appreciation generates exactly as much foreign saving (through an increased current account deficit) as required to offset the reduction in domestic saving. From an open economy perspective, then, the issue is not so much the quantity of domestic saving, but the terms on which the world is willing to finance domestic investment.

Therefore an indication that domestic savings are not a constraint on investment is that Brazil currently has ample access to international finance markets at low spreads. In this sense, spreads on sovereign debt have declined since the 2002 crisis from above 2000 basis points (bps) to around 150 bps in 2007. Although spreads are still above those of investment-grade countries in the region, like Mexico (76 bps), current rates are historically the best conditions Brazil has faced in credit markets in recent times. While the general reduction in financing costs across emerging markets is partially caused by high levels of liquidity and lower investors' risk aversion, investors also perceive a steady improvement in economic fundamentals in Brazil over the past few years. For example, S&P ratings increased from B^+ with a negative outlook in July 2002 to BB^+ with a positive outlook in May 2007.

Clearly, the preceding discussion does not imply that Brazil is immune to international capital market shocks or that in the future market access will not be a constraint.[47] Despite the fact that the current fiscal position, in terms of the primary surplus, the overall fiscal balance, and external debt have turned more solid in the recent period, the overall debt burden is still high compared to international standards. Thus, Brazil remains in a vulnerable position, especially because of the short-term maturity and duration of its domestic debt. Nevertheless, the current situation shows that access to international finance is currently not a binding constraint on economic growth.

That said, there are reasons for concern that if other constraints on investment are lifted, low savings may again become a binding constraint: with a domestic savings rate of less than 17 percent of GDP, there is little room for Brazil to expand investment significantly without running a large current account deficit and risking another external crisis and suffering the loss of access to external financing. Moreover, although there are reasons to expect that improved economic performance may help expand savings, there are also factors that could further reduce the country's savings rate in the future (such as a rising share of elderly citizens in the population and a higher degree of urbanization).

Poor financial intermediation. To the extent that there are segments of investment with inadequate access to financing, it is also important to analyze the efficiency of financial intermediation in Brazil. The discussion that follows focuses on financial intermediation costs in credit markets, especially lending by commercial banks. A distinction is made between costs associated with attracting savings related to risks to savers (the deposit rate) and banking costs (the lending-deposit rate spread).

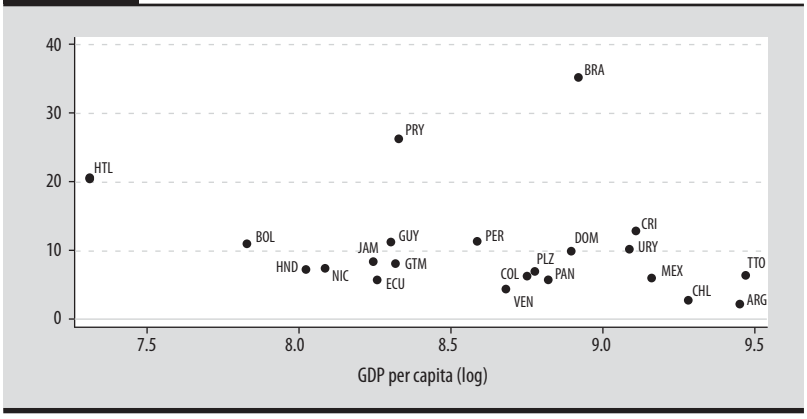
Concerning deposit rates, currently, the real ex ante cost of funding is around 8 percent per year, which is also very close to the

[47] The global financial crisis erupting at the time of final writing may reimpose such a constraint in the short term.

SELIC rate. Brazil is not only an outlier regarding the high level of its lending rate, as shown in Figure 3.13, but its deposit rate is also very high in real terms (although the difference with other countries in the region is not as large as for the case of lending rates). Several explanations have been advanced to explain the anomalously high real money market interest rates in Brazil in terms of risks to savers. These explanations include fiscal and monetary policy in the context of weak economic fundamentals, jurisdictional uncertainty (Arida, Bacha and Lara-Resende, 2004), and a trade-off between financial de-dollarization and real interest rates (Bacha, Holland and Gonçalves, 2007).

Explanations based on weak fiscal and monetary macroeconomic policies can be rejected but evidence of jurisdictional and anti-dollarization effects can be found (see working paper version). Nevertheless, in actuality their contribution to lending rates is minor compared with the intermediation spread. The main proximate cause of high lending rates by commercial banks is large intermediation spreads. While the marginal cost of funds for banks has been decreasing from a maximum of around 16 percent in mid-2003 to almost 8 percent in May 2007 along with lending rates, the implied spreads—defined as the difference between the lending and the

FIGURE 3.13 **Ex Post Real Spreads in Latin America and the Caribbean, 2005**



Source: WDI, World Bank.

deposit rate—have remained fairly stable, around 25 percent. Figure 3.13 compares Brazil's extremely high ex post real spreads with those from other countries in Latin America and the Caribbean.

According to World Bank (2006), banking spreads are high mainly because the domestic money market rate is high and its effect on the lending rate is more than proportional.[48]

However, a regression analysis shows that such an explanation is misleading.[49] A simple regression of the spreads on the SELIC for data from November 2001 to May 2007 yields the result:[50]

$$\text{Real\_spread} = \underset{(0.46)}{22.70} + \underset{(0.03)}{0.14}\ \text{Real\_SELIC}$$

R-squared = 0.14

While this regression confirms that the spread and the money market rate are indeed systematically—and positively—related, the large constant term and the R^2 both suggest that the key is elsewhere. Our analysis concludes that the explanation of these high spreads is a combination of factors that include lack of competition and low efficiency, as well as weak information and enforcement of creditor rights (see working paper for details).

In summary, financing costs can be extremely high in Brazil for certain segments of firms. The high lending rates observed in commercial banks are mainly driven by a high intermediation spread in the banking system that can be traced to microeconomic distortions and institutional weaknesses more than macroeconomic circumstances.

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[48] There are many potential explanations for why a higher money market interest rate could have an impact on spreads. For example, higher lending rates induce an adverse selection problem. In turn, a higher proportion of risky loans will result in a larger risk premium, which is reflected in the spread.

[49] The authors thank Peter Montiel for this observation.

[50] Standard errors are in parenthesis.

Conclusion: From Symptoms to Syndromes

This chapter began by showing that in the last quarter century Brazil experienced a severe drop in economic growth, after an excellent performance in the previous five decades. Leaving aside the lost decade of the debt crisis of the 1980s and its aftermath, a supply side growth decomposition revealed that the main difference between economic performance in the period following price stabilization (1995–2006) and the previous high-growth era has been the much slower pace of capital accumulation.

The previous two sections have extensively analyzed various potential constraints on investment that could explain slow economic growth in Brazil. The exercise reveals the complexity of performing an in-depth GDM analysis because the available evidence is not always indicative of the relative importance of a particular constraint vis-à-vis other problems identified in the analysis. This study of the Brazilian case does not point toward a "smoking gun" that can be blamed as the sole culprit of Brazil's poor growth performance. Nevertheless, the analysis sheds light on the severity of the various problems and therefore allows for a tentative ordering of the constraints.

Strong evidence was found that the most severe constraints on growth currently are human capital as well as high and inefficient taxation because they significantly reduce the returns on investment and thus hold back growth. The analysis identified a second group of problems as potentially strong constraints, which may become binding over time. They include infrastructure (especially in electricity and transportation) and financing. Domestic savings may be too low to sustain higher growth and may choke investment if access to international financial markets deteriorates. There is also evidence that Brazil has poor bank intermediation that impedes certain investment activities; is still fragile regarding macroeconomic stability and access to international capital markets; is lagging behind in its business environment; and is burdened by a large informal economy. While these factors are relevant, at the present time they seem to be milder constraints. Finally, although there is ample room for

improvement in the areas of innovation and structural transformation, these factors also do not appear to be binding constraints on economic growth.[51]

The analysis has also shown that the most binding constraints exhibit common features, which points toward a principal syndrome: an overspending state. This syndrome is consistent with the timing of the Brazilian economic slowdown; if the drop in growth rates in the early 1980s is ascribed to the debt crisis and to the fact that growth has been hindered mainly by a failure to resume rapid capital accumulation. The main picture that emerges from the analysis is that of a public sector that has been rapidly increasing taxation on the private sector to finance ever-expanding current expenditures, especially social security outlays, and underinvesting in public infrastructure and education (human capital) for a long time. As coined by Pinheiro et al. (2006) the Brazilian state can be characterized as a "dysfunctional" state, in the sense that the quality and quantity of public goods it provides is not commensurate with the size (and complexity) of the tax burden it imposes on its citizens.

The sharp increase in public expenditure, as shown in Figure 3.14, coincides with the new constitution of 1988, which established large entitlements of publicly guaranteed services and rights (especially more generous public and rural pension schemes), without providing an answer as to how they would be financed. In addition, the call for more decentralization implied that the responsibility for providing education, health care, and transportation shifted to the states and municipalities, while the federal government remained responsible for financing them. As Figure 3.14 shows, this implied a very rapid increase of public consumption as a share of GDP from a long-run average of around 11 percent of GDP for 1947–80 to around 20 percent for 1995–2006.[52]

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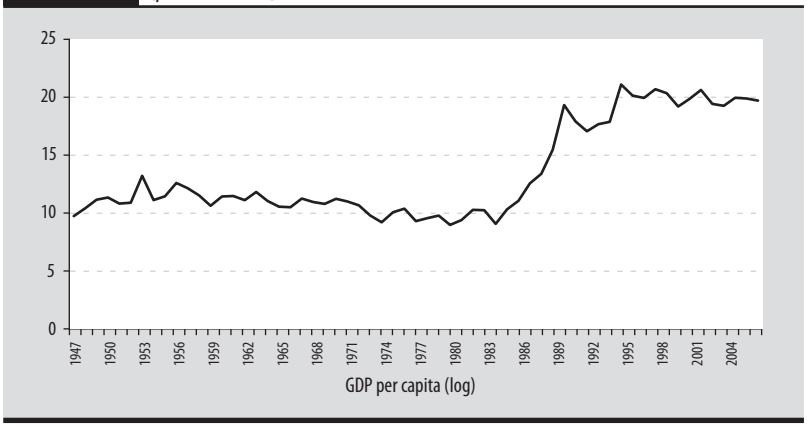
[51] The hypothesis that low investment is caused by high investment prices was also discarded.

[52] Considering all levels of government and expenditures, the total public expenditure in Brazil amounted to around 42.5 percent of GDP in 2006.

FIGURE 3.14 Public Consumption, 1947–2007
(percent of GDP)



Source: IPEA, based on Banco Central do Brasil (BCB).

Such an increase in current expenditures had to create a major disruption in the economy. During the 1980s Brazil was basically excluded from international credit markets, following the debt crisis, so the government resorted primarily to inflation to finance the increase in expenditures. Thus, the symptoms of the overspending state syndrome during the 1980s basically were macroeconomic instability. After several failed attempts, the Plan Real was successful in reducing inflation. However, the expansion in expenditures required an important increase in the tax burden, as well as debt financing. Debt dynamics were increasingly regarded as unsustainable and the inconsistency behind the exchange rate regime and fiscal policy implied the collapse of the pegged exchange rate regime in early 1999. Again, macroeconomic instability—especially fiscal unsustainability—turned out to be the main constraint during these years. In addition, the increase in current public expenditure, and the consequent drop in public savings, was so large that it could be accommodated only by reducing public investment, creating potentially important bottlenecks in the energy sector and road infrastructure that were not remediated by privatizations.

During the 2000–03 period, access to international financial markets was limited due to market concerns regarding the sustain-

ability of debt. Thus, investment was limited by domestic savings. In turn, domestic savings were low—indeed, lower than in the past and than in most of the region, probably because of the high tax burden and negative public savings. The result was low investment, constrained by exclusion from international capital markets. Moreover, Brazil misallocated investment by underinvesting in areas in which social returns tend to exceed private returns, such as infrastructure (notably roads) and basic education, which further constrained growth. Finally, over the past few years, the government has been trying to attain fiscal sustainability by reducing the debt burden. However, the consistently positive and high fiscal surpluses attained were produced by increasing the tax burden even more, rather than adjusting expenditures, which aggravated the high tax distortion.

Thus, currently the overspending state syndrome is reflected primarily in a very high and complex tax burden that limits the private returns on investment. Meanwhile, there is little fiscal space to finance important investments in infrastructure and education due to the continuing increases in current expenditures, especially social security. To put this into perspective, while coverage is low and demographics are very favorable (the population is still very young, compared to OECD countries), Brazil currently spends a similar fraction on social security as developed countries with older populations and almost universal coverage. There will be little space to catch up and grow at a faster steady-state rate without a resolution of these underlying problems, which keep pressing for an unsustainable increase in current expenditures. Long-run growth in Brazil will benefit from the dismantling of the overspending state, which will require drastic pension reform.

References

ABDIB (Associação Brasileira da Infra-Estrutura e Indústrias de Base). 2006. "Agenda da infra-estrutura 2007–2010." São Paulo, Brazil. Mimeographed document.

Acemoglu, D., Aghion, P. and Zilibotti, F. 2006. "Distance to Frontier, Selection and Economic Growth." *Journal of the European Economic Association*. 4(1): 37–74.

Adrogué, R., Cerisola M. and Gelos, G.. 2006. "Brazil's Long-Term Growth Performance–Trying to Explain the Puzzle." Working paper No. 282. Washington, DC: International Monetary Fund.

Afonso, J. R., Biasoto, G. and Freire, A. C. 2007. "O Reduzido Investimento Público no Brasil e Reflexões sobre sua Retomada." Paper presented at CEPAL's 19th Regional Seminar on Fiscal Policy, Santiago: Chile.

Arida, P., Bacha, E., and Lara-Resende, A. 2004. "Credit, Interest, and Jurisdictional Uncertainty: Conjectures on the Case of Brazil." Paper presented at seminar on "Inflation Targeting and Debt: The Case of Brazil," December 12–13, 2003, Rio de Janeiro: Brazil.

Bacha, Edmar L., Holland, Márcio and Gonçalves, Fernando M. 2007. "Is Brazil Different? Risk, Dollarization, and Interest in Emerging Markets." Anais do XXXV Encontro Nacional de Economia (Proceedings of the 35th Brazilian Economics Meeting) 028. ANPEC-Associação Nacional dos Centros de Pósgraduação em Economia.

Barro, Robert J. and Jong-Wha Lee. 2000. "International Data on Educational Attainment: Updates and Implications." Working paper No. 42. Cambridge, MA: Center for International Development, John F. Kennedy School of Government, Harvard University.

Barros, R. 2006. "Determinantes Imediatos da Queda da Desigualdade no Brasil: Educação, Segmentação e Discriminação no Mercado de Trabalho." In *Seminário Resultados sobre a Queda Recente na Desigualdade de Renda Brasileira com Foco em mercado de Trabalho.* Rio de Janeiro, Brazil: IPEA.

Bartelsman, E., Haltiwanger, J. and Scarpetta S. 2004 "Microeconomic Evidence of Creative Destruction in Industrial and Developing Countries." Policy research working paper No. 3464. Washington, DC: World Bank.

Bielschowsky, R. 2002. "Investimento e reformas no Brasil: indústria e infraestrutura nos anos 1990." Brasília, Brazil: CEPAL/IPEA.

Calderón, C. and Servén, L. 2003. "The Output Cost of Latin America's Infrastructure Gap." In W. Easterly and L. Servén, editors, *The Limits of Stabilization: Infrastructure, Public Deficits and Growth in Latin America*. Palo Alto, CA and Washington, DC: Stanford University Press and the World Bank.

———. 2004. "The Effects of Infrastructure Development on Growth and Income Distribution". Policy research working paper No. 3400. Washington, DC: World Bank.

Daumal, M. and Zignago, S. 2005. "The Border Effects in Brazil." Mimeographed document.

Davis, S., Haltiwanger, J. and Schuh, S. 1998. *Job Creation and Destruction*. Cambridge, MA: MIT Press.

Easterly, W. and Servén, L. 2003. *The Limits of Stabilization: Infrastructure, Public Deficits, and Growth in Latin America*. Palo Alto, CA and Washington, DC: Stanford University Press and the World Bank.

Empresa de Pesquisa Energética. 2005. Relatório Analítico: Projeções do Mercado de Energia Elétrica 2005–2015. Brasília, Brazil.

Escribano, A., Guasch, J.L., Garrido, L., Peltier, N. and Singh, H. 2005. "The Impact of Infrastructure on Competitiveness: A Firm-level Analysis Based on ICA Surveys." Washington, DC: World Bank. Unpublished paper.

Fay, M. and Morrison, M. 2005. "Infrastructure in Latin America and the Caribbean: Recent Developments and Key Challenges." Report No. 32640-LCR. Washington, DC: World Bank.

Ferreira, P.C. and Araújo, C.H. 2006. "On the Economic and Fiscal Effects of Infrastructure Investment in Brazil." *Ensaios Econômicos*, No. 613. Rio de Janeiro, Brazil: EPGE/FGV.

Ferreira, P.C. and Nascimento, L G. 2005. "Welfare and Growth Effects of Alternative Fiscal Rules for Infrastructure Investment in Brazil." *Ensaios Econômicos*, No. 604. Rio de Janeiro, Brazil: EPGE/FGV.

Frischtak, C.R. and Gimenes, A. 2005. "Infra-Estrutura e Competitividade no Brasil." Estudos e Pesquisas N. 97. Rio de Janeiro, Brazil: INAE.

Galindo, A., Micco, A., and Suárez, G.. 2004. "Cycles and Financial Protection." Washington DC: Inter-American Development Bank. Unpublished document.

Gobetti 2006. "Estimativa dos investimentos públicos: um novo modelo de analise de execução orçamentária aplicado às contas nacionais." Secretaria do Tesouro Nacional. Mimegraphed document.

Hausmann, R. and Klinger, B. 2006. "Structural Transformation and Patterns of Comparative Advantage in the Product Space." Working paper No. 128. Cambridge, MA: Center for International Development, John F. Kennedy School of Government, Harvard University.

Hausmann, R., Hwang, J. and Rodrik, D. 2006 "What You Export Matters." Working paper No. 11905. Cambridge, MA: National Bureau of Economic Research.

Hausmann, R., Rodrik, D. and Velasco, A. 2005 "Growth Diagnostics." Cambridge, MA: John F. Kennedy School of Government, Harvard University.

Kaufmann, D., Kraay, A., and Mastruzzi, M. 2006. "Governance Matters V: Governance Indicators for 1996–2005" (September). Washington, DC: World Bank.

Loayza, N. 1996. "The Economics of the Informal Sector: A Simple Model and Some Empirical Evidence from Latin America." *Carnegie-Rochester Conference Series on Public Policy* 45: 129–162

Lucas, R.E., Jr. 1988. "On the Mechanics of Economic Development." *Journal of Monetary Economics.* 22(1): 3–42.

Mankiw, N., Romer, D. and Weil, D. 1992. "A Contribution to the Empirics of Economic Growth." *Quarterly Journal of Economics.* 107(2): 407–37.

McKinsey. 2004. "Eliminando as Barreiras ao Crescimento Econômico e a Economia Formal no Brasil." São Paulo, Brazil: McKinsey & Company.

———. 2006. "Reining in Brazil's Informal Economy." The McKinsey Quarterly.

Menezes-Filho, N. 2001. "A Evolução da Educação no Brasil e seu Impacto no Mercado de Trabalho". São Paulo, Brazil: Instituto Futuro Brasil.

Neri, M., Coelho, D., Ancora, M. and Pinto, A. 1997. "Aspectos Dinâmicos do Desemprego e da Posição na Ocupação." *Revista Estudos Econômicos*. 27: 137–59.

Pinheiro, A.C. 2006. "Growth Acceleration in Brazil: Obstacles and Knowledge Gaps." Washington, DC: Inter-American Development Bank. Unpublished manuscript.

Psacharapoulos, G. and Patrinos, H. 2002. "Returns to Investment in Education: A Further Update." Policy research working paper No. 2881. Washington, DC: World Bank.

Rajan, R. and Zingales, L. 1998. "Financial Dependence and Growth." *The American Economic Review.* 88(3): 559–86.

Reis, M.C. and Ulyssea, G. 2005. "Cunha Fiscal, Informalidade e Crescimento: Algumas Questões e Propostas de Políticas." Texto para Discussão 1068. Rio de Janeiro, Brazil: IPEA.

Schneider, F. and Klinglmair, R. 2004. "Shadow Economies around the World: What Do We Really Know?" Working paper No. 1167. Munich, Germany: Center for Economic Studies and the Ifo Institute.

Subramanian, U., Anderson, W.P., and Lee, K. 2005. "Measuring the Impact of the Investment Climate on Total Factor Productivity: The Cases of China and Brazil." Policy research working paper No. 3792. Washington, DC: World Bank.

Terra, M.C.T. 2003. "Credit Constraints in Brazilian Firms: Evidence from Panel Data." *Revista Brasileira de Economia*. 57(2): 443–64.

Ulyssea, G. 2007. "Segmentação no Mercado de Trabalho e Desigualdade de Rendimentos no Brasil: Uma Análise Empírica." Texto para Discussão 1261. Rio de Janeiro, Brazil: IPEA.

World Bank. 2003. "Financial Sector Assessment: Brazil." Washington, DC. Mimeographed document.

———. 2005. Investment Online Climate Survey. (http:iresearch.worldbank.org/ics/jsp/index.jsp).

———. 2006. "Brazil: Interest Rates and Intermediation Spreads." Washington, DC: Mimeographed document.

———. 2007a. "Brazil: Improving Fiscal Circumstances for Growth." Report No. 36595-BR. Washington, DC: World Bank.

———. 2007b. "How to Revitalize Infrastructure Investments in Brazil: Public Policies for Better Private Participation." Report No. 36624-BR. Washington, DC: World Bank.

———. 2007c. *Informality, Exit and Exclusion*. World Bank Latin American and Caribbean Studies. Washington, DC: World Bank.

CHAPTER 4

Ecuador: Binding Constraints to Growth

*Simón Cueva, Vicente Albornoz, and Leopoldo Avellán**

Introduction

This document assesses the underlying constraints on economic growth in Ecuador through a systematic examination of the potential reasons behind low growth, using a decision tree approach, and following the growth diagnostics methodology developed by Hausmann, Rodrik and Velasco (2005). Ecuador has been an average growth performer within Latin America, with a slightly higher average growth than the region over the last 50 years, attributable to the discovery of vast oil reserves in the 1970s. Like most countries in the region, it has failed to ensure sustainable and high growth rates that would help make strong steps toward poverty reduction. This study finds that micro risks and infrastructure weaknesses constitute key binding constraints on growth. Macroeconomic risks and the high cost

*Simón Cueva is with Universidad de las Américas. Vicente Albornoz is with Corporación de Estudios para el Desarrollo (CORDES). Leopoldo Avellán is with Centro de Investigaciones Económicas (CIEC), Escuela Superior Politécnica del Litoral (ESPOL). The authors acknowledge research assistance from Lorena Andrade, Salomón García, Sandra Guamán, Andrea Heredia, José Hidalgo, Felipe Hurtado, David Molina, and María Caridad Ortiz. They thank Manuel Agosín, Edna Armendáriz, Eduardo Fernández-Arias, Fidel Jaramillo, Bailey Klinger, Daniel Lemus, Marcela Meléndez, Alberto Melo, Erik Neira, Xavier Ordeñana, Pablo S. Proaño, Gustavo Solórzano and participants in the IDB Growth Diagnostics seminars in Washington for their comments.

of finance, arising from high country risk and poor intermediation, are significant binding constraints, as well. Although human capital and geography pose important challenges for policymaking, they are not binding constraints at the moment.

The study is structured as follows. The second section presents some stylized facts about the Ecuadorian economy. The third section discusses key binding constraints on growth. The fourth section reviews the constraints that might not be the tightest ones at this time, but that eventually must be relaxed in order to achieve sustained growth in the future. The fifth section reviews some constraints that are not binding, and the sixth and final section provides some conclusions and policy recommendations.

Ecuador's Economic Performance: Stylized Facts

The Role of the External Sector

With a per capita GDP estimated at US$3,173 for 2007, Ecuador is a medium-income country within Latin America. Over 1951–2005, Ecuador posted an average 4.9 percent real growth rate, which is relatively high by Latin American standards during that period, though lower than for the best performers such as the Dominican Republic, Costa Rica, or more recently Chile. This relatively favorable performance is largely attributable to the oil boom, which boosted Ecuador's average annual growth to 10.4 percent in the 1970s—the region's highest. Except for that decade, Ecuador posted growth rates very close to the region's average, except for a very weak performance during the 1990s, mainly due to the 1999 financial crisis. Ecuador's growth over 2000–05 was again one of the highest in the region—especially reflecting the boost to oil production in 2004, once the new heavy oil pipeline was in place—before becoming low by regional standards. Ecuador's per capita growth is largely similar to the performance of other Latin American economies, with a 2.4 percent average per capita growth over 1951–2005. However, Latin America's growth performance has been rather disappointing and

below the world average (De Gregorio and Lee, 2003). As a result, Ecuador's growth performance has been poor in comparison to some of the best performing economies, such as Korea or Spain.

Ecuador's economic performance has been characterized by significant volatility and a marked dependence on diverse primary export commodities. In the early years of the twentieth century, the Ecuadorian economy was largely based on agricultural products, particularly cocoa, coffee, and related products. Their share of the economy has gradually declined since the middle of the last century, despite some occasionally favorable times (in the late 1940s, mid-1950s, mid-1960s, and mid-1970s). From the late 1940s to the 1960s, the banana boom was critical to help modernize the Ecuadorian economy. In 1954, Ecuador became the world's leading banana exporter, with export proceeds representing over half the country's total exports in the mid-1960s. Despite a declining share as a result of the subsequent oil boom, bananas remain an important export product, accounting for around 18 percent of total exports in the last decade.

Oil has become a critical sector for the economy since the exploitation of important oil reserves in the early 1970s. The oil boom was extremely abrupt, with the export share of oil export proceeds jumping from less than 1 percent in 1971 to 66 percent five years later. Oil production deeply modified the economy, prompting an urbanization process and the emergence of a middle class, as well as giving the government a much larger economic role. Since the mid-1970s, oil export revenues have evolved in line with international oil prices and the country's ability to develop its reserves further, but have never been lower than 19 percent of total exports. More recently, a few commodities, such as shrimp and flowers, have also achieved a non-negligible share of the country's exports and boosted growth. However, oil has been the main overall driver of economic fluctuations.

Investment and Savings

In recent years, the average investment rate in Ecuador as a percent of GDP has been relatively large by regional standards. The Eco-

nomic Commission of Latin America (Machinea, 2006) points to high investment/GDP ratios for Ecuador in recent years (the highest out of 19 Latin American economies), while UTEPI (2007) refers to a 15 percent annual growth of gross domestic investment over 2000–04, a faster pace than for the region. The International Monetary Fund (IMF) figures on gross investment for 13 Latin American countries, including the largest ones, show that gross investment as a percent of GDP has indeed been large in Ecuador in recent years: the corresponding rate reached 21.6 percent on average in 2000–06, compared to 18.5 percent for 12 other comparator countries (see Zettelmeyer, 2006). However, this trend is mostly recent: Ecuador's investment rates over 1979–2006 have been only marginally larger than the regional average, as investment was comparatively low during the 1980s and the 1990s. The recent surge in investment has been driven by private investment, which added up to 18.3 percent of GDP during 2000–06, compared to 14.1 percent of GDP in 1979–99.

Investment rates were relatively high during the 1960s and 1970s. According to De Gregorio and Lee (2003), Ecuador's average investment rate during 1965–95 (near 24 percent of GDP) was lower only than that of Guyana among a large subset of Latin American countries. Similarly, UTEPI (2007) estimates that point to capital stock figures for Ecuador were only lower than Nicaragua among 17 Latin American countries: with a permanent inventory methodology, the results suggest that investment rates—used in the study to estimate the initial capital stock in 1980—were indeed large before then. As a result, Ecuador's capital stock has since remained larger than for most countries in the region, with even a slightly faster build up than for other countries.

Although the high levels of Ecuadorian capital stock may be related to the weight of the oil sector, both because of the large oil investments during the 1970s and early 1980s and because of those related to the heavy oil pipeline in early 2002, the available data on oil and non-oil investment—building on the data provided by Espinasa (2007)—suggests that only some 13 percent of gross investment was related to oil during 1993–2006, except for the years when the heavy

oil pipeline was built (2001–03). Thus, at least part of the relatively high capital stock levels could reflect some over-investment in low-productivity sectors, as a result of specific protection.

Gross investment trends are more volatile in Ecuador than in the region, mostly reflecting and amplifying the larger swings of the country's overall economic activity. Meanwhile, Ecuador's domestic savings, which were low by regional standards from the mid-1980s through the mid-1990s, have consistently grown and are now among the highest in the region. These trends reflect, in the late 1990s, the impact of the economic crisis on the private sector, forcing it to increase private savings and, in the early 2000s, the favorable impact of oil prices, allowing improved public savings. Overall, for the past two decades and despite large swings, Ecuador's domestic savings have remained close to the Latin American average.

Key Binding Constraints on Growth

Infrastructure: Critical Needs in Key Areas

Beyond the oil and energy sectors, Ecuador faces many additional challenges regarding infrastructure—although actions are being taken gradually to address those shortcomings. The World Bank's enterprise surveys show mixed results in terms of Ecuador's rankings within Latin America (Table 4.1). While delays to obtain an electric or telephone connection are longer and the impact of electric outages

TABLE 4.1 Infrastructure Indicators, 2005

Infrastructure	Ecuador	Region	All countries
Delay in obtaining an electrical connection (days)	29.54	25.75	25.82
Number of electrical outages (days)	9.47	13.50	23.46
Value lost due to electrical outages (% of sales)	5.04	3.66	3.93
Number of water supply failures (days)	4.12	-9.13	11.68
Delay in mainline telephone connection (days)	92.65	54.32	34.41
Firms using the Web in interaction with clients/suppliers (%)	55.41	43.92	44.67

Source: World Bank enterprise surveys.

greater than the regional average, water supply failures or the average number of electric outages are moderate in regional terms.

According to the 2006 Central Intelligence Agency (CIA) World Fact Book, the share of Ecuador's roads that are paved is close to 17 percent, a relatively low share by Latin American standards, partly reflecting the country's geographical diversity and the natural obstacles posed by the Andean mountains. However, UTEPI mentions that 3 percent of the road network is now under concession, a relatively high number by regional standards, which ensures enhanced maintenance of the roads. Meanwhile, Ecuador has the lowest number of airplane departures per million habitants, which may partly reflect its relatively high population density in South America, which facilitates land transportation. However, the recent renovation of Guayaquil airport and the ongoing construction of the new Quito airport suggests than improvements are underway. In a similar vein, the granting of concessions to recognized foreign companies for the operation and renovation of the ports of Guayaquil and Manta signal an improvement in the coastal infrastructure.

Regarding telecommunications, according to the World Bank's *World Development Indicators* (WDI) and UTEPI (2007), in 2004 Ecuador ranked 10th out of 17 Latin American economies, with 124 fixed phone lines per 1,000 habitants, while it ranked 5th (with a remarkable improvement from 15th place in 2000), with 348 mobile lines per 1,000 habitants. As discussions are underway for the renewal of the existing mobile phone concession contracts, mobile telecommunications continue a dynamic expansion. Access to personal computers and to the Internet remains relatively difficult for Ecuadorians, with the country ranking in the lowest half of the region, despite some improvement in recent years. Telecommunications and transportation, while regarded as a business constraint in the World Bank's Investment Climate survey, are not considered critical problems, with only 18.1 and 10.6 percent of respondents, respectively, considering them to be severe or very severe obstacles.

The remainder of this section focuses on two critical sectors for the Ecuadorian economy: oil and energy. Both are largely

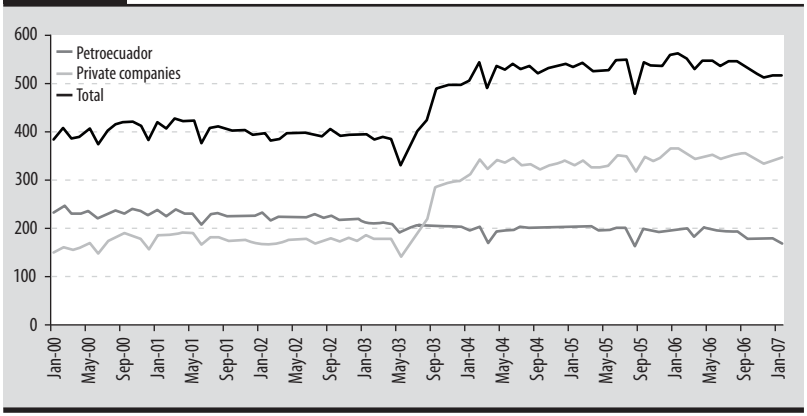
controlled or dominated by the public sector, thus highlighting the importance of appropriate decisions on public investment (or lack of it) for growth. Both sectors are also characterized by highly inefficient sectoral strategies, which have failed to foster the relevant sector's development.

Oil Sector Development: Investment, Governance, and Natural Resources Issues

Oil has had a very significant role in Ecuador's economy in recent decades. During 1980–2006, oil-related GDP represented 12.8 percent of total GDP on average (measured in constant prices). In recent years (2000–06), this share has risen to 17 percent. The importance of oil is also reflected in trade composition. Oil exports accounted for 48.1 percent of total exports on average during 1980–2006. Finally, oil is critical for fiscal accounts: from 1980 to 2006, oil revenues represented 36.5 percent of central government revenues, with some decline of the corresponding share (to 29.5 percent) in recent years. However, these figures, taken from official sources, underestimate oil revenues, as increasingly large subsidies on oil derivatives are directly financed from oil proceeds, before oil revenues are transferred (on a net basis) to the central government. The subsidies—not included in central government revenues—have been rapidly rising in recent years, reaching about 6 percent of GDP in 2007.

Since oil extraction started in Ecuador's Amazonian region in the early 1970s, production grew constantly until 1994, when state oil production (managed by Petroecuador) started to fall, while private production increased. Between 1994 and 2006, state oil production fell at a relatively constant pace, with an annual average rate of decline of 4.5 percent. At the same time, private production posted moderate growth (16.6 percent annually, during 1994–2000), before increasing its pace (to 38.2 percent annually in 2002–04) and subsequently almost stagnating (with a 2.7 percent annual growth in 2004–06). These numbers exclude the production of Bloque 15 oil field, which was operated by the U.S. firm Occidental until April

FIGURE 4.1 Daily Oil Production, 2000–7
(thousand barrels)



Source: Central Bank of Ecuador.
Note: Data exclude the impact of the decision to rescind the Occidental contract in April 2006.

2006, when the Ecuadorian government took control of it, alleging contract infringement. Petroecuador has operated the field since then. The decline in state production, combined with the recent stagnation of private production, clearly reveal the limitations faced by the oil sector (Figure 4.1).

Different sources provide somewhat diverse estimates for Ecuador's crude oil reserves. Even with the most pessimistic estimate, and assuming no new oil fields discoveries, Ecuador could maintain its 2006 production level for 23 years. According to crude reserves projections by the Oil & Gas Journal, world proved reserves grew by 2.7 percent annually during 1980–2006, while Ecuadorian reserves increased by 5.7 percent over the same period. With a shorter time frame (2000–06), the average growth of Ecuador reserves (13.9 percent) is even larger than for world's reserves (4.1 percent). As a result, the share of Ecuador reserves in the world doubled (from 0.17 to 0.34 percent) from 1980 to 2006. All in all, this suggests that the availability of oil reserves is not a constraint on the sector's growth.

Regarding transportation capacity, Ecuadorian crude oil lies almost exclusively in the country's Amazonian region. Thus, the presence of an oil transportation system to the Pacific Ocean, through the Andes,

is essential. The light crude oil pipeline (Oleoducto Trans-Ecuatoriano, SOTE) has been functioning since 1975 with a transportation capacity, after several expansions, of 390,000 barrels per day (b/d). Transportation capacity was a key constraint to production growth until late 2003, when the heavy crude oil pipeline (Oleoducto de Crudos Pesados, OCP) started to operate, with a capacity of 450,000 b/d. This allowed a significant increase in private production, particularly in 2004. Since January 2004, following an initial step-up, private production has barely grown. Despite the 160,000 b/d step-up in production, the OCP excess transportation capacity (290,000 b/d) remains quite large, at 35 percent of the pipeline's capacity. In addition, the gradual reduction in public production explains why the capacity utilization of the existing pipelines has been close to 59 percent, on average since January 2005. In summary, transportation capacity has not been a constraint to the growth of production in the sector, at least since late 2003.

In addition, between 1999 and 2006 the average price of Ecuador oil exports rose from US$9.2 per barrel to US$50.8 per barrel. Over the same period, state production declined from 277,000 b/d to 188,000 b/d. In other terms, production fell by 32 percent while export prices increased by a factor of five. Overall, it appears that oil prices do not explain the sector's mediocre performance.

Turning now to institutional limitations, the main problems hampering the oil sector's ability to grow in line with its potential mainly reflect legal limitations, the absence of a clear sectoral strategy, Ecuador's limited attractiveness to foreign investors, and the lack of conditions fostering open competition in diverse areas (see Albornoz, Cueva and Gordillo, 2006).

Since the termination of the oil exploration contract with Texaco in 1992, the existing regulatory framework has not included a way to allow private investments in oil fields operated by Petroecuador. The implementation of shared-management contracts, approved in August 2000, has not been possible, as the Constitutional Court declared them unconstitutional in December 2000.

The absence of a clear national strategy and an independent business-style management of Petroecuador toward oil production

growth are critical. This absence largely results from the significant political instability that Ecuador has experienced in recent years, which has led to a very rapid changeover in sector authorities and the lack of continuity in policies. The oil sector is probably the worst hit sector in this regard.

The negative impact of this lack of a clear strategy has been reinforced by the perception among foreign investors that some recent decisions have hampered legal stability. Over and above concerns about diverse legal interpretations, the perception of unilateral changes in contracts implies that it will be difficult to restore the confidence of either firms currently operating in the sector, or of potential new serious partners. This highlights the importance of clear guidelines and national objectives reflected in priorities for public investment decisions; measures to provide some certainty for decisions in the oil sector beyond potential political changes; an enhanced negotiation capacity for the public sector with respect to private companies; and building the status of the state as a strategic partner in critical areas.

A third key area is related to the strong constraints against free competition in several subsectors as a result of the state monopoly position and the existence of heavily regulated prices. Areas that are particularly affected include oil refining, oil derivatives commercialization, and oil derivatives imports for domestic markets. Beyond legal limitations or the related large fiscal costs, price regulations on oil derivatives have restrained any significant role for the private sector in those areas, thus limiting the room for new private investments and explaining the obsolescence of oil infrastructure.

The recurrent underinvestment in the oil sector, particularly by Petroecuador, explains the persistent decline in state production, as well as the obsolescence of existing infrastructure in many areas (refining, derivative transportation, stocking). In addition, Petroecuador uses relatively old technology in comparison with private companies, and its operations have a high environmental impact.

Behind institutional problems and underinvestment, vested interests combined with coordination failures are partly to blame

for the production decline and infrastructure limitations. Inefficient and nontransparent markets have allowed the maintenance of some profitable and noncompetitive businesses. Aging refineries increase the need to import derivatives. The postponement in the construction of pipelines for transporting derivatives has permitted costly road transportation schemes to persist. Limitations for stocking derivatives have increased the need to make use of privately controlled stocking and sea transportation systems. The continued use of a sea oil terminal, which was expected to be temporary back in 1977, results in the need for manual support for oil derivative loading and unloading operations. The growing costs of subsidies for domestic consumption of oil derivatives are the key driver of smuggling activities to neighboring countries.

The impact of the oil sector's inefficiencies for economic growth passes through at least two channels. First, the sector's growth has been rather lackluster in the context of historically high international prices, despite existing reserves. Second, as the sector is a key provider of public revenues, these inefficiencies have had huge opportunity costs in terms of public savings and public expenditure, in turn restraining the possibility of fostering appropriate growth-enhancing and poverty-reducing policies. Unlike electricity, oil is not per se a significant input for other economic activities, except for oil refining. Oil derivatives prices are low by international standards because of high state subsidies; thus there is no direct impact in terms of high costs, but there are obvious inefficiencies in terms of the best and more equitable use of public funds.

Overall, development of the oil sector has been mediocre because of institutional limitations, the lack of long-term state policies, underinvestment, and the presence of strong interest groups that benefit from the lack of transparency. The inability of successive governments to tackle the inefficiencies in those sectors has been an important constraint to the country's economic growth.

In 2006, average daily oil production in Ecuador was 536,000 barrels. In order to achieve an increase in production, large investments are required. Espinasa (2007) presents a scenario whereby

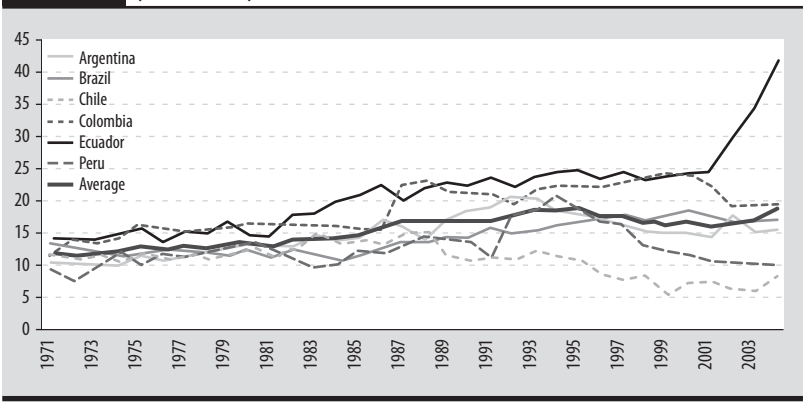
the exploitation of existing light and semi-light oil fields is optimized, in order to reach and maintain a daily level of oil production close to 890,000 barrels. Reaching such levels would imply investment and maintenance outlays of about US$4.7 billion over five years. A second scenario would include the start of operations in the heavy crude oil field ITT, requiring additional investments of US$3.9 billion and providing about 200,000 barrels per day. In summary, reaching a daily average production of 1,090,000 barrels would require investments of about US$8.6 billion—and, according to Espinasa, is achievable within eight years.

The Electricity Sector: Inappropriate Regulation and Business Environment

The most vulnerable aspect of Ecuador's infrastructure is probably the electricity sector. Electricity supply is a major problem and a source of large distortions. Electricity rates are high compared to the region (only lower than in El Salvador, Nicaragua and Panama) despite being subsidized. The high costs, by regional standards, of electricity tariffs in Ecuador, coupled with repeated blackouts, have hampered the private sector's competitive position in several sectors. The country has been constantly under the threat of power outages because of the lack of generation. Electricity is the business obstacle most commonly cited as a severe or very severe problem (by 28.3 percent of respondents) in the World Bank's investment climate survey. Moreover, it seems that the sector's problems have become recurrent enough so as to be considered by some respondents to be the norm for the country's environment, which would explain why some firms, despite not citing the issue as an obstacle, report having sales losses because of electricity outages.

Distribution utilities face large and recurrent efficiency issues. Ecuador ranks first among Latin American countries in terms of energy losses (by 2004, almost 42 percent of the transmitted and distributed energy was lost), a problem that has become more critical in recent years (see Figure 4.2). As Neira and Ramos (2003) note,

FIGURE 4.2 Energy Transmission and Distribution Losses, 1971–2003
(percent of output)



Source: World Development Indicators (WDI), World Bank. Average includes Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Panama, Peru, and Uruguay.

such a situation is due to both technical reasons (factors inherent to energy transportation, which partly reflect underinvestment in transportation facilities) and nontechnical ones (energy smuggling, equipment obsolescence, inefficient business management).

The expensive energy costs are largely related to the growing dependence on thermoelectric- rather than hydroelectric-generated electricity; the former has much higher marginal costs. Hydroelectric production fell from nearly 86 percent to only 59 percent of total production from 1989 to 2004. Meanwhile, the share of oil-related generation grew from 14 percent in 1989 to almost 33 percent in 2004. Many large energy generations projects, which were expected to move forward according to the 2000 official electric plan, have been postponed or have not started (see Table 4.2). These trends do not reflect natural resource constraints but mostly underinvestment for hydroelectric plants. According to OLADE, Ecuador uses about 7 percent of its hydroelectric generating potential, and the country's energy demand is growing faster than the added supply capacity, implying the growing need to import even more costly energy from Colombia and, more recently, Peru.

The energy sector is largely dominated by the public sector. As pointed out by IDB (2001), Ecuador has the lowest level of private

TABLE 4.2 Electric Generation Projects and Implementation since 2000

Project	Generation type	Estimated operation	Annual generation (GWH)	Current status
EDC1	Gas	Jan. 2002	838	Operating since Aug 2002
EDC2	Heat	July 2002	634	Postponed until 2008
EDC3	Combined cycle	July 2003	789	Postponed until 2011
Termoriente	Thermoelectric	Jan. 2003	2,010	Construction not started; concession in process
San Francisco	Hydroelectric	May 2004	1,103–1,403	Partially started, to be completed by 2008
Mazar	Hydroelectric	Jan. 2006	569–744	Expected by March 2009
Molino Mazar	Hydroelectric	Jan. 2006	677–1,042	Will start in March 2009, depending on Mazar [a]

Source: CONELEC, 2000 and 2006 electric plans.
Note: Annual generation ranges are for medium and dry hydrology for hydroelectric projects.

investment in electricity and one of the lowest levels of private sector participation in generation and distribution in the region, while transmission operations are state-controlled.

Twenty firms take care of energy distribution. All are under heavy public sector control. For instance, 19 of the 20 firms have a Solidarity Fund, a public entity dependent on the presidency, as their main shareholder, with other minority shareholders, including local governments and regional chambers of commerce.

State-controlled distribution utilities are characterized by consistent energy losses. Such inefficiencies reflect a combination of inadequate investment, lack of competition, political interference, management and governance issues, and regulatory shortcomings.

Underinvestment, particularly for transmission operation, is a partial cause of growing energy losses. According to the World Bank (2005), the electricity sector received investments adding up to only 0.16 percent of the country's GDP over 1996–2000.

A portion of the growing debts to energy suppliers run up by the most inefficient utilities can be attributed to the government's decision to maintain a subsidy on final energy prices, without proper and prompt compensation to distribution utilities. Debt built up to about US$1 billion through 2006 is expected to be taken over by the

central government in line with a new energy law. In turn, the growing debt that generation firms have run up with their main supplier of oil derivatives, Petroecuador, has hurt the national oil company's financial situation, aggravating the already low investment in oil production. Through renewed emergency decrees, successive governments have maintained Petroecuador's provision of oil derivatives to over-indebted generation utilities, mitigating the risk of large energy blackouts but boosting the costs of oil derivative imports.

Management and collection procedures vary widely for different regional firms and explain a large share of distribution inefficiencies. The appointment scheme for the companies' boards and managers—by direct nomination from political authorities—raises governance issues. Regional, industrial, and business leaders usually play a role in such nominations, while they are also some of the larger electricity customers. As a result, enhancing the firms' poor collection procedures (which would help in reducing energy losses and recovering longstanding debts) is challenging. The new energy law called for an open system for the nomination of the board and managerial positions in the distribution firms, with the aim of ensuring more professional and independent management. However, the legal reforms have not been implemented so far, as the general prosecutor has issued a statement establishing that electric utilities must follow the legal provisions that regulate private businesses instead of the energy law.

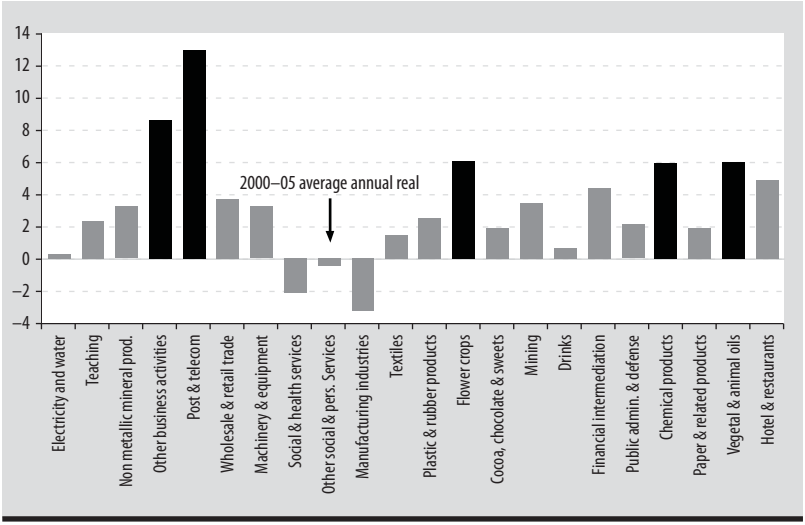
The regulatory framework for energy pricing exacerbates existing problems. There are two wholesale markets for electricity: long-term contracts agreed between production and distribution utilities, and the spot market. With a clear and recurrent segmentation, efficient firms typically rely on long-term contracts, ensuring them a more predictable and cheaper provision of electricity. Inefficient utilities depend more heavily on the spot market, where electricity prices are based on the marginal producing cost for each time period, and the most efficient producers are called first to supply energy at each period. Spot prices can vary widely from soft-demand periods, when hydroelectric utilities are the main providers, to peak hours, when

all production utilities, including expensive thermoelectric ones, are working. Thus, lower-cost generating firms—hydroelectric—make their largest profits during peak periods and have little incentive to increase their production capacity, as this would push out high-cost generating firms from the market, lowering their own profits. Some private thermoelectric projects—which generally require much lower initial investments and have a shorter investment recovery horizon—have been developed to take advantage of the high spot prices resulting from the sector's underinvestment and inefficiencies. Some have faced challenges in collecting debts from inefficient utilities (the ones mostly relying on the spot market). This has led to legal actions and has worsened the environment for new private investment. Meanwhile, hydroelectric plants—which require large initial investments and long horizons for investment recovery—have been held back, both because they have not been made a priority for public investment and because private projects face many unknowns, including reliance on inefficient utilities, growing debts, state-controlled prices, and legal uncertainty.

Meanwhile, energy demand continues to grow, while cheap supply has not necessarily followed. In recent years, some private businesses have decided to build their own generation facilities to meet their own energy needs, highlighting the lack of confidence in the public sector's ability to ensure credible and efficient service. Finally, the risk of energy blackouts remains, as the country depends heavily on weather factors during some months to ensure adequate coverage of energy demand.

Electricity represents a non-negligible input for several economic sectors. According to the 2005 national accounts figures, the combined value-added for the 22 economic sectors for which electricity represents at least 2 percent of intermediate production costs added up to 46.6 percent of national GDP. Of those 22 sectors, 17 (with combined value added equivalent to 78.9 percent of the 22 sectors) have witnessed growth rates below the national average during 2000–05 (see Figure 4.3). In addition, at least two of the remaining five sectors (with average annual growth rates faster than

FIGURE 4.3 Real Growth and Electricity-intensive Sectors, 2005
(percent)



Source: Central Bank national accounts and authors' estimates.

the overall economy) have benefited from specific conditions (the boom of mobile telecommunications from limited coverage five years ago; weather-specific and trade preference advantages for flower crops) explaining their positive performance.

In summary, public sector management of the electric sector has resulted in a highly inefficient sector, with high costs, subsidized but expensive tariffs, a growing dependence on expensive thermoelectric energy, entrenched vested interests, financial constraints for Petroecuador and the development of the oil sector, and a clear impact on the overall economy. It is vital for Ecuador to build new plants with low marginal costs in order to reduce generation costs and enhance its competitiveness. The weak business environment, combined with inefficiencies and political interference in the operation of power distribution plants, have hampered the country's ability to attract private investment for hydroelectric generation, despite Ecuador's favorable natural environment for such plants.

Overall, infrastructure—particularly in the oil and energy sectors—appears to be a key binding constraint on Ecuador's growth.

However, removing the barriers to ensure an efficient implementation of new investment projects involves addressing institutional and legal constraints.

Micro Risks: The Weakest Link?

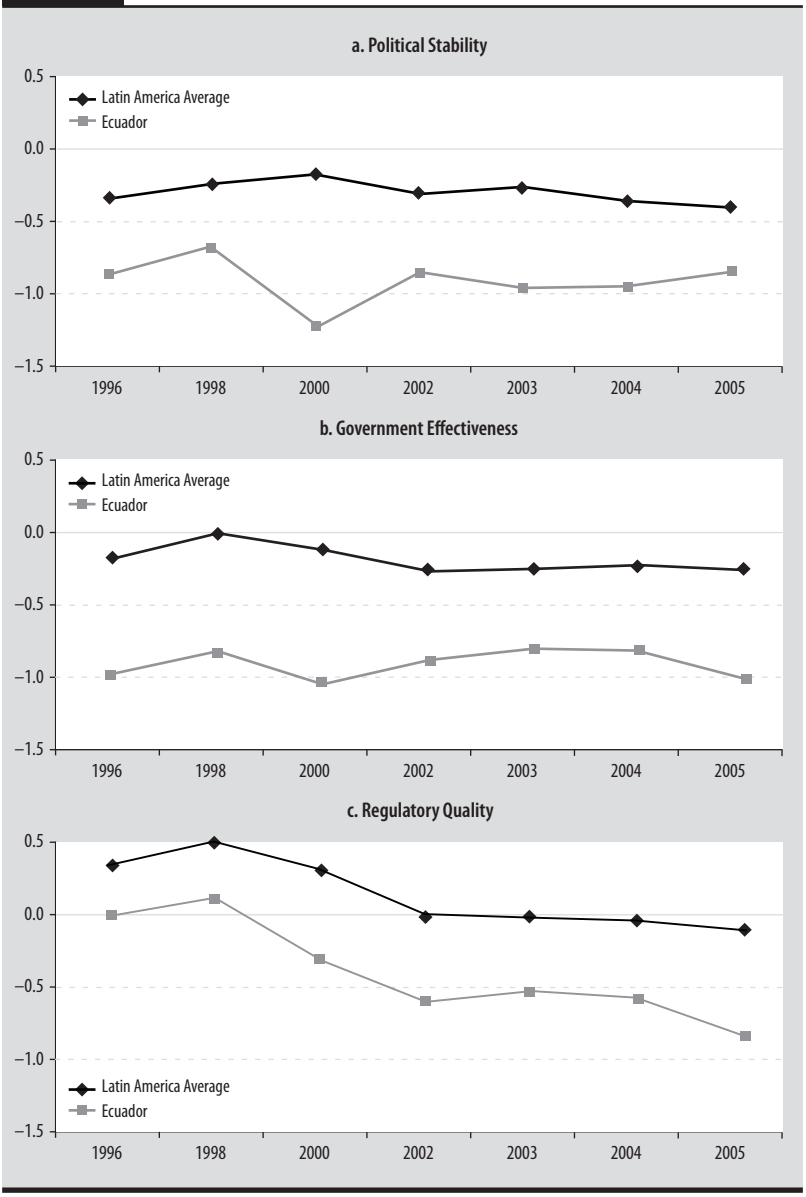
Almost every international survey or competitiveness assessment of Ecuador emphasizes weak institutions and governance issues, which are the focus of this section. Other sources of micro risks—output concentration and the potential lack of competition that could arise from it or from weak government regulation—are also discussed.

Since becoming the first country in the region to return to democracy in 1979, Ecuador has had more favorable political rights and civil liberties than the Latin American average—which improved with some lag compared to Ecuador. Despite some deterioration in recent years—reflecting a period of political instability with some presidential transitions characterized by flexible legal interpretations of the constitutional mandate—Ecuador remains one of the most developed democracies in the region, from the standpoint of individual liberties.

Nonetheless, a comparative analysis of World Bank indicators on governance issues—including political stability, government effectiveness, regulatory quality, rule of law, and control of corruption—points to a relatively weak position for Ecuador within the region (see Figure 4.4). Ecuador has performed worse than the average Latin American country for all indicators since 1996. The differences are larger for some specific indicators, such as government effectiveness and control of corruption.

The unfavorable perceptions of the country's institutional environment result from several factors. With eight presidents since 1996, instability has become a hallmark of Ecuadorian politics. Following the overthrown of former President Bucaram in 1997, no elected president has finished his constitutional mandate so far. Such instability has also reached key ministries and the management of public enterprises, hindering government effectiveness. Combined

FIGURE 4.4 Governance, Rule of Law, and Government Effectiveness, 1996–2005



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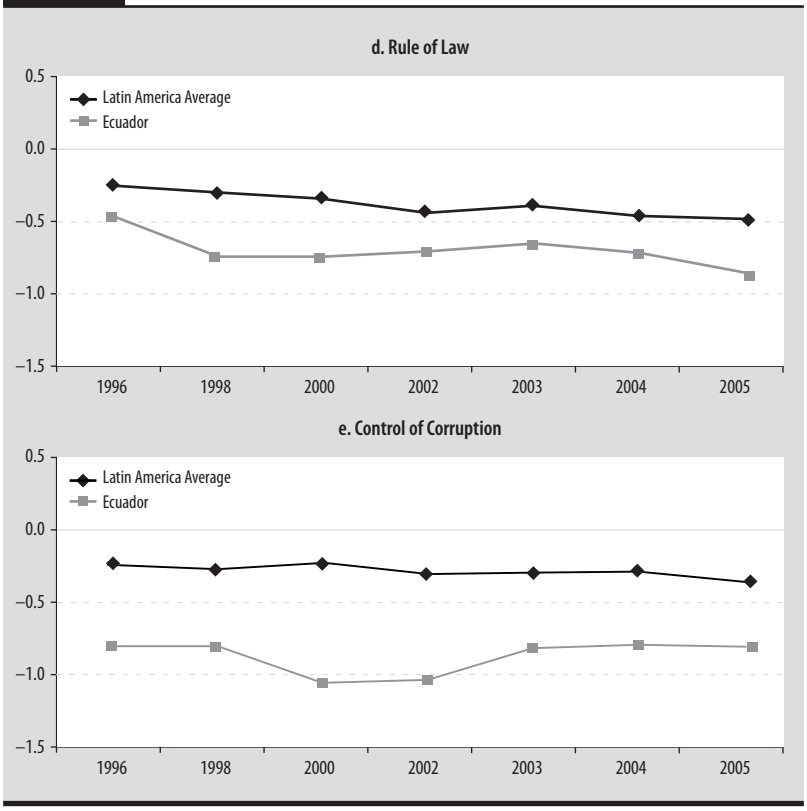
with a large financial crisis in 1999, the recurrent political change-overs have reduced the credibility of regulatory bodies as effective

FIGURE 4.4 Governance, Rule of Law, and Government Effectiveness, 1996–2005



Source: WDI, 2000–5.
Note: An increase in the index means an improvement.

and independent institutions. Successive governments have lost bargaining power with different interest groups, including business groups and workers' unions.

Corruption is also generally viewed as an important weakness for Ecuador (see Table 4.3). The country ranks poorly in the Transparency International index on perceptions of corruption. The Investment Climate Assessment highlights the issue, while a survey conducted by the World Bank points to corruption as one of the top three factors inhibiting private investment.

This problem is worsened by the lack of confidence in the judicial system. The unequal prevalence of the rule of law appears to be

TABLE 4.3 Ecuador and Latin America: The Judiciary and Corruption

Type of corruption	Ecuador	Region	All countries
Payment required by a typical firm to get things done (% of sales)	2.8	1.5	1.2
Firms expected to give gifts in meetings with tax inspectors (%)	1.4	5.9	30.4
Value of gift expected to secure a government contract (% of contract)	7.3	4.1	2.2
Confidence level in the judiciary system (%)	29.2	55.5	59.0
Time spent resolving a dispute (weeks)	—	7.7	12.3
No resolution in courts for overdue payments (%)	71.5	78.1	68.8

Source: World Bank.

a recurring problem in the country, reflecting the instability in the judicial system and the lack of consensus regarding its legitimacy. Since 1997, Ecuador has had several supreme courts, which have partly reversed decisions made by their predecessors and have faced diverse criticisms regarding their legitimacy. Crime rates also have gone up, and security costs are relatively high in Ecuador.

Institutional Weaknesses that Harm the Business Environment

Legal and political instability, including frequent legal changes and diverse legal interpretations, reduce Ecuador's attractiveness for both national and foreign private investment. This includes difficulties enforcing creditor rights and pursuing legal procedures to recover assets. According to the Heritage Foundation indexes, Ecuador's performance in respect to property rights and the quality of the business environment is rather disappointing. The country has been posting growing lags with Latin America trends, especially after 2000.

The recent decisions to force changes to the contracts with private oil companies through a new law, and to rescind the contract with U.S.-based Occidental Petroleum Co., have further eroded the attractiveness of the country to foreign investment. After Argentina, Ecuador is the country facing the largest number of arbitration procedures on foreign investment issues before the World Bank-affiliated International Center for the Settlement of Investment Disputes (ICSID). In addition, foreign direct investment (FDI) to Ecuador

has been largely concentrated in primary sectors—93.4 percent, according to UTEPI (2007)—especially oil, and has been extremely low in other areas, such as manufacturing industries.

The trade openness index shows an improvement in import and export swiftness/facilities compared to the region average, reflecting the adoption of new trade agreements that reduced barriers and enhanced customs administrative processes. Since 1995, Ecuador has signed a relatively low number of trade agreements and now has higher average tariffs than the region average, with a reduction in the trade openness ratio from 68.1 percent of GDP in 2000 to 55.4 percent of GDP in 2004 (see UTEPI, 2007).

While the global tax burden is not unduly large by regional standards, the tax environment is not the most favorable for attracting foreign investment. Tax-related paperwork involves about 600 working hours per year per business, while the tax burden on gross profits is about 34 percent. The efficiency of the tax structure can be questioned. Corporations complain that the legal obligation to share 15 percent of their profits with the labor force is equivalent to a tax on firms' earnings, which is not always eligible to be used for tax credit overseas. Also, export drawback procedures are cumbersome and involve discretionary decisions. Tax-related problems are mentioned as severe or very severe business constraints by the respondents to the investment climate survey, in terms of both tax administration procedures (28.5 percent) and tax rates (34.1 percent).

Customs efficiency is harming Ecuador's competitiveness, as a result of bad practices and corruption, which tend to increase import and export costs. Rodríguez (2006) highlights the existing limitations and weaknesses, including an outdated legal framework, heavy political intervention in the daily management of customs, the lack of harmonization of internal procedures with international best practices, weak control procedures, and a limited use of technological procedures. Customs and trade regulation are cited by 24.9 percent of the investment climate survey respondents as a severe or very severe obstacle to doing business, an issue that appears to be more sensitive for medium and large firms. Ecuador posts weak indicators in

respect to trade procedures, with longer delays for exports clearance and even much longer delays for import procedures than the region averages—themselves already low by international standards.

Even within Latin America, Ecuador performs poorly in respect to many indicators related to microeconomic risks and appropriability. The worst areas appear to be governance, the rule of law and law enforcement, corruption, and political instability. In turn, these factors have been hampering a stronger business environment, the predictability of investment decisions, and the country's attractiveness to new businesses. This area is clearly a binding constraint on growth. However, overcoming such constraints will be a difficult and long-term challenge.

The Role of Powerful Groups in Affecting Market Competition

In a country with weak institutions, high inequality, and no antitrust regulation, the presence of strong economic groups with extensive involvement and influence over political decisions could result in inefficient public decisions, in terms of ensuring a reasonable framework for free market competition in diverse economic sectors (see Box 4.1). Firms associated with powerful interest groups could become local monopolies—thus producing less output than the optimal amount under perfect competition—and use favorable regulation or decisions on tariff and nontariff barriers to deter entry and competition. Public policies could provide undue protection to specific sectors, lead to privileged financing, or encourage overinvestment in certain sectors that might have poor rates of returns and productivity but are able to influence public policies through their political power. However, the presence of powerful groups controlling large sectors of the economy, with concentration of economic assets, does not necessarily result in low growth, as the examples of Chile or South Korea can attest. Also, output concentration and market power might not be undesirable if natural monopolies exist.

Based on firm-level data from the Firms Superintendency's indicator database, which includes balance sheets and income state-

ments from 27,606 active firms in Ecuador, the Herfindahl-Hirschman index for market concentration can help identify sectors where some economic groups have significant market power. Within private sectors, output concentration is not large for 43 sectors (7 percent), is moderate for 64 sectors (10 percent), and is significant for 527 sectors (8 percent). The latter sectors account for 40 percent of total sales in the sample. From another perspective, among the top 50 sectors in sales (adding up to 70 percent of total sales), 21 sectors are classified as concentrated, 9 sectors are moderately concentrated, and 20 do not show evidence of concentration. Not surprisingly, all the state-controlled or state-regulated sectors are either concentrated or moderately concentrated, suggesting some evidence of government failure to foster competition in those areas.

The firm-level data in the indicator database reveal that the degree of output concentration is positively correlated with the return on assets and the return on equity, with statistically significant results. As expected, sectors with higher concentration are more profitable than others. However, the interpretation of this result is ambiguous. On the one hand, a higher concentration, related to stronger market power, may allow higher margins and increased profitability. On the other hand, more profitable firms may grow faster, thus increasing their market share within their sector, leading to more concentration. In addition, the estimates do not find a significant link between investment rates—measured by assets growth or by net fixed assets growth—and output concentration. In a competitive environment, profitability should translate into higher investment rates, which in turn would help firms grow faster. The results suggest that this is not occurring. A potential explanation is that firms may be holding large market power for other reasons (including some overprotection from public policies), and that power would allow them to increase profitability without necessarily investing more. However, the results should be taken with caution because of reverse causality issues.

An additional way to assess the preferred economic interpretation is to observe whether public regulation could explain the degree

of market concentration. Thus, to assess to what extent powerful economic groups might limit competition within their sectors through unfair regulation, different measures of trade protectionism were constructed, as proxies of the state's decision to protect specific sectors. Using Clasificación Industrial Internacional Uniforme (CIIU) data at the four-digit level, the variables that capture some degree of protection include: the average tariff by sector; the ratio of mean tariffs to the tariff range by sector; an index of trade protection for each sector negotiated under the draft agreement in the free trade area (FTA) negotiations with the United States; a similar index of trade protection for each sector under the CAN-MERCOSUR agreement; and an index including the share of forbidden-import merchandise within each sector. The correlations between the protection measures and the market concentration index are not statistically significant, suggesting that those sectors with a stronger output concentration are not necessarily better protected under trade agreement negotiations or through tariff decisions.

Alternatively, trade policy may have been used to protect products or sectors with strategic value, in the Hausmann, Hwang and Rodrik (2005) perspective. As for import substitution policies, trade policy has long been considered a powerful policy tool to protect domestic industries against foreign competition until local industries reach levels of development similar to their competitors. Trade protection indicators and the Hausmann and Klinger (2006) data are combined to assess whether trade policy has been somehow effective in terms of protecting those sectors with strategic value. As measures of product sophistication and density in the product space, the prody and density variables were used, as defined by Hausmann and Klinger. The prody variable captures the degree of revealed sophistication implicit in each export product. The density variable assesses the likelihood that a specific product might be exported, by looking at its proximity to a group of products where a comparative advantage has already been established. Those two variables have been aggregated to a CIIU four-digit level classification, for which trade protection variables are available.

BOX 4.1 Vested Interests and Growth

Vested interests can play a role in influencing public policies in order to maintain existing privileges, overprotect existing industries, reduce competition, or push for investment in nonpriority areas. Several facts suggest that Ecuador may be more vulnerable than other countries in these areas:

- While the 1999 financial crisis resulted from several factors—weak regulatory standards, macroeconomic shocks, and financial dollarization—special interests played a key role, including an undue influence on key legislative and executive decisions, related lending, and some capture of regulatory institutions (see De la Torre, García-Saltos and Mascaró, 2001; Jácome, 2004).
- The presence of large oil revenues enhances the risks of state capture by special interests for the sake of controlling significant rent-related revenues. The influence of special interests in exacerbating budget rigidities and fiscal pro-cyclicality, and distorting expenditure decision during the budget process, is discussed in the macroeconomic section of this study.
- The oil and electricity sectors suffer from inefficient and nontransparent markets, which have facilitated the survival of lucrative and noncompetitive businesses, large-scale smuggling, regressive subsidies, and nonrecovered debts. Inefficiencies in these sectors have impeded faster growth and more progressive fiscal policies.
- Several economic sectors are subject to significant market concentration. Panel data suggest that output concentration is related to higher profitability but not necessarily to (indirectly measured) investment rates. A potential explanation would be that firms having significant market power and high profitability benefit from some policy protection shielding competition, despite limited investments in the sector. However, this study did not find convincing evidence that highly concentrated sectors have benefited from special protection under trade agreements.
- The absence of strong regulatory institutions perceived as technically driven and independent has undermined the ability to foster social consensus on sound macroeconomic policies, as well as the state's capacity to provide public goods conducive to growth.

While the quantitative evidence on the impact of vested interests remains limited, these factors show that they can potentially amount to a significant constraint on growth. This implication highlights the importance of efforts to enhance transparency in public decisions, improve the accountability of private businesses, and minimize the risks of capture of critical institutions by special interests.

The correlation results suggest that: if anything, trade policy is aimed at protecting the "wrong" sectors, in terms of the sectors'

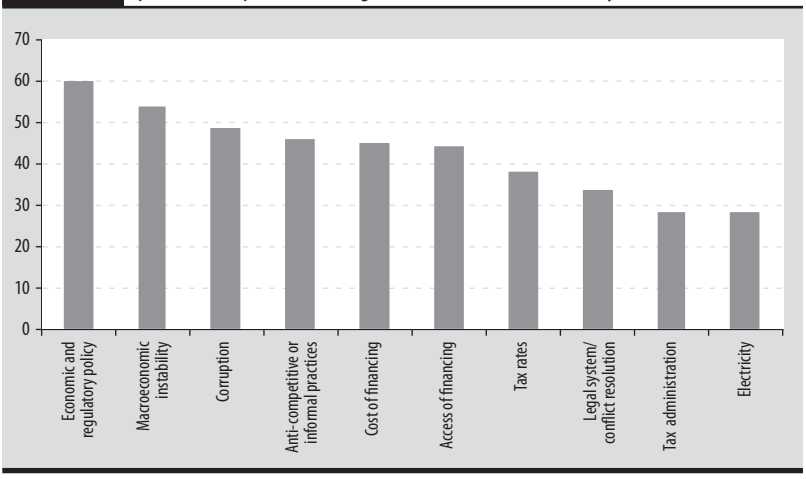
strategic value or sophistication; and trade policy is protecting sectors with some export potential. However, as Hausmann and Klinger point out, a country might be exporting goods with low strategic value; thus a higher density level may not necessarily correspond to products with high sophistication. Hence the last result should be interpreted with caution.

Access to Finance

Financing costs could be an important constraint to Ecuador's growth. Private sector surveys have usually pointed to the high cost of finance as a major complaint within the private sector. Access and cost of finance are high on the list of business constraints identified as severe or very severe in the World Bank investment climate survey (by 45 percent and 46 percent of the survey respondents, respectively). In addition, the Proyecto Salto survey on microenterprises clearly points to credit access as a significant business constraint.

In spite of the current favorable international conditions, 14.2 percent of firms responding to the World Bank´s enterprise survey

FIGURE 4.5 Top Ten Constraints for Firms Investing in Ecuador, 2005
(percent of respondents listing the constraint as severe or very severe)



Source: World Bank enterprise surveys.

perceive "access to and cost of financing" as a major or severe obstacle, a level which is above the Latin American median (and topped only by Honduras, Nicaragua, and Argentina). Moreover, access and cost of finance are relatively more binding in Ecuador than for the average country in the region. Based on the enterprise survey results, the ratio of average rankings for financial constraints (average and cost of finance) with respect to average rankings for all growth obstacles place Ecuador relatively high within the region.

International Financing

Political and macroeconomic instability, including a weak credit history, have resulted in high costs of international finance for Ecuador. The country has gone through several episodes of foreign debt default or rescheduling over recent decades. Ecuador has the highest sovereign country risk within Latin America, as measured by EMBI+ indexes, after having peaked above 4,400 basis points (bp) in mid-2000, in the context of a deep financial crisis. With a 689bp average during January–October 2007 (including a period of high volatility reflecting contradictory statements regarding the payment of interest coming due in mid-February), Ecuador's sovereign risk was, on average, 490bp higher than the Latin American index. While some particularities of Ecuadorian sovereign bonds—such as the option for the sovereign to buy back at par the bonds at any of the biannual interest due dates—may partly explain the high risk premium, the difference is large enough to suggest that external financing is much more expensive for an Ecuadorian firm or bank than for its competitors in other countries in the region.

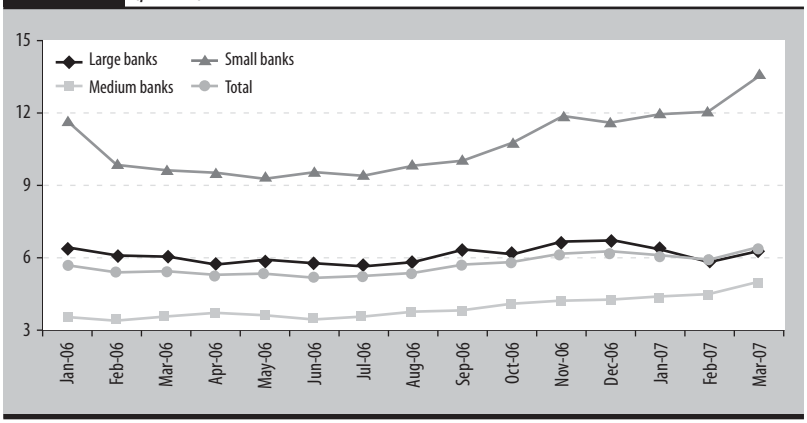
In the same vein, Ecuador ranks poorly in credit ratings if compared with other countries in the region. Although the oil boom makes it easier for the government to service its debt, some announcements threatening international creditors with initiating an unfriendly restructuring process harmed Ecuadorian creditworthiness in international markets. Investment banks have reacted by downgrading sovereign bonds.

Despite high international financing costs, their actual impact on domestic creditors and domestic lending rates remains somewhat limited, at least for now. On the one hand, the stock of private foreign debt has been growing markedly in recent years, suggesting that foreign financing availability is not scarce. Moreover, a large share of it (though no official data are available) relates to operations backed by foreign deposits, which isolates the country risk impact.

On the other hand, banks' financial obligations (including liabilities with foreign financial institutions or multilaterals) represent a limited share of the banks' total liabilities (see Figure 4.6). This reflects the upward trend of bank deposits over recent years, which has allowed a significant increase in bank lending.

Meanwhile, high international oil prices boosted Ecuador's exports and allowed an unusual external current account surplus in recent years. Overall, foreign financing costs or availability do not appear to represent a constraint to igniting further growth for now. However, Ecuador's economic history clearly shows that the country's difficult access to foreign financing has been an important component of some of its worst crises. In view of the current benign international environment (which could be reversed by recent tur-

FIGURE 4.6 Share of Financial Obligations over Total Liabilities
(percent)



Source: Banking Superintendency.

bulence in mortgage operations), one cannot discard the risk of a reversal of the situation at some moment, when high country risk and inconsistent policies regarding foreign financing could increase financing costs. In that regard, high international financing costs can be viewed as a moderately high binding constraint on growth.

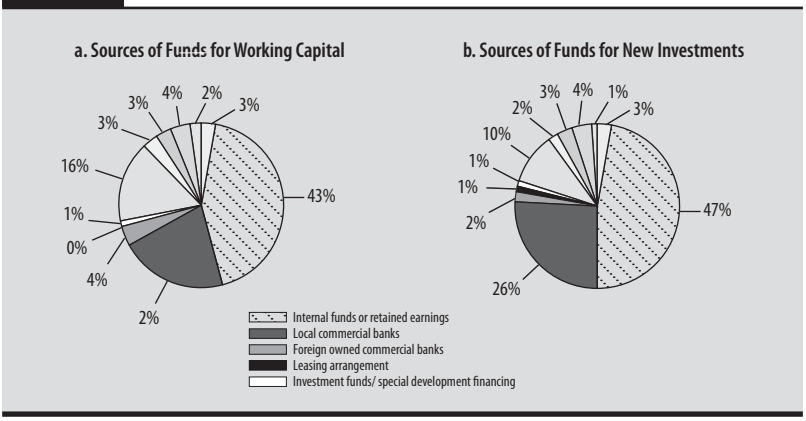
Domestic Financing

While business and microentrepreneur surveys emphasize respondents' perceptions of limited access to financing or financing that is too costly, data on credit and interest rates point to a lesser actual constraint—although financial intermediation remains limited in Ecuador. The World Bank Doing Business survey suggests that access and cost of finance are important limitations. Banking credit is a significant source of funds. Combined with leasing arrangements, development financing, trade lines (supplier or customer credit), and credit card financing, it represents 46 percent of working capital financing requirements and 41 percent of new investments' financing (see Figure 4.7). Large firms perceive access to financing (for example, collateral) as a less sensitive issue, with a statistically significant difference.

A deeper analysis of the survey results tends to confirm that those firms that mention financing constraints actually perceive the impact of such constraints in their day-to-day business activities and change their business decisions accordingly (while such matching does not necessarily apply to other constraints). For example, firms with different perceptions about access or cost of finance as a business constraint allocate, on average, statistically different shares of internal funds or retained earnings to finance working capital and new investments. They also statistically differ, on average, on their relative use of local banks' loans or trade credit to finance working capital or new investments.

The 17,626 microenterprises covered by the Proyecto Salto/Habitus survey on microenterprises place access to affordable credit as the most critical requirement for business success, by far. Some

FIGURE 4.7 Source of Funds for Working Capital and New Investments

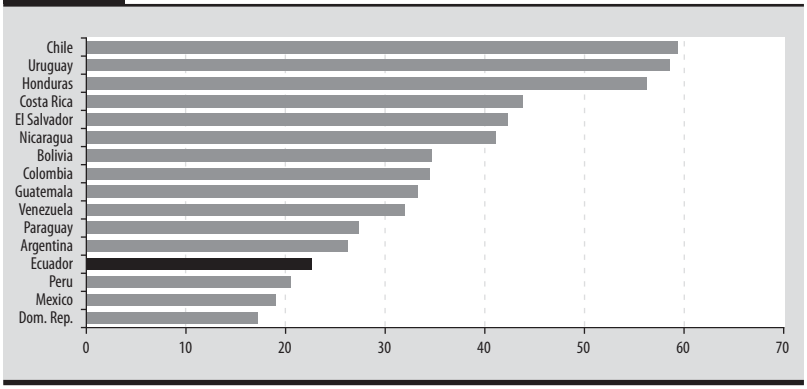


Source: World Bank.

39.4 percent of the firms state their need for credit to finance intermediate goods and merchandise, while 12.0 percent need credit for equipment, machinery, and facilities. The survey's universe differs markedly from the larger firms covered by the World Bank survey: 90.4 percent of the microenterprises finance their activities internally through sales, following by customer credit (2.8 percent), and supplier financing (1.8 percent), while financing from any type of financial institution is negligible. Cumbersome and long procedures (38.7 percent), excessively high collateral requirements (26.3 percent) and high interest rates (21.9 percent) are referred to as the most critical problems with banking loans. Finally, 50.1 percent of those surveyed would take a loan with a 20 percent annual interest rate. Statistical tests tend to confirm that those factors that firms declare to be crucial for success—particularly credit constraints—are indeed correlated with business assessment, business expectations, sales problems, or the willingness to take a loan.

While survey results emphasize credit constraints, credit to the private sector has grown at double-digit levels in Ecuador over the last five years (by more than 22 percent in 2006), in a similar trend to that of bank deposits, once customers regained confidence in the banking sector after the 1999 crisis. However, financial intermedia-

FIGURE 4.8 Financial Intermediation, Selected Countries, 2006
(bank deposits as percent of GDP)



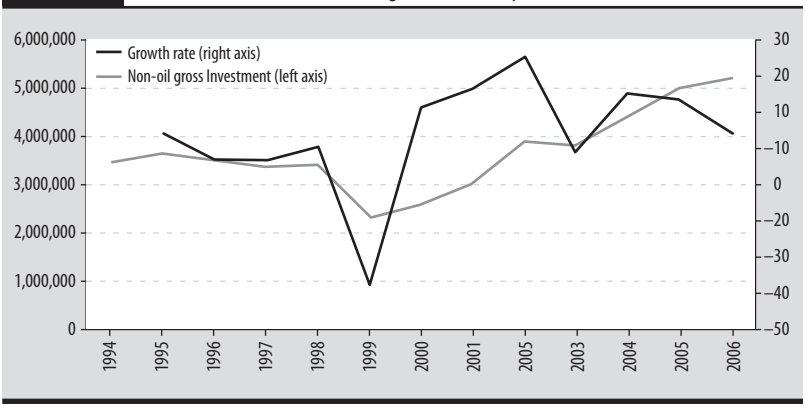
Source: FELABAN, ECLAC.

tion, measured as deposits as percent of GDP, remains rather low by regional standards (see Figure 4.8). The overall impression is that access to credit has been clearly expanding within the economy, though a large chunk of the economy—mostly informal—remains limited in credit access.

The favorable trends for deposit and credit growth in recent years have coincided with a very healthy international environment, including global growth trends, favorable terms of trade for Latin America, and abundant liquidity. The enhanced credit access over the expansionary phase of the business cycle has coincided with a faster growth rate for non-oil investment (see Figure 4.9). When subtracting oil investments, as measured by Espinasa (2007), from the central bank figures on gross fixed capital formation, there appears to be a negative (–0.8 percent) average annual growth for non-oil investment over 1994–98, before becoming positive (12 percent) in the post-crisis years (2000–06). A potential explanation might be that the lack of credit was one of the driving forces behind the low non-oil investments in the 1990s, suggesting that access to credit can indeed be a binding constraint on growth.

The aftermath of the 1999 financial crisis led, following some initial reluctance, to a gradual recovery of depositor confidence in financial institutions. As Ecuador's history shows, should the inter-

FIGURE 4.9 Gross Non-Oil Investments
(constant 2000 US$, thousands; growth rates in percent)



Source: Central Bank of Ecuador and Espinasa (2007).

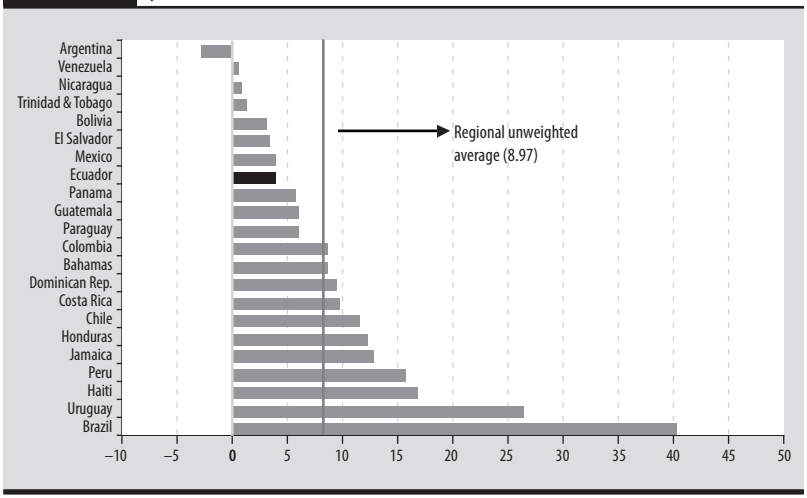
national environment deteriorate, the country could face sudden difficulties in access to finance, while weakness on the medium-term fiscal front and the rigidities imposed by dollarization would amplify financing troubles.

Between 2002 and 2006 (data prior to 2002 are not comparable to recent data), bank credit grew by $4.1 billion. Of this amount, the largest share was channeled to services, commerce, and industry. Those sectors were the most important destinations of credit in Ecuador, even before 2002. Growth rates for bank credit have been high for services, transportation, and construction, including infrastructure. Bank credit has grown at relatively low rates from already initially low levels for agriculture, energy, and mining. No data are available to distinguish real estate loans from productive investments.

Regarding the cost of financing, real lending rates appear to be relatively low, in the lower range of Latin America (see Figure 4.10). Real rates have been declining gradually but continuously since the country adopted dollarization in 2000.

However, these figures are masking part of the costs of financing since the use of banking fees and other costs has gradually been more tolerated against the backdrop of a weak regulatory environment

FIGURE 4.10 Real Lending Interest Rates, Latin America, 2006
(percent)

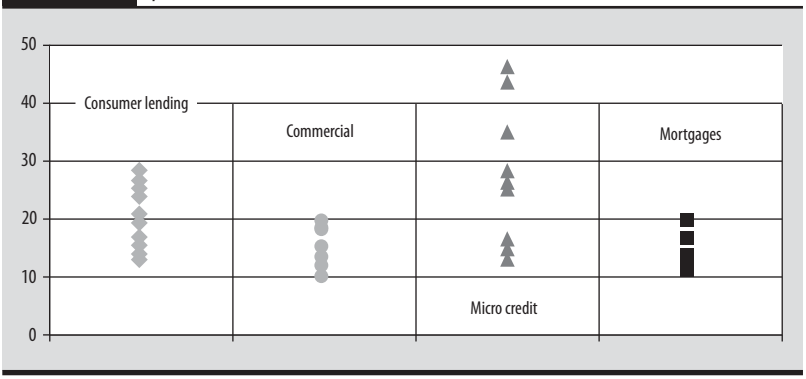


Source: ECLAC.

and the limited financial sophistication of the average customer. An imperfect proxy for actual credit costs can be obtained by comparing several items in the banks' income and losses accounts (including interest revenues, and fees, as well as financial advisory and other service revenue) with the stock of their credit portfolio (see Figure 4.11). Such an exercise for the end of March 2007 reveals an "implicit interest rate" of 22.5 percent for the overall financial system, though these costs may be overestimated by including some transaction-related (but not credit-related) fees. However, for financial institutions mainly specialized in microcredit or small consumption credit markets (that offer very limited financial transactions beyond credit), the ratio varies from 28 to 84 percent. This clearly suggests that the size of implicit banking costs charged to customers through indirect means can be substantial. Thus, the system's lack of transparency has made it difficult for the final borrower to assess the actual borrowing costs.

Recent efforts by the Banking Superintendency have helped clarify the actual costs of credit. As expected, they point to a highly segmented credit market, with rates widely different depending on the existence of valuable collateral (such as mortgages) and customer

FIGURE 4.11 Real Cost of Credit, 2007
(percent)



Source: Banking Superintendency.
Note: Including fees, insurance, and other costs for 19 banks as of May 2007.

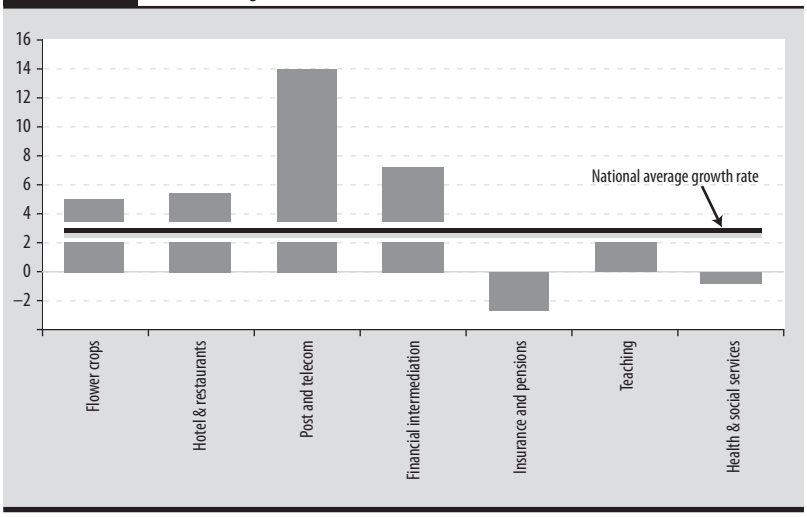
informality. Microcredit rates show a wide variance, partly reflecting very diverse groups, from the rural or very informal market where the costs of putting together credible financial information of the borrower are very high relative to the size of the loan, to small consumer lending.

Finally, financial intermediation services are an important input for several economic sectors. An approach similar to that proposed by Rajan and Zingales (1998) could be developed to evaluate the potential impact of financing constraints on other economic sectors.

According to the 2005 national accounts, the combined value-added of the seven economic sectors for which financial intermediation represents at least 1 percent of their intermediate production costs added up to 11 percent of national GDP. Of these seven sectors, three (with combined value added equivalent to 40 percent of the seven sectors) have witnessed growth rates below the national average during 2000–06, two sectors posted growth rates close to the national average, and two sectors (post and telecom, and financial intermediation) posted growth rates much larger than the country's average (see Figure 4.12).

A few considerations appear relevant to help put together the different pieces of the financing puzzle:

FIGURE 4.12 Real Growth and Sectors Relying on Financial Intermediation
(Percent real growth)



Source: Central Bank national accounts and authors' estimates.
Note: Real growth, 2000–2006, for those sectors where financial intermediation represents 1 percent or more of their intermediate consumption.

The 1999 financial crisis—explained by weak regulatory standards for the sector, entrenched vested interests in the financial sector regulatory agencies during the 1990s, and the combination of macroeconomic and external shocks—led to high borrowing costs for the private sector.

Since the financial crisis, the financial indicators of the banking system as a whole have gradually improved, in terms of liquidity, profitability, operational costs, and credit quality. However, the individual situation of diverse financial institutions is rather heterogeneous, while depositor concentration remains quite high, reflecting the country's inherent income inequality. These two elements emphasize the system's vulnerabilities.

The absence of a modern and comprehensive legal and regulatory environment for financial institutions' resolution procedures and depositors' protection, particularly in a dollarized economy, has resulted in the decision by private banks to build up large liquid assets funds for precautionary reasons, thus resulting in higher financing costs.

The orientation of existing banking rules to formal sector customers, while banks face a significant informal market tends to widen the segmentation between microcredit markets and traditional banking markets further. In this context, asymmetric information tends to make it harder to ensure credit access to the informal sector.

The weak enforcement of creditor rights—not only in the existing legal framework but, more importantly, as a result of the delays in the judicial system related to the collection of arrears or to the seizure of collateral—plays a significant role in increasing financing costs.

Overall, the general impression regarding domestic financing, both in respect to access and to the cost of credit, is that the market remains highly segmented, with a much more limited access to credit by informal and small businesses. In addition, several institutional drawbacks (weak regulation, limited transparency, informality, imperfect functioning of the legal system, and creditor rights mechanisms) appear to be critical factors perpetuating the still-high financing costs for some market segments, while macroeconomic weaknesses are largely to blame for the high costs of access to international finance. All in all, though its weaknesses largely reflect flaws in other areas, domestic financing is indeed a non-negligible constraint on growth.

Macroeconomic Environment: Hard-to-reach Social Consensus

Since its return to democracy in 1979, Ecuador has faced recurrent difficulties in reaching a sustainable consensus on fiscal policy management. This can be observed through the various legal reforms related to fiscal management, some of which have been very short-lived. One of the reasons for this instability is the mistrust between the different actors involved in fiscal matters, which is evident in the high number of earmarking regulations related to both fiscal revenues and expenditure.

Ecuador's adoption of full dollarization has helped the country stabilize its economy, expand the time horizons of economic agents—

particularly through the availability of longer term loans—and ensure low inflation. However, dollarization implies medium-term risks and rigidities for macroeconomic management. So far, Ecuador has benefited from a benign international environment and the depreciating trend of the U.S. dollar. These factors have helped the country maintain its external competitiveness, despite the real appreciation trends related to high domestic inflation in the post-1999 years, which counterbalanced the initially very high real depreciation observed during 1999–2000, when Ecuador witnessed a large nominal depreciation of its currency before adopting dollarization. Indeed, real exchange rate figures show that the multilateral real exchange rate so far in 2007 is, on average, 5.5 percent more depreciated than it was in 1998, before the financial crisis took place.

However, the lost margin of maneuver for monetary and exchange rate policies would imply a larger dependence on fiscal and labor flexibility to adapt to an external shock, should such a shock occur. This section discusses the issue of political instability and its impact on fiscal issues, fiscal procyclicality, the budgetary process, and labor regulation.

Unstable Political Equilibriums and Vulnerable Fiscal Fundamentals

The relative powers of players involved in the preparation, approval, and implementation of the budget have changed significantly in recent years. In 1998, the Constituent Assembly introduced deep constitutional reforms giving the president greater powers over budget issues while limiting congressional attributions. Congress was forbidden from increasing total public revenues or expenditures and was only allowed to introduce budgetary changes at the level of sectoral expenditures.

Such changes were accompanied by modifications to the electoral process that changed the regional perspective of members of congress (they became more related to provincial constituencies, as national parliamentarians disappeared) and lengthened their tenure (from two years to four). According to Mejía Acosta et al.

(2006), those reforms combined in unintended and perverse ways. While presidential powers were strengthened (thus removing some incentives for the president to work with legislative coalitions), the reforms also impeded the parliamentarians from building up formal links with their constituencies through the budgetary process, as deputies lack any legal option to direct public funds to their provinces. As a result, political parties were weakened while local governments were strengthened, as their responsibilities as intermediaries between the population and the central administration increased. Such changes rendered the management of the budget more complex, as distributional aspects of the budget are no longer solved through the budget approval process but keep reappearing throughout the process of budget implementation, when local authorities press for additional financing for local purposes. Thus, the budget ends up being modified extremely often (see Cueva, 2007).

One of the clearest examples of the unstable equilibriums achieved on budgetary issues is the Fiscal Responsibility and Transparency Law. Approved in 2002, the law was issued to limit the risks that additional oil revenues could lead to large and risky increases in public expenditures. The law was passed in a period when oil production was expected to grow (thus boosting fiscal revenues), given that the construction of a new heavy crude oil pipeline was moving ahead. Also, parliamentarians still had clear memories from the 1999 financial crisis. As the legal reforms were to become binding only after the then-president and parliamentarians would end their tenure by 2003, none of the players involved was constrained in his or her ability to direct such funds for various electoral purposes, including deputies' potential reelection. Three years later, by 2005, the economic environment had changed, mainly because oil prices had increased significantly. Both the Palacio administration and the congress then in place felt constrained by the law and pushed for large reforms, including the rolling back of some critical aspects of the law. Legal changes were quickly approved, allowing the changes to be effective for the approval of the latest annual budget under the Palacio administration, as well as the latest budget approval by the parliamentarians who

agreed to the changes. A budget was then approved with a marked increase in public expenditure (13 percent in real terms), improving the electoral chances of the actors in place. This story is intended to illustrate the instability of fiscal consensus, political agents' behavior with respect to a sustainable policy, and the vulnerability of policies in the face of the changing incentives of political actors. These political difficulties in achieving fiscal consensus have contributed in part to Ecuador's fiscal vulnerabilities.

Fiscal Procyclicality

In recent years, and following the 1999 financial crisis and the country's adoption of dollarization, macroeconomic risks have become less important, at least in the short run. Favorable oil prices, a benign international environment, and large remittances from workers abroad have helped maintain generally positive macroeconomic indicators, even in periods of political turmoil. Like other Latin American countries, Ecuador is thus facing a particularly favorable international environment, which may be masking underlying macro vulnerabilities.

Despite these recent improvements, Ecuador's history shows that the country is vulnerable to macroeconomic shocks. Growth trends clearly show the risks that financial or fiscal/external crisis imply for medium-term growth prospects. The combination of a volatile political environment with an economy subject to external shocks and dependent on natural resources makes it critical to ensure that mechanisms for prudent macroeconomic management are in place and are working. Economic crises in Ecuador have often occurred as a result of weakened fiscal and debt sustainability, declining and relatively low prices of key commodities, and tightening constraints for attracting foreign savings. In addition, dollarization has reduced the margins of maneuver for monetary policy and amplified the risks arising from foreign developments that could reduce access to international markets while increasing interest rates. In this context, building liquidity and a fiscal cushion in good times would enhance the country's ability to address potential shocks successfully.

An obvious step to mitigate macroeconomic risks would be to build savings funds or to repay public debt in good times, so as to set up a cushion for risky situations. (Another one would be to strengthen the banking system and bank resolution procedures.) However, Ecuador has not been characterized by a countercyclical fiscal policy and by effective mechanisms to channel extraordinary fiscal resources to debt reduction or savings funds. These shortcomings in fiscal policy are clearly one of the issues that the country could address to reduce growth volatility and the large costs related to recurrent macroeconomic crises.

For the period 1990 to 2006, there is a clear correlation between real per capita GDP growth and real per capita public spending for the nonfinancial public sector (lagged for one period, with a corresponding correlation coefficient of 0.45). This suggests that a year of faster economic growth is typically followed by a year of faster public spending growth. Thus, public spending policies do not appear to follow a countercyclical path. Instead, public expenditure tends to reflect the availability of existing funds, which in turn depend on economic activity.

A potential explanation for such trends is the lack of clear incentives for governments to adopt any kind of countercyclical fiscal policy to boost savings during economic booms. On the contrary, public spending tends to follow the availability of public funds, reflecting the lack of social consensus for prudent fiscal policies.

Budget Rigidity

Public spending in Ecuador is characterized by a highly rigid structure, impeding government from implementing active fiscal policies or significantly modifying fiscal priorities within the general budget. In recent years, at least three separate studies have reached similar conclusions regarding budget rigidities. World Bank-IDB (2004) mentions earmarking rules and other inflexible elements in the short-run as adding up to 98 percent of the overall budget, while Almeida, Gallardo and Tomaselli (2005) estimate that share

at 92 percent. Finally, Cueva (2007) estimates the budget rigidity at about 96 percent, depending on the level of fuel subsidies. This high rigidity implies that regardless of their ideological preferences, governments have hardly any margin of maneuver to change the structure of public expenditures. Much of that inflexibility arises from legally established and hard-to-change earmarked revenues or expenditures. Thus, the recurrent annual budgets reproduce the earmarking of previous years, perpetuating a rent-based system whereby every agent with some political influence tries to ensure some earmarking procedure to lock in revenue flows without any results-oriented system. The earmarking system is one of the main factors behind the deceiving quality of public expenditure, which partly reflects a natural resource curse.

In recent years, subsidies on the domestic prices of oil derivative products have become an increasing source of public spending rigidity. In 2007, the total (implicit and explicit) costs of oil derivative subsidies were estimated at US$2.3 billion, equivalent to 28.7 percent of the general budget. In 2002, the subsidies added up to only US$160 million, equivalent to 3.3 percent of the general budget. Such impressive growth of subsidy-related costs can be explained, as the consumer prices of gasoline and diesel have remained unchanged since January 2003 and that of cooking gas has not moved since February 2001. As international oil and oil derivative prices have markedly increased in recent years, the government has covered the growing difference between producer and consumer prices, reflecting political difficulties in gradually adjusting consumer prices.

In view of hard-to-reach political agreements over fiscal policies, can budget rigidities and earmarking act as second-best alternatives to limit procyclical fiscal trends, thus reducing macroeconomic volatility? This view can only be partially supported, for several reasons.

Budgetary earmarking implies a reduced margin for governments to take advantage of favorable economic cycles to develop much-needed infrastructure in sectors with high public participation, such as oil and energy. As a result, long-term growth and fiscal revenues are harmed.

While budget rigidity hampers an open and transparent discussion of budgetary priorities, it is combined with a highly discretionary budget implementation system, whereby agents with strong political powers, including regional leaders, end up obtaining the largest share of the pie. As growth-enhancing or poverty-reducing programs may end up being sidelined throughout the budget implementation process, they can still face larger constraints in the economic busts and suffer from fiscal procyclicality more than other areas.

Finally, the procyclicality of fiscal policies is one of the main reasons behind the recurrent political pressures to introduce earmarking schemes and encourage budget rigidity. Regional entities and diverse public sector institutions look to some earmarking features to protect their revenues, as they fear being left out in bad economic times. From a political standpoint, a reduction of budget rigidity would probably not be sustainable unless some mechanism ensuring some stability of fiscal accounts could be put in place, so as to provide assurances to the relevant actors that their fiscal-related revenues would not be overly affected in case of a shock. Thus, one could suggest that, should some initial political agreement be built around it, a Chilean-style scheme aiming at a structural fiscal target could reduce incentives for the tendency to add earmarks.

In sum, Ecuador's history highlights the risks of macroeconomic instability for medium-term growth arising either from fiscal or financial flaws. From that perspective, macroeconomic stability remains an Achilles' heel for the country. While the current benign environment may have reduced its visibility, this is a potentially significant binding constraint on the country's sustained growth prospects.

Nonbinding Constraints

Geographical or Natural Resources Impediments

Ecuador has diverse and abundant natural resources, both for mining and oil-related activities, which have been critical to sustaining fiscal revenues and external accounts. Land in Ecuador is mostly

productive and the country has a variety of regions with different features that enable the production of different types of crops all year round. Diverse agricultural sectors (cocoa, coffee, bananas, shrimps, flowers) have been drivers of economic activity at different times. A comparison with other countries, based on available data, shows that Ecuador ranks favorably in terms of agricultural area, arable land, forested areas, water resources, and hydroelectric generation capacity. Ecuador ranks very high in terms of biodiversity, as well as in terms of its oil reserves.

However, Ecuador's diversity is also a source of geographical constraints. With four highly different areas and despite a relatively high population density within South America, the country's fragmentation implies higher transportation and infrastructure costs, particularly to overcome natural obstacles in the highlands. Earthquakes and volcanic eruptions have also affected economic growth and infrastructure over time. Moreover, geographical differences partly account for cultural conflicts and regional antagonism, with a tradition of bi-centralism around the two largest cities and growing calls for increased decentralization. If not properly managed, such tendencies could cause further strains on medium-term fiscal stability.

Overall, natural resources do not appear to be a key binding constraint on growth, though geography plays a role in explaining the country's large, and not always fulfilled, infrastructure needs.

Low Human Capital

According to WDI data for 2004, the country ranked in the top half of Latin American countries in terms of primary education coverage (with a 99.5 percent rate as of 2004), at the region's average for literacy rates (92.7 percent of the population older than 15 was literate in 2004), but in the lowest half for secondary education coverage (with 52.2 percent coverage in 2004) and tertiary education (with 21.8 percent coverage, according to measures available from the "Sistema Integrado de Indicadores Sociales del Ecuador" for 2001). World

Bank WDI estimates that for 2001, 42 percent of the workforce had primary education, 32 percent had secondary level education, and 24 percent had university-level studies. UTEPI estimates show that the share of workers in manufacturing industries with university-level studies varies from 8.4 percent in low-technology industries to 12.6 percent in natural resource-based sectors, and up to 26.6 percent in medium and high-technology sectors. While Ecuador ranks poorly within Latin America for R&D spending, research and publications, and the number of U.S. or European patents or ISO certifications obtained, it is relatively well-positioned in terms of training provided by firms to their employees, according the World Business Environment Survey referenced in IDB (2001). In addition, according to the World Bank 2006 enterprise survey, 629 of 652 firms consider that the skills of available workers are not an obstacle to the firm's growth, and the remaining 23 firms consider the skills of available workers to be a minor obstacle. Overall, while education quality is weak, the available evidence suggests that human capital does not appear to be a key constraint on growth.

Conclusion and Policy Recommendations

This review of potential binding constraints on growth in Ecuador suggests some areas that do not appear to be critical for limiting economic growth (natural resource endowment, geographical impediments, human capital, domestic savings, and market failures), though this does not mean they do not face challenges and shortcomings. Other issues, such as macro stability or access to domestic or international finance, suffer from weaknesses that could potentially present serious constraints if no corrective actions are undertaken. A few hot points—mostly related to institutional weaknesses and infrastructure—are hampering the appropriability of private investment returns and the potential for more dynamic entrepreneurship. Some policy recommendations can thus be proposed within these lines.

Problems related to access to finance reveal weaknesses in terms of high country risk, as well as a regulatory and market envi-

ronment, that are not conducive to effective creditor rights and deep financial intermediation. These areas, which currently benefit from a favorable world economic cycle and terms of trade developments, could become more critical over time if no remedial actions are undertaken to reduce vulnerabilities.

The benign international environment may be hiding some of the vulnerabilities resulting from the markets' perceptions of a level of country risk which is very high even by regional standards. Building some bridges with international financing providers—either international institutions or market players—may help repair the recent difficult relations and overcome concerns related to the country's history, and could potentially be critical to ensuring access to international financing in case of a reversal of the current favorable environment.

High financing costs and limited access to finance—repeatedly noted in business surveys as critical constraints, especially for small and medium-sized firms—largely reflect underlying factors, such as the limited credibility of the judiciary, weak creditor protection, informality, and the lack of transparency. Those issues—closely related to micro risks and business environment aspects—require long-term and comprehensive efforts to be overcome.

Efforts to improve financial market transparency—with some limited but positive steps taken recently to limit abuses from some participants and address the public's lack of financial sophistication—along with steps to strengthen modern and efficient mechanisms for banking regulation, as well as early prevention and resolution procedures, and efforts to increase attractiveness to foreign private financial institutions, would surely help reduce credit costs and increase access to finance.

Macroeconomic stability remains critical for limiting the risks of large crisis episodes, which have been too common in Ecuador's history. The stylized facts of economic growth highlight the country's vulnerability to external shocks, which in turn can imply large setbacks in terms of medium-term growth. In addition, a reversal of the benign international environment cannot be discarded. Thus,

advances in developing a wider consensus around sound fiscal policies with properly designed countercyclical features and strengthening the financial system are important for lowering the risk of economic instability and lessening its potentially large negative impact on medium-term growth.

The development of consensus on prudent fiscal policies with countercyclical features would greatly help reduce the country's vulnerabilities, while social protection and pro-poor spending should be undertaken during economic recessions. However, some of the structural characteristics of the Ecuadorian budget process make it difficult to ensure sound fiscal policies. In particular, the significant earmarking of tax revenues, the growing trends toward fiscal decentralization, political instability, limits on transparency and a results-oriented perspective in the budget procedures, and weak prioritization of policies regarding public investment restrain the ability of the central government to implement active fiscal policies in line with the government's political priorities.

A sound fiscal reform toward more prudent fiscal policies cannot be achieved without a well-designed scheme providing some assurance to the relevant actors that their fiscal-related revenues would somehow be protected in case of economic downturns. Otherwise, pressures for added and continued earmarking schemes will remain. A Chilean-style system targeting a structural fiscal balance could potentially help achieve that aim, although its political feasibility is currently problematic.

Despite the large economic costs of the 1999 financial crisis, Ecuador has made little progress since then to buttress the regulatory policies related to the financial system and to ensure a sound financial safety net. This has become particularly critical, as dollarization has significantly limited the central bank's ability to act as a lender of last resort, and in view of the maintained deposit concentration in the banking system. The country still lacks a comprehensive legal framework combining a transparent and well-financed depositor protection scheme with modern and efficient procedures for bank resolution. Despite some progress in recent years, banking

supervision remains subject to institutional weaknesses. Achieving broader consensus in relation to reforms necessary for building a sound regulatory environment for the financial system would be important for limiting the risks of a potential financial crisis over the medium term, which could rapidly unravel any previous growth achievements.

Infrastructure remains a critical constraint for some sectors. Oil and energy are clear examples of the potential impact of underinvestment and inadequate regulation of growth and fiscal revenues—both for the sector itself and for its consequences in the overall economy, either through lost fiscal revenues or through the impact on other sectors.

Ecuador must find ways to channel resources for infrastructure investments into some key areas, including oil, energy, and to a lesser extent, telecommunications, without hampering fiscal stability. The current fiscal environment provides a real opportunity to prioritize the use of oil-related revenues for hydrocarbon and energy infrastructure, which have been neglected for many years. However, such efforts may be ineffective if they are not accompanied by sectoral reforms to increase the transparency and enhance the administrative and technical efficency of publicly- controlled enterprises. Transparency and accountability obligations for publicly-controlled enterprises should be raised to match international best practices, independent of whether such companies have any private shareholders.

Addressing the large, regressive, and non-targeted oil derivative and electric tariff subsidies, as well as the existing cross-debts in the energy sector, would be important to eliminate significant distortions, reduce the incentives for smuggling, and gradually establish a real competitive environment conducive to new investments.

Introducing a business-oriented and more professional management for energy distribution utilities also implies addressing governance issues and appointing professional managers, with actual independence from the large debtors with the sector.

Microeconomic environment and appropriability issues are critical areas that need structural solutions, which will be difficult to

implement. Ecuador performs poorly in terms of governance, institutions, property rights and legal stability, even within a region with performance that is below the world average. All relevant indicators, as well as general perceptions, stress the importance of these areas, with institutional weaknesses hampering the business environment, along with financial intermediation and access to finance. However, addressing these issues requires a major overhaul of institutional constraints and requires difficult political changes.

With those large caveats, policy recommendations would include:

- Institutional strengthening through continued reforms in the areas of the judiciary and customs.
- Actions to enhance transparency in public decisions, in terms of both the use of fiscal resources and the efficiency of public investment. Along those lines, fostering accountability and transparency for public spending can be partially obtained through an enhanced budget process, including a modern financial management system, results-oriented practices, easily understandable budget objectives (for example, in terms of education or health coverage rates, or specific infrastructure projects and timeframes), better integration between planning and budgeting activities, and transparent rules for the granting of concessions in public markets.
- Building stronger regulatory institutions that can be widely perceived as technically driven and independent. This step is critical in order to minimize the risks of capture by special interests. In parallel, supporting the development of databases to better assess market concentration, corporate governance, and the accountability of private businesses would be an important action.

These steps would better position Ecuador for strong and equitable growth.

References

Albornoz, V., Cueva, S. and R. Gordillo. 2006. "El sector petrolero en el Ecuador y su potencial de crecimiento." *Estudios Sectoriales RED 2006.* Caracas, Venezuela: Corporación Andina de Fomento. Mimeographed document.

Almeida, M. D., Gallardo, V. and A. Tomaselli. 2005. "Gobernabilidad Fiscal en Ecuador." Quito, Ecuador: GTZ (Gesellschaft für Technische Zusammenarbeit).

Cueva, S. 2007. "Transparencia Presupuestaria en el Ecuador." Temas de Economía y Política No. 11. Quito, Ecuador: CORDES.

De Gregorio, J. and J. W. Lee. 2003. "Economic Growth in Latin America: Sources and Performance." In: E. Fernández-Arias, R. Manuelli and J. S. Blyde, editors. *Sources of Growth in Latin America–What is Missing?*. Washington, DC: Inter-American Development Bank.

De la Torre, A., García-Saltos, R. and Y. Mascaró. 2001. "Banking, Currency, and Debt Meltdown: Ecuador Crisis in the Late 1990s." Washington, DC: World Bank.

Espinasa, R. 2007. "Ecuador–Oil Sector." Washington, DC: Inter-American Development Bank.

Hausmann, R. and B. Klinger. 2006. "Structural Transformation and Patterns of Comparative Advantage in the Product Space." Cambridge, MA: Center for International Development, John F. Kennedy School of Government, Harvard University (June).

Hausmann, Ricardo, Hwang Jason, and Rodrik, Dani. 2005. "What You Export Matters." Working paper No. 11905. Cambridge, MA: National Bureau of Economic Research.

Hausmann, R., Rodrik, D. and A. Velasco. 2005. "Growth Diagnostics." Cambridge, MA. Mimeographed document.

IDB (Inter-American Development Bank). 2001. Economic and Social Progress Report (IPES) 2001. *Competitiveness: The Business of Growth*. Washington, DC: Inter-American Development Bank.

Jácome, L. 2004. "The Late 1990s Financial Crisis in Ecuador: Institutional Weaknesses, Fiscal Rigidities, and Financial Dollarization at Work." Working paper 04/12. Washington, DC: International Monetary Fund (January).

Machinea, J.L. 2006. "Estudio Económico de América Latina y el Caribe 2005–06." Santiago, Chile: ECLAC (Economic Commission for Latin America and the Caribbean).

Mejía Acosta, A., Araujo, M. C. and V. Albornoz. 2006. "The Political Economy of the Budget Process: The Case of Ecuador." Country Studies Initiative. Washington, DC: Inter-American Development Bank.

Neira, E. and E. Ramos. 2003. "Diagnóstico del Sector Eléctrico Ecuatoriano." Apuntes de Economía. No. 31. Quito, Ecuador: Banco Central del Ecuador (July).

Rajan, R. and L. Zingales. 1998. "Financial Dependence and Growth." *American Economic Review*. 88: 559–86.

Rodríguez, M. 2006. "Modernización del Estado–Reforma Aduanera." *Ciudadanizando la Política*. November. Quito, Ecuador: Grupo FARO.

UTEPI (Unidad Técnica de Estudios para la Industria). 2007. "Competitividad Industrial del Ecuador." Programa Integrado MICIP-ONUDI. Quito, Ecuador: UTEPI.

World Bank. 2005. "Ecuador, Investment Climate Assessment." Report 31900-EC. Washington, DC: World Bank.

World Bank-IDB (Inter-American Development Bank). 2004. "Ecuador: Creating Fiscal Space for Poverty Reduction. A Fiscal Management and Public Expenditure Review." Washington, DC: World Bank.

Zettelmeyer, J. 2006. "Growth and Reforms in Latin America: A Survey of Facts and Arguments." Working paper 06/210. Washington, DC: International Monetary Fund.

CHAPTER 5

Tearing Down The Walls: Growth and Inclusion in Guatemala

Daniel Artana, Sebastián Auguste, and Mario Cuevas[*]

Introduction

Guatemala is the largest country in Central America in terms of population (almost 13 million) and GDP (over US$32 billion). With a GDP per capita at around US$2,500, it is a middle-income country (MIC). The population is growing rapidly (around 2.5 percent per year) and is relatively young (about half the population is under 18 years of age). About 40 percent of the population is indigenous and lives in rural areas. Commerce, agriculture, and manufacturing are the mainstays of economic activity. Economic growth has been steady but low: 4 percent per year since 1950 and only 1.3 percent per year in per capita terms. At this rate, Guatemala would need 54 years to double its current GDP per capita.

As a result of slow growth, the country has been falling behind internationally: its current share of world GDP is 21 percent below

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[*] Daniel Artana and Sebastián Auguste are affiliated with the Fundación de Investigaciones Económicas in Buenos Aires, Argentina, and Mario Cuevas is affiliated with the Centro de Investigaciones Económicas Nacionales of the Universidad Francisco Marroquín in Guatemala City, Guatemala. The authors thank Hugo Maul for his guidance in the preparation of the section on informality; Jaime Díaz for able and dedicated research assistance; and peer reviewers Manuel Agosín, Ronan Le Berre, Osmel Manzano, Ernesto Stein, and Alfie Ulloa for very useful comments.

that in 1980. The comparison is even less favorable relative to high-growth emerging economies. Singapore, for instance, currently has a GDP per capita almost seven times larger than Guatemala, while at the end of the 1950s they were at similar levels.

Guatemala, consequently, can be characterized as a case of slow growth, with a mix of low productivity growth and slow physical and human capital accumulation. In addition, there are shortcomings in several inputs complementing private capital, including institutional quality and investment climate. Human capital is extremely poor, even compared to economies with the same income level. Infrastructure is also not well developed. In addition, several factors affect risks and the appropriability of private returns; notably problems with property rights, crime, instability, and corruption.

Social indicators do not compare favorably, even with countries with a similar income level. Over half the population lives below the poverty line; the income-based Gini coefficient (0.57) is the second highest in Latin America and one of the highest in the world. Education attainment is extremely low, even for a middle-income country and despite recent advances. Average schooling is between four and five years, and the illiteracy rate is close to one-third of the total adult population. Health indicators are similarly poor: only two-thirds of the population has access to basic health care, the child malnutrition rate is high, and maternal and infant mortality rates are among the worst in Latin America.

Guatemala has suffered the devastating effect of a long-lasting civil war that began in 1960 and finished in 1996 with the signing of the Peace Agreement. The conflict deepened historical divisions, thwarted institutional development, and weakened governance. The Peace Agreement sought to establish an agenda of public policies to develop the country and reduce inequality, emphasizing social policies targeted to those who were historically marginalized (indigenous and rural populations). The Agreement did not provide a detailed roadmap on how to achieve the objectives. Coordination among different interest groups and the design of those policies has proven to

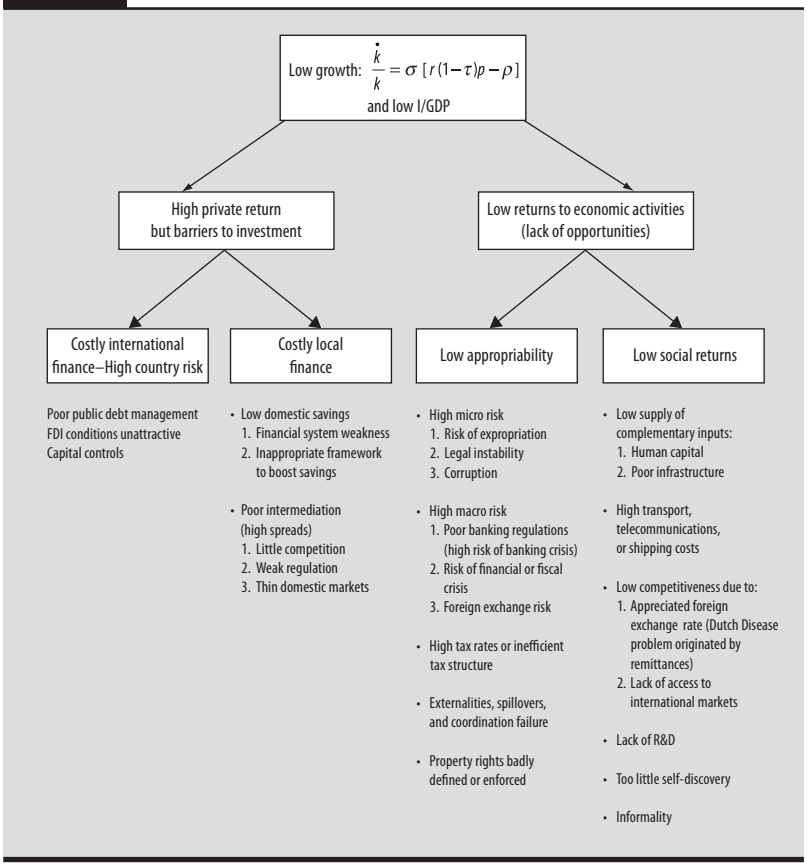
be very difficult; thus little progress has been made so far in terms of reaching the Agreement's goals. As a consequence, and despite several economic reforms, economic growth has not recovered the rates achieved before the 1980s.

There is an international consensus that the most immediate challenge for Guatemala is improving the provision of public goods, which almost unavoidably requires overcoming strong domestic opposition to improving tax collection. The Peace Agreement set a tax revenue target of 12 percent of GDP to be reached by 2002, a significant increase from the level existing at the time of the Agreement (7.9 percent). Unfortunately, progress in terms of collecting tax revenues has been slow, limiting the implementation of public policies and leaving little room for increasing investment in key public goods, such as education, security, and infrastructure.

This study analyzes the challenges Guatemala faces to achieving faster growth, applying the growth diagnostic methodology (GDM) (see Hausmann, Rodrik, and Velasco 2005). Following a "clinical economics" approach (Sachs, 2005), a set of questions about constraints to competitiveness and growth is formulated. Then micro and macro evidence is examined to identify "binding constraints to growth," understood as those constraints whose removal would yield a large payoff in terms of growth. This requires first identifying the problems and second ranking those problems to provide clear policy recommendations. In doing so, the growth diagnostic decision tree shown in Figure 5.1 will be followed, adapted to the case of Guatemala.

The rest of the chapter is organized as follows. The second section briefly analyzes the Guatemalan economy and its recent evolution. The third section describes the growth process in Guatemala, showing that economic growth and capital accumulation is slow across the board and that several reforms across the years (against the market in the 1950s and 1960s, and pro-market in the late 1980s and 1990s) have not been able to boost economic growth, illustrating that the binding constraints must be something more

FIGURE 5.1 Growth Diagnostic Tree for Guatemala



Source: Authors' compilation.

fundamental and affecting all sectors. The fourth section presents evidence on barriers to investment, finding that although there are several micro problems, access to finance is not currently a (most) binding constraint. The fifth and sixth sections explore the lack of opportunities, first analyzing factors reducing social returns (finding that human capital is one of the most bindings constraints) and then, in the sixth section, analyzing to what degree those social returns can be appropriated by private investors, noting that appropriability is another important problem in Guatemala. Finally, the seventh section summarizes the most important conclusions and discusses policy prescriptions.

Guatemala at a Glance

Economic Performance: Steady but Slow

Guatemala has broadly followed the same pattern as the rest of Latin America, although inflation has been low by Latin American standards and Guatemala has not endured many macroeconomic crises. During the 1960s and 1970s economic growth was fairly rapid. It slowed in the 1980s and rose again in the 1990s, but it did not reach pre-1980s levels. Many other countries in the region, such as Costa Rica and Chile, not only recovered their pre-1980s growth rates, but are now growing much faster. In Guatemala no economic sector has recovered to the pre-1980s growth rates. Thus growth is slow across the board.

Why has Guatemala been unable to restore its growth record after the "lost decade"? What has changed in the world? What has changed in the country? The answer seems to be a combination of factors, as will be shown throughout this work. First, the terms of trade deteriorated. The exports-to-GDP ratio declined from about 25 percent just before the crisis of the early 1980s to just 15 percent after the crisis; exports in constant prices grew at 7 percent per year pre-crisis and now grow at just 4 percent. Second, the prolonged civil war slowed the process of human and social capital accumulation. Although schooling has been increasing, it has increased at a much lower rate than in other countries and quality has remained lower. Other social indicators related to human capital, such as health, have also improved at a slow pace. Third, investment in physical capital has been historically low, and it has not recovered to the pre-1980s levels. In simple terms, this suggests that Guatemala has not been investing enough in adapting itself to and taking advantage of a globalized world.

In the past 40 years, Guatemala has undertaken several structural changes that led to fluctuations in relative prices (for example, the creation and elimination of price distortions, or the adoption of trade reforms that opened or closed the economy). However, no significant changes in product composition or differential changes

in long-run trends at the sector level can be observed. It appears that the factors behind the country's poor economic performance are common to all sectors. In other words, the fact that the removal of many price distortions (introduced in the import substitution phase) did not substantially change growth trends in any particular sector seems to show that the binding constraints (following removal of price distortions) are common to all sectors, and include such factors as poor complementary inputs and an unfavorable business climate.

Slow Policy and Structural Change

Economic policies in Guatemala have closely followed the trend observed in other Latin American countries. For example, in the 1950s and 1960s Guatemala introduced import substitution policies, controls on interest rates, a fixed exchange rate, credit targets, and large-scale infrastructure investments. As in other countries, import substitution turned out to be unsustainable and created rigidities in the economy. When policy reforms were introduced in the 1980s and 1990s, the growth balance changed. The GDP shares of manufacturing and agriculture have fallen steadily, while the service sector has grown at a relatively fast rate. Agriculture, nonetheless, has remained an important sector in the economy, particularly in terms of employment generation. The services sector currently includes the most dynamic activities in the Guatemalan economy, notably commerce, transport, power, telecommunications, and banking.

The Benefits and Challenges of Economic Diversification

The Guatemalan economy is now less volatile than it used to be. A more stable growth pattern can in part be traced to a more diversified economy, but it is also due to responsible macroeconomic management and the adoption of policies that have dampened the impact of external shocks, such as interest rate liberalization and a floating exchange rate. As a result, the growth and inflation volatilities of the Guatemalan economy are lower than the regional averages.

On the up side, economic diversification is already pointing to factors that may be important for sustaining future growth. For example, demand for a better quality labor force and modern infrastructure has increased, along with pressure to strengthen the policy and institutional framework. Unfortunately, deep structural imbalances remain to be addressed, since current trends do not seem to be promoting the fuller integration of domestic markets by reducing the growing gap between the formal and informal sectors or fostering rural development.

Uneven Responses and Linkages to the External Sector

Despite progress in reducing tariffs and liberalizing trade and developments in *maquilas* and exports of other nontraditional products, total exports are not growing quickly. In the last five years, the export share of GDP has stagnated at around 17 percent. Guatemala remains a relatively closed country. The ratio of trade flows (exports plus imports) as a percentage of GDP increased from 39 percent in 1991 to 46 percent in 2006, almost exclusively because of the increase in imports. This ratio is still the lowest in Central America.

The stagnant export ratio of recent years is the result of major divergences in the trends of the three leading export sectors. The first is the *maquila* sector, which has benefited greatly from U.S. trade preferences and the relative success of the Free Trade Zone (FTZ) regimes in attracting foreign direct investment (FDI). The second is the group of traditional exports (such as coffee, bananas, and sugar), whose trade volumes fell steadily during the 1990s because of slow demand growth and low commodity prices. The third is nontraditional exports (including flowers, vegetables, fruits, and organic crops), which developed rapidly in the 1990s.[1] As a result

[1] Growth of services exports has accelerated recently. A recent study Cuevas and Bolaños (2007) highlight the growth in services exports such as business process outsourcing, medical services, medical tourism, and long-term care. Two out of the six industrial clusters supported by the National Competitiveness Program are in the services sector (tourism and software).

of these diverging trends, the Guatemalan export basket diversified despite stagnation in export values relative to total GDP.

The rapid growth of nontraditional agricultural exports is generally attributed to previous agricultural policies to promote diversification; access to long-term financing from public credit programs; and investments in infrastructure facilities such as irrigation, roads, and electricity. In addition, private organizations and trade associations like the Exporters' Association (AGEXPORT) have played a catalytic role in promoting nontraditional exports.

Policy Reforms in Overlapping Waves

The transition to democracy in the mid-1980s triggered successive waves of overlapping policy reforms. In the last 20 years, the country has undergone three major phases of policy reforms. First, the trade regime was liberalized in the mid- to the late-1980s, especially, although not exclusively, in the context of the Central American Common Market (CACM). Tariffs were reduced and exchange controls and many nontariff barriers were eliminated. Fiscal incentives through tax and duty exemptions were granted to *maquilas* and nontraditional agricultural exporters. During the first wave of reforms, the country joined the General Agreement on Tariffs and Trade (GATT), entered into several trade agreements, and was included in the Caribbean Basin Initiative (CBI). The first wave of reforms deepened in the 1990s with the removal of export taxes, reductions in tariffs—the (unweighted) average tariff was reduced to less than 10 percent—and further exchange rate liberalization. The first wave of policy reforms opened up the economy and signaled a drastic departure from the import substitution model.

The second wave of policy reforms was meant to liberalize the financial sector. Beginning in the early 1990s, interest rates were liberalized, the independence of the Central Bank was strengthened, standardized reserve requirements were introduced, compulsory lending was eliminated, supervision of the banking sector was improved, and a deposit guarantee scheme was introduced. These

policies were also meant to enhance competition and facilitate restructuring of the banking sector through mergers and acquisitions. These reforms deepened financial markets and facilitated the expansion of available services (for example, financial depth measured by the ratio of broad money to GDP rose from 22 percent in 1990 to 29 percent in 2006). Further legal and policy reforms in the financial sector were introduced in 2002.

The third wave of reforms, which started in the late 1990s, increased the participation of the private sector in infrastructure and modernized the regulatory framework. The reforms included privatization of power and telecommunications, concessions for the operation of the rail network and road construction, a management contract for mail services, and further liberalization of foreign investment. The third wave of reforms facilitated the acceleration of growth in the nonfinancial services sector and set the stage for the subsequent recovery of the construction sector.

Together, the three waves of policy reforms overhauled public policy in Guatemala. However, as will be discussed later, there are still important reforms left to be implemented, which are critical for realizing the full benefits of previous reforms.

Adjustment to Economic Shocks

In recent years, Guatemala has been subjected to several economic shocks, both internal and external. In the late 1990s, the terms of trade were negatively affected as a result of a severe and protracted collapse in the international price of coffee; export revenues fell by half between 1999 and 2002, harming an estimated 600,000 people directly or indirectly involved in the coffee business. Subsequently, an economic slowdown in the United States and other trading partners in 2000–02 again hit export revenues, especially *maquila* products. More recently, the sharp increase in the price of oil has led to a rising fuel import bill and deteriorating terms of trade.

Guatemala has adjusted to both internal and external shocks. Despite the stagnation in the level of real per capita GDP, consump-

tion has continued to increase. This is in part the result of foreign exchange inflows that have softened the impact of external shocks. Such inflows include remittances (rising from around US$400 million in 1997 to around US$3.6 billion in 2006) and external financing for the private sector. Other types of flows have likely cushioned the impact of external shocks, including (possibly) revenues from the trafficking of illicit goods and money laundering. Internal shocks have also taken place. The central bank fell into a policy trap by seeking to sterilize financial inflows while simultaneously emphasizing controls on money aggregates and fostering nominal exchange rate stability, thus leaving little room for responding to real shocks. Political conditions during 2000–04 also slowed growth, since tensions between the government and the private sector led to a deterioration in the investment climate and delays in the reform agenda.

The end of the negative terms of trade shock, improved economic performance in the United States and other trading partners, and the rapid growth of international liquidity set the stage for recovery starting in 2004. More recently, positive expectations fueled by the Central American-Dominican Republic Free Trade Agreement (CAFTA-DR) have increased investor confidence and monetary easing domestically (responding to external conditions) has validated the economic recovery in terms of low real interest rates.

Policy Reform Agenda

The most important topics on the policy reform agenda are policy, education, health, infrastructure, and domestic security. In addition, the exchange rate is generating concern in Guatemala, since remittances and private financial inflows, as well as flows associated with illegal activities, are driving a sustained real exchange rate appreciation.

One initiative of policy reform, named "Plan Visión de País," aims at building and strengthening a broad consensus among political actors on the key principles that should guide policy reform in the next several years (in education, security, health and nutrition, rural development, macro-fiscal policy, and intercultural relations).

The Plan was promoted by a particular segment of the business community and a committee of senior public figures. Following complex negotiations, all political parties with representation in Congress signed a declaration of principles. Unfortunately, the Plan was temporarily shelved after falling victim to the complex political environment prevailing in Guatemala.

The Pacto Fiscal has also been revived to review and strengthen the country's faltering tax "policy." The current Pacto Fiscal follows several attempts at building a consensus on tax reform and is supported by various political actors, interest groups, and the government. Its aim is to find a more sustainable solution to long-standing shortcomings in fiscal policy since some of the temporary patches introduced by the previous Pacto Fiscal expire in 2008. The current Pacto Fiscal is emphasizing transparency in fiscal policy, especially with regard to expenditures, to complement tax reforms.

Low Economic Growth and Investment

Low Productivity Growth

Harberger (2005) and Loening (2002) have analyzed the sources of growth in Guatemala, finding that the physical capital contribution has been low and has fallen in recent decades (see Table 5.1). Generally, labor has been more important than physical capital as a growth factor, but what really changed after the "lost decade" is the real cost reduction (in Harberger's terms), which is growing at barely half the rate that prevailed prior to the 1980s. Since 1990, the real cost reduction[2] gains in Guatemala have been very low when compared to successful countries in the region: on average, total factor productivity (TFP) growth in Guatemala has been 1.7 percent yearly, whereas in Costa Rica, the Dominican Republic, and Chile, TFP has grown at 2 percent, 3 percent, and 3 percent, respectively.

[2] Real cost reduction refers to the TFP in Harberger's paper or TFP plus education in Loening's work.

TABLE 5.1A TFP Estimations

Update of Loening's TFP Estimation Approach, Guatemala, 1951–2005 (percent)

Period	GDP growth rates	Contribution of			
		Capital	Education	Labor	TFP
1951–55	2.3	0.7	0.2	–0.9	2.3
1956–60	5.3	2.1	2.7	1.6	–1.1
1961–65	5.3	1.4	2.7	1.5	–0.4
1966–70	5.8	2.0	2.6	1.4	–0.4
1971–75	5.6	1.9	2.1	0.8	0.6
1976–80	5.7	2.9	3.8	2.1	–3.2
1981–85	–1.1	0.8	–0.2	–0.8	–1.2
1986–90	2.9	0.5	2.1	1.2	–1.0
1991–95	4.3	1.1	0.8	0.5	1.9
1996–2000	4.0	1.8	1.4	0.3	0.4
2001–05	2.5	1.5	2.0	0.5	–1.5
Average	**3.8**	**1.5**	**1.8**	**0.7**	**–0.3**
	100%	**39%**	**48%**	**19%**	**–9%**

Source: Authors' calculations following approach in Loening (2002).

TABLE 5.1B TFP Estimations

Harberger's TFP Estimation, Guatemala, 1960–2001 (percent)

	High growth 1960–80	Low growth 1980–1986	Other 1986–2001
GDP growth	5.6	–0.9	3.8
Capital contribution	0.8	0.1	0.6
Labor contribution	1.4	1.3	1.6
Real cost reduction	3.4	–2.4	1.7

Source: Harberger (2005).

Low Capital Accumulation

The current total investment ratio in Guatemala (around 13 percent) is below the average in Latin America (23 percent) and below fast-growing economies in East Asia (22 percent). In the last 35 years, Guatemala has been one of the countries in Latin America with the lowest ratio of gross fixed capital formation to GDP. This is due to deficiencies in both private and public sector capital formation.

Public investment represented on average 5 percent of GDP in the late 1970s and early 1980s, but fell to half this level in the 1980s and most of the 1990s as a consequence of fiscal constraints. There was a short-lived surge in public investment right after the signing of the Peace Agreements, peaking at 3.5 percent of GDP in 1999, but it went back to 1.8 percent of GDP in 2004, and currently stands at around 2 percent of GDP.

For the private sector, the ratio of gross private fixed capital formation to GDP was on average 10 percent in Guatemala between 1970 and 2003, well below the 16 percent average in the region. The civil conflict affected the accumulation process. The ratio fell to 7 percent when the armed conflict worsened during the 1980s. Since the conflict ended, the increase in private accumulation has not been enough to compensate for the previous losses. More recently, even this mild recovery stopped, and since 2000, there has been a declining trend, and the rate has not reached the pre-1980s levels.[3]

Labor Productivity, Reallocation, and Growth

Following the shift-share analysis in Hopenhayn and Neumeyer (2004), this study first analyzes whether price distortions have historically affected economic growth in Guatemala, exploring how labor has been allocated across sectors (since data on capital stock are not available at the sector level). Following this approach (see Hopenhayn and Neumeyer's paper for further details on the methodology), labor productivity is decomposed into:

- Within-change or shift component, which is a weighted average of the increment in TFP, capital stock per worker, and average human capital in the sector, assuming constant returns to scale. This term should explain all of the variation in output per capita under balanced growth.

[3] The private investment ratio peaked at almost 14.8 percent of GDP in 1999 but fell back to around 12 percent of GDP in 2001, and stayed at approximately that level for several years.

- Between-change or share component, capturing the growth in GDP per worker, corresponding to the reallocation of labor across sectors (with constant output). If labor goes from sectors with low to high labor productivity, the term should be positive.
- An interaction effect, which is negative if labor goes from a sector with growing average productivity to a sector where output per worker is falling.

The exercise yielded the following findings:

- Labor reallocation has been stronger than output reallocation, which explains why labor productivity lags behind output growth.
- The general pattern is that employment flowed from agriculture and mining to services; the share of total employment in agriculture and mining, for instance, declined from 52 percent in 1960 to 14 percent in 2005.
- Except for the 1960s, the within-change has been the most important factor explaining output per capita growth.
- Between-changes have been always positive except during 1970–5, showing that labor has moved from low to high labor productivity sectors. The interaction effect has always been negative, showing that labor has flowed from sectors where average productivity is rising to sectors where average productivity is falling.

The fact that the within-change is the most important factor suggests that the economy has had a balanced but slow economic growth. In countries where price distortions had a significant effect on the economy, such as Argentina in the 1970s and 1980s, the most important factor was a negative interaction effect, indicating the misallocation of factors. In Argentina, when the price distortions were eliminated in the 1990s, the economy had important gains just from reallocating the resources efficiently. By contrast, the pattern of balanced growth observed in

Guatemala resembles the type found in more successful economies (such as Chile) or developed countries, where deepening capital and rising productivity account for most of the economic growth.

This evidence suggests that price distortions are not hindering resource allocation in Guatemala.[4] The evidence is clear that the slow growth in Guatemala is not caused by a high level of investment that is poorly allocated, but rather by a low level of investment, which should be explained either by the high costs of financing or the lack of opportunities, which are analyzed next.

Barriers to Investment: Credit Market Imperfections

Macro Evidence

Table 5.2 presents some stylized facts about investment in Guatemala's formal sector since 1960. Guatemala's national saving rate is low. Although it has risen to around 15 percent of GDP since 2002 from a typical level of around 12 percent, it remains lower than the average for Latin America and the Caribbean (20 percent) and for fast-growing countries in South Asia (26 percent). However, external sources of financing are readily available. Evidence of this is the availability of large foreign exchange inflows in the form of private remittances (which have increased sevenfold since 2001, and now represent 11 percent of GDP) and private external debt (official international reserves increased from US$1 billion at the end of the 1990s to US$4 billion in 2006, which suggests an abundance of resources).

On the other hand, remittances are not invested or saved but rather immediately consumed (and mainly in nondurables). The country is not attractive to foreign direct investment (in the 2000s, FDI flows have represented only 1 percent of the GDP, which is very low by Latin American standards). Country risk is relatively high for

[4] This does not mean that price distortions in Guatemala are absent, but rather that the distortions have not had a significant role in the observed growth pattern, and therefore cannot be a binding constraint.

TABLE 5.2 Stylized Facts of Investment in the Formal Sector, 1960–2006 *(percentage)*

	Real domestic credit to private sector (growth, percentage)	Domestic credit to private sector/GDP	Real interest rate	Gross capital formation/ GDP
1960–75	7.07	12.3	8.92	12.26
1976–85	6.64	16.4	7.91	16.36
1986–2006	5.14	8.3	7.93	18.35
1960–2006	6.09	15.9	8.26	15.85

Source: Authors' calculations using Banco de Guatemala (BANGUAT) data.

a country that has not faced large macroeconomic shocks, financial crises, or public debt defaults, and the capital market is very much underdeveloped.[5] Domestic credit to the private sector represented just 16 percent of GDP in the last 40 years, which is very low even by regional standards (the increase observed in the last 15 years has barely met the levels reported before the "lost decade"). Interest rate spreads are also high by regional standards.

Micro Evidence

Domestic saving and financing patterns are distorted because creditor protection is poor, bank regulation is weak, and equity and venture capital outside certain narrow circles are scarce. There is no framework for business or individual bankruptcy, either. Uncertainty regarding property rights in many areas of the country also distorts access to credit. Therefore, from a macroeconomic perspective the country does not seem to face financial constraints, but some micro factors might be explaining why these resources do not subsequently materialize as credit and investment. However, the low credit to GDP ratio is not necessarily a reflection of credit constraints, as it could be that the available portfolio of investment projects is very narrow.

[5] The ratio of market capitalization to GDP is just 1.24 percent, well below countries with similar GDP (35.9 percent, on average) and Latin American and Caribbean (32.6 percent, on average).

To better understand the availability and terms of financing in Guatemala, a comparison was made between conditions in Guatemala and conditions in other similar countries, following a cluster analysis using the World Development Indicators database.

Some 129 countries were first clustered into three groups: low-cost, high-cost, and extreme-imbalance countries, using a quadratic Euclidean distance rule along three dimensions:[6] the spread between deposit and loan rates, real interest rates, and the savings-to-GDP ratio (see Table 5.3). Guatemala is in the high-cost cluster, with countries such as Armenia, Bolivia, Brazil, Colombia, Costa Rica, Georgia, Kenya, Nicaragua, Sierra Leone, Toga, Uganda, and Zambia. No developed country falls in this group, but some relatively high-growth countries such as Costa Rica do. In these countries, the savings rate is low, the cost of financial intermediation is high, and the real rate of interest on loans is also high—but Guatemala has somewhat better conditions than the archetypical high-cost country.[7]

Second, 162 countries were clustered in three groups: low, medium, and high financial depth, according to: the ratio of broad

[6] Cluster analysis helps in discovering structures in data without explaining them. As an exploratory tool, cluster analysis groups objects into categories on the basis of their similarity. Specifically, country observations like those in this study can be sorted into groups in such a way that the association between two observations is high if they belong in the same group and low otherwise. Distance in n-dimensional space is used as a clustering rule for grouping objects. By this methodology, the hierarchy is constructed from the individual elements by progressively merging clusters. Obviously, the results of cluster analysis (country groupings) depend on the choice of variables used in the analysis. The most straightforward way of computing distances in n-dimensional space is to calculate Euclidean distances. Standard Euclidean and quadratic Euclidean distances are the two most common clustering rules; quadratic distance places greater weight on observations that are further apart. Quadratic Euclidean distance is computed as:

$$D(x, y) = \sum_i \left(x_i - y_i\right)^2$$

[7] This holds for a macro analysis of the financial markets, but it does not necessarily mean that individual enterprises or groups of enterprises do not face problems accessing resources. For more information, refer to the informal economy and institutional analysis presented in this study.

TABLE 5.3 International Clustering by Financing Conditions
(unweighted averages)

Variable	Repressed	High cost	Guatemala	Low cost
	Percentage			
Spreads	66.6	*13.0*	*10.0*	6.3
Real interest rate	–16.8	*13.3*	*8.5*	5.6
Saving/GDP	8.2	*10.4*	*13.8*	25.0
Number of countries	2	*48*	—	79

Source: Author's calculations on the basis of data from the World Bank World Development Indicators (WDI) *(corresponding* to 2004–05). Data on high-cost cluster and on Guatemala are italicized.
— not available

money (M2) to GDP and the ratio of credit to the private sector to GDP (see Table 5.4). Guatemala is in the low-financial depth group, together with Argentina, Brazil, Colombia, Costa Rica, El Salvador, Indonesia, Mexico, Pakistan, Peru, Turkey, and Venezuela, as well as Albania, Bangladesh, Cameroon, Haiti, Mali, Sierra Leone, and Uganda. This is a very diverse group that includes large emerging markets such as Brazil, Indonesia, and Mexico, as well as small impoverished countries such as Mali and Sierra Leone. Guatemala is a very "typical" member of the third group, as the country average M2/GDP ratio is very close to the group average, and the credit/GDP ratio is 2 percentage points above the group average.

The third piece of evidence at the micro level is based on the World Bank's Investment Climate Assessment survey. Some 4,719 firms from Brazil, Chile, Ecuador, El Salvador, Guatemala, Honduras, and Nicaragua were clustered into three clusters: firms facing

TABLE 5.4 International Clustering by Availability of Credit
(unweighted averages)

Variable	Low	Guatemala	Moderate	High
M2/GDP	*29*	*29*	67	113
CSP/GDP	*18*	*20*	56	126
Number of countries	100	—	43	19

Source: Author's calculations on the basis of WDI data.
— not available

TABLE 5.5 Cross-Country Clustering of Firms by Terms of Financing
(firms as percentage of country total)

Country	Unfavorable	Intermediate	Benign	Total
Guatemala	0.44	33.19	66.37	100
Brazil	3.30	14.89	81.81	100
Chile	0.32	4.47	95.21	100
El Salvador	0.65	20.47	78.88	100
Ecuador	5.23	53.72	41.05	100
Honduras	0.45	45.70	53.85	100
Nicaragua	2.88	30.82	66.30	100
Total	2.01	22.53	75.46	100

Source: Authors' calculations, based on World Bank Investment Climate Assessment (ICA) survey.
Note: The variables used in the multivariate cluster analysis were firm size, collateral as financial constraint (dummy variable), and financial cost.

relatively adverse terms of financing, with both access and cost of financing being cited as constraints; firms with better terms of financing; and firms with relatively benign terms of financing (in the sense that firms are less likely to cite either the cost or access to financing as a binding constraint) (see Table 5.5).

The results show that two-thirds of Guatemala firms fell into the cluster associated with relatively benign financing conditions (both cost and access to financing). Similarly, nearly one-third of Guatemalan firms in the ICA survey reported "intermediate" terms of financing. Only a very small percentage of Guatemalan firms belong in the cluster associated with adverse terms of financing.

Returns to Investment in Physical Capital vs. Cost of Financing

Following an iterative approach using national accounts data for the period 1950–2006, the (social) rate of return of aggregate private investment in Guatemala was estimated.[8] The average rate was found

[8] This method measures the internal rate of return (IRR) of yearly aggregate investment, not the average rate of return on existing physical capital. This means that the IRR is likely to be more sensitive to macroeconomic conditions than measures based on returns to the capital stock.

to be 28 percent (in real terms).[9] This high rate is not surprising since capital is scarce in Guatemala, and the rate computed shows the average return for existing capital and not for new investment (which is relevant for growth).[10]

What is important is to analyze the evolution of the rate of return, which varied considerably over the 50 years. In the 1960s and 1970s, when the economy was growing fast, the rates of return were exceptionally high. The rates of return collapsed in the early 1980s, recovered following the transition to democracy, peaked right after the signing of the Peace Agreement, and declined again in subsequent years. The rates declined in a period in which financial conditions were more favorable (after the capital account liberalization and modernization of financial infrastructure). The decline was not due to an increase in the stock of capital, since it has been almost constant. In this sense, the evolution of the capital stock and the rate of return seem to not be consistent with a financial constraint story.

Summing up, the fact that remittances are consumed and foreign access to credit is not exploited; that individual firms report relatively good financing conditions; and that investment did not pick up when the financial conditions improved show that costly financing is not the most binding constraint in Guatemala. The little formal lending going on in the country is more related to the demand for credit (and the availability of profitable projects) than the supply of funds. These findings lead to an analysis of the lack of opportunities branch of the tree in the remainder of this chapter.

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[9] An estimation of the aggregate production function with time series suggests a similar value: a social return on private capital of around 30 percent.

[10] Remember that private investment is driven by private IRR. It does not necessarily follow from high social IRRs that the risk-adjusted private IRR is high. This is a common fact in Latin America. Higher risk demands compensation and this discourages some investment projects. In a world of high mobility of capital, this higher cost is shifted to more immobile factors (like labor) or to consumers.

Social Returns to Economic Activity

Human Capital Accumulation

Of the 124 countries included in the Global Competitiveness Index (GCI), Guatemala ranks 75. Other countries in the region, such as Costa Rica, El Salvador, and Panama, rank higher. Among the nine so-called pillars in the index, Guatemala's worst rankings are in higher education and training (94), followed by institutions (81). The best rankings are obtained in business sophistication (60) and technological readiness (71).

Guatemala has a GCI ranking in line with its level of development (GDP per capita in PPP US$) for most of the components except for higher education and training (fifth pillar), suggesting that human capital might be a binding constraint.

The effect of investment in education on economic growth and development has been studied at least since Denison (1962, 1967) and currently no economist could neglect its importance. The channels through which education investment influences growth are more controversial, however. To mention just a few possible channels: human capital might be needed to catch up with foreign technological progress and the creation of domestic technology (Benhabib and Spiegel, 2003); education might exhibit strong externalities (such as allowing better institutions and better functioning of the democratic process); and education might also affect the efficiency of the educational system (better qualified teachers offer better education quality, even for the same number of years of schooling).[11] Obviously, investment is just a portion of the story because what matters is how well investment is allocated (its efficiency), since increases in years of schooling could be attained at the expense of reducing the quality of education.

[11] Lucas (1990), for instance, argues that one reason why physical capital does not flow to poor countries may be the fact that these countries are typically poorly endowed with factors complementary to physical capital, such as human capital, thereby reducing the rate of return.

Guatemala has made some efforts in recent years to increase the average years of schooling and education in general. Due to a significant increase in recent years, net enrollment in primary school in 2004 was in line with comparable countries. In 1990 the net enrollment ratio in primary school was just 64 percent, but increased to 93 percent by 2004. In secondary education net enrollment ratios have increased significantly, from 19.5 percent in 1985 to 48.6 percent in 2004, and the proportion of pupils reaching fifth grade (from the same cohort) increased from 39.1 percent in 1985 to 77.9 percent in 2004. Other indicators, such as the intake rate, primary completion rate, and ratio of pupils to teachers, have improved significantly, too. As a result of this effort, the adult illiteracy rate fell from 39 percent in 1990 to 30.9 percent in 2004. Although the situation has been improving, Guatemala is still well behind countries with similar GNI per capita,[12] and behind Latin America. In particular:

- Guatemala has a high rate of illiteracy (30.9 percent), the highest in Latin America (the regional average is 9.8 percent) and one of the highest among countries with similar GNI per capita (the average is 10.6 percent).
- The net enrollment ratio in primary school is similar to the regional average and the average for countries with

[12] The set of middle-income countries includes: Algeria, American Samoa, Belarus, Belize, Bolivia, Bulgaria, Cape Verde, China, Colombia, Cuba, Djibouti, Dominica, the Dominican Republic, Ecuador, Egypt, Arab Rep., El Salvador, Equatorial Guinea, Fiji, Gaza Strip, Georgia, Grenada, Guatemala, Guyana, Indonesia, Iran Islamic Rep., Iraq, Jamaica, Jordan, Kazakhstan, Kiribati, Macedonia FYR, Maldives, Marshall Islands, Micronesia Fed. Sts., Morocco, Namibia, Panama, Papua New Guinea, Paraguay, Peru, the Philippines, Romania, Russian Federation, Solomon Islands, Sri Lanka, St. Vincent and the Grenadines, Suriname, Swaziland, Syrian Arab Republic, Thailand, Tonga, Tunisia, Turkey, Turkmenistan, Ukraine, Uzbekistan, Vanuatu, West Bank, and Yugoslavia.

The set of Latin American countries includes: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, the Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Uruguay, and Venezuela.

similar GNI per capita. The progression from primary to secondary school is among the highest for both sets of comparator countries. This shows that the high illiteracy rate is in part due to the burden inherited from previous years, and that the situation for primary school pupils has improved.

- Nevertheless, the gross enrollment ratio in primary school is in line with the regional average for both sets of countries, so Guatemala is not catching up to the rest in terms of educating adults.
- Both the net and gross enrollment ratios for secondary school are low relative to the set of comparator countries (in fact, they are the lowest in Latin America).
- The gross enrollment ratio for tertiary education is also the lowest in Latin America.
- Guatemala is allocating resources to public education at a level well below the regional average and the average of countries with similar GNI per capita. Guatemala's public expenditure in education (as a percentage of GDP) represents only 40 percent of the Latin American (weighted) average.[13]

Figure 5.2 shows how Guatemala compares to various international education benchmarks.

The average rates conceal important gender and racial differences in education: 58 percent of indigenous people are illiterate, and among indigenous women the rate is 69 percent. For non-indigenous groups, the rates are 25 percent for women and 16 percent for males, also showing a gender bias.

In addition to poor education, Guatemala also reports poor health indicators when compared to the average of Latin America

[13] Although the private sector has a larger participation in education in Guatemala than in other countries of the region (particularly in secondary school), private sector spending on education is not likely to be enough to compensate for the lack of public expenditure in this sector.

FIGURE 5.2 International Benchmarks, 2004

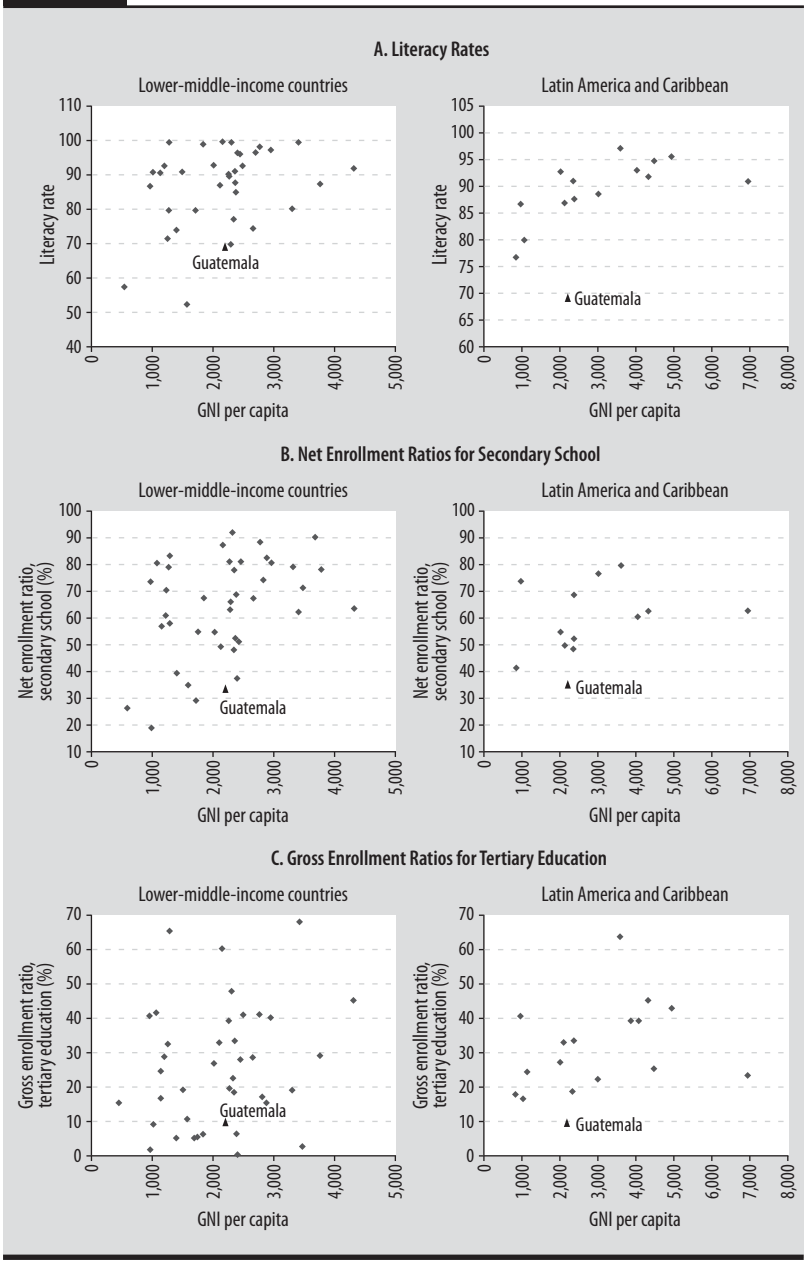
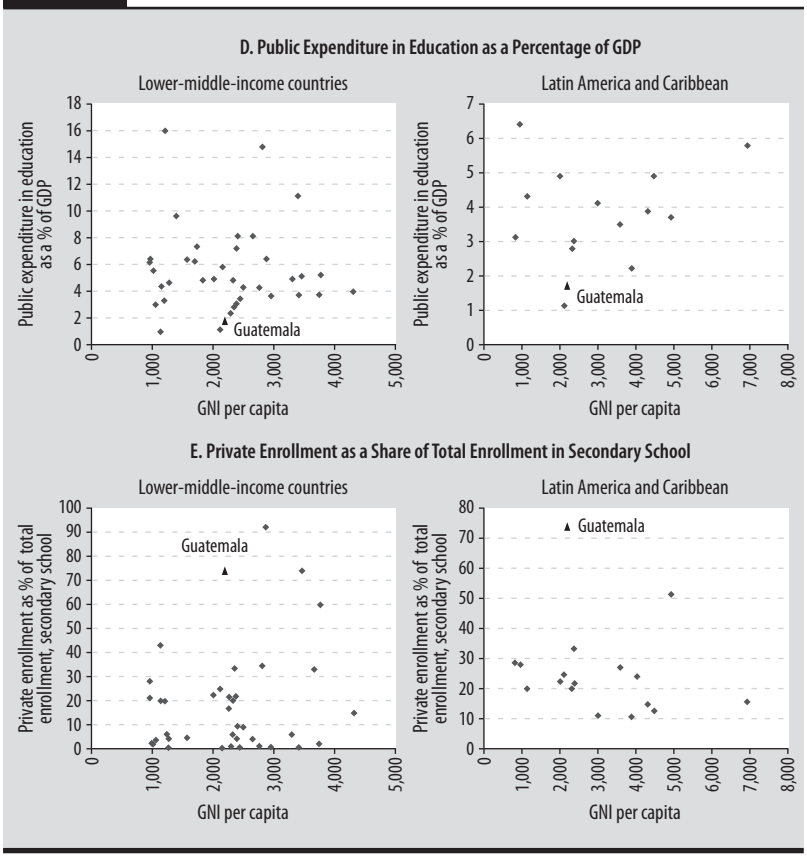


FIGURE 5.2 International Benchmarks, 2004
(*continued*)



Source: World Bank, EdStats.

and Caribbean countries and high-income countries (see Table 5.6). For instance, life expectancy at birth is 68 years, while the average in Latin America is 72, and infant mortality rate is 39 per 1,000, while the regional average is 29.6. The immunization rate is 76 percent. Compared only to Central American countries, Guatemala performs poorly. For instance, El Salvador, which also suffered the devastating effects of a long-term civil war and has a GNI per capita similar to Guatemala, has an infant mortality rate of 29 per 1,000, an immunization rate of 97 percent, and life expectancy of 71 years.

TABLE 5.6 Health Indicators, Guatemala vs. Latin American and High-income Countries

	Guatemala		Average for Latin America and the Caribbean		High-income countries	
	2000	2005	2000	2005	2000	2005
GNI per capita, Atlas method (current US$)	1,740	2,400	3,679.4	4,007.7	26,527.7	35,130.5
Life expectancy at birth, total (years)	66.3	68	71.2	72	78	79
Mortality rate, infant (per 1,000 live births)	39	—	29.6	—	6.5	—
Mortality rate, under-5 (per 1,000)	53	—	35.7	—	—	—
Immunization, measles (% of children aged 12–23 months)	76	—	89.1	—	90.8	—
Prevalence of HIV, total (% of population ages 15–49)	—	0.9	—	0.57	—	0.37

Source: World Bank.
— not available

Returns to Schooling

The fact that the stock of human capital is low does not mean that human capital is scarce or that more investment in this sector pays off. But, in Guatemala it is clear that human capital is scarce since an additional year of schooling yields high returns compared with other countries. Bils and Klenow (2000), for instance, rank Guatemala 6th out of 50 countries in terms of the rate of return to schooling. Hausmann and Rodrik (2005) show that Guatemala has the highest returns to schooling in Latin America.

According to Bils and Klenow (2000), the recovery in growth rates in the 1990s should have pushed the returns to schooling upward, thus causing more schooling; by contrast, an increase in human capital (holding growth constant) is expected to push returns down. In the case of Guatemala, the relatively shallow decrease in returns to schooling between 1989 and 1998 seems to show that the increase in schooling has not been enough, com-

pared to other countries, to accommodate demand for this factor (see Table 5.7).

In 1989, with a literacy rate of 61 percent, one additional year of schooling had a return of 0.142, but in 2004, with a literacy rate of 69.1 percent, the return fell to 0.124. The decline in returns to schooling is stronger at lower levels of education. For instance, the net enrollment ratio in primary school increased from 64 percent in 1990 to 93 percent in 2004, and the returns to finishing primary school fell 28 percent between 1998 and 2004. For higher levels of education, the declining trend is not so clear; in fact, the return to finishing higher education has not fallen but has increased in the last decade, even in a context in which enrollment in tertiary education has increased by 15.7 percent.

The very high returns to schooling for Guatemala are consistent with the fact that Guatemalan workers are among the least educated in Latin America, and the fact that education has improved significantly but returns have not fallen drastically (as happened in other Latin American countries that reported significant increases in education, such as Honduras). As the reported increase in human capital did not depress returns, this suggests that human capital has been a binding constraint.[14]

Another piece of evidence is Loening (2002), who analyzes the relationship between economic growth and education in Guatemala using time series analysis and an error correction model. In the time series analysis, average years of schooling are strongly correlated with per capita growth. The results, according to the author, are that a better-educated labor force appears to have a positive and significant impact on economic growth: both through factor accumulation

[14] Since these are private returns to schooling, one might think that the private sector could close the gap through private schooling. This trend is not observed in Guatemala, but several factors limit the expansion of private schooling. Perhaps the most important (as in any other country) are the imperfections in credit markets (people cannot normally borrow to accumulate human capital; accumulation is restricted only to relatively rich individuals, thus perpetuating a very unequal income distribution). In addition, health problems (such as malnutrition) might significantly limit the accumulation for poor individuals.

TABLE 5.7A Returns to Schooling

Returns to One More Year of Schooling or Finishing Primary or Secondary School or Higher Education					
	Bils and Klenow (2000), based mainly on 1998–9 data	Hausmann and Rodrik (2005), based on 1998 data	Hausmann and Rodrik (2005), based on 1998 data		
Country	One more year of schooling	One more year of schooling	Finished primary school	Finished secondary school	Finished higher education
Argentina	0.107	0.091	0.422	0.789	1.127
Bolivia	0.073	0.113	0.781	1.283	1.425
Brazil	0.154	0.132	0.622	1.138	1.922
Chile	0.121	0.123	0.341	0.761	1.458
Colombia	0.145	0.119	0.449	0.908	1.668
Costa Rica	0.105	0.098	0.326	0.684	1.22
Dominican Rep.	0.078	0.068	0.281	0.377	0.896
Ecuador	0.098	0.135	0.681	1.31	1.833
El Salvador	0.096	0.105	0.557	1.027	1.482
Guatemala	**0.142**	**0.136**	**0.841**	**1.347**	**1.991**
Honduras	0.172	0.104	0.467	1.003	1.506
Mexico	0.141	0.126	0.709	1.225	1.732
Nicaragua	0.097	0.11	0.574	0.86	1.636
Panama	0.126	0.116	0.483	1.015	1.559
Peru	0.085	0.129	0.474	0.99	1.459
Paraguay	0.103	0.129	0.665	1.181	1.662
Uruguay	0.09	0.084	0.427	0.765	1.079
Venezuela	0.084	0.085	0.351	0.622	1.076
Latin America average	0.112	0.114	0.52	0.97	1.493
Taiwan	N.A.	0.067	0.257	0.5	0.826
Thailand	0.091	0.192	0.915	1.827	2.361
United States	0.093	0.12	0.186	0.553	0.98
Maximum	—	0.192	0.915	1.827	2.361
Minimum	—	0.067	0.186	0.377	0.826

Source: Bils and Klenow (2000); Hausmann and Rodrik (2005).

Note: Returns to schooling correspond to the OLS coefficient in a standard Mincer equation. In the case of years of schooling, this coefficient shows the proportional change in wages when the individual has one more year of education. In the case of the dummy for finishing primary school, it shows the proportional change in wages for those whose maximum level is finished primary school compared to those who have not finished.

TABLE 5.7B Returns to Schooling

Recent Evolution				
Year	One more year of schooling	Finished primary school	Finished secondary school	Finished higher education
1989	0.142	—	—	—
1998	0.136	0.841	1.347	1.991
2002	0.137	0.727	1.407	2.413
2004	0.124	0.656	1.321	1.988

Source: Bils and Klenow (2000), for 1989 results; Hausmann and Rodrik (2005), for 1988 results; values for 2002 and 2004 were estimated based on the Encuesta Nacional de Empleo e Ingresos (ENEI), 2002 and 2004 (in both cases, the results were expanded using the frequency weight of the stratified sampling estimated by ENEI).

Note: The returns are calculated as a simple Mincer equation (a standard OLS regression of the natural log of total labor income on age, age squared and schooling) (years of schooling in one case, and dummies for highest level of education reached).

and through the evolution of total factor productivity. An increase by 1 percentage point in average years of schooling would raise output per worker by about 0.16 percentage points (a large effect compared to the results obtained for other countries). Growth accounting shows that economic growth in Guatemala has been historically driven by factor accumulation and not TFP growth. Loening suggests that the poor performance in TFP growth is related to Guatemala's poorly developed human capital. These results suggest that social returns to schooling are very high too.

Human Capital and Indigenous Groups

The origins of rural poverty in Guatemala can be traced to a long history of social discrimination and inequality. Indigenous groups have traditionally been excluded from the social, economic, and political mainstream of the country. This situation has been exacerbated by Guatemala's complex topography, as high mountains and dense forests have kept these mainly indigenous communities remote from the rest of the country. In addition, more than three decades of civil conflict had devastating consequences for the rural population.

Indigenous communities speak a wide range of languages and dialects (many do not speak Spanish) and live in rural areas,

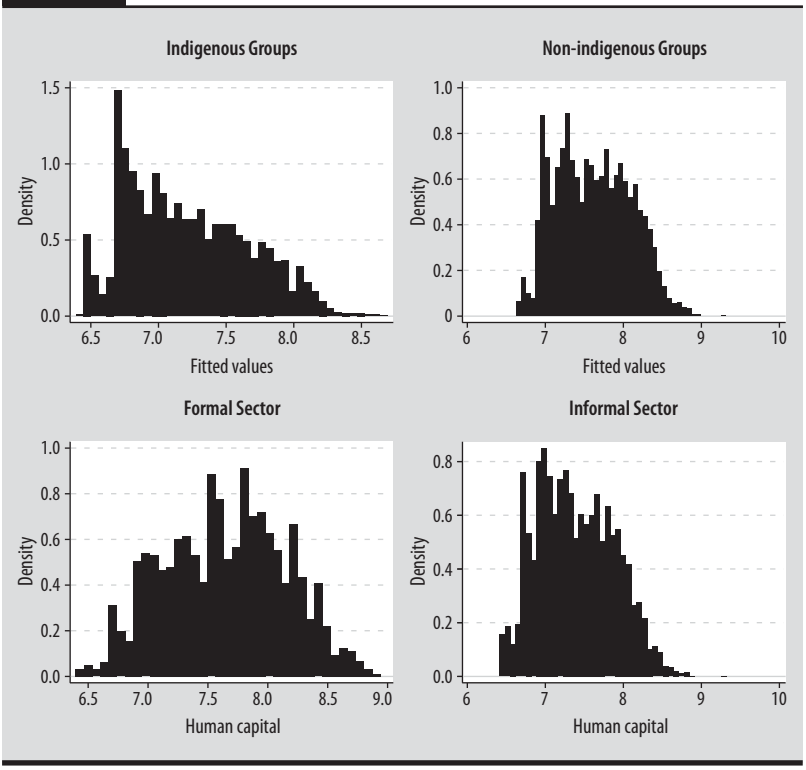
and this has kept them further marginalized. Today, although indigenous communities make up 43 per cent of the population, they account for less than a quarter of Guatemala's total income and consumption. They not only have problems with access to education, but also have extremely limited access to basic services and infrastructure.[15]

Schooling among indigenous people is lower than the national average, particularly among women. However, education does not seem to be the only factor explaining lower income for indigenous groups, since in a standard Mincer equation indigenous individuals have a strong and significant negative premium even after controlling for education. This is not related to location, since including a dummy for rural or urban location does not change the coefficient associated with belonging to an indigenous group. What explains the negative premium on education? A simple answer could be discrimination, but it is also possible that the quality of education among indigenous groups is poorer and that having a mother tongue other than Spanish is a disadvantage in a Spanish-based education system and in the formal sector of the economy.

To compare the differences in human capital among indigenous and non-indigenous people, a Mincer equation was first estimated using Heckman's two-step methodology (to control for the endogenous decision to participate in the labor force) using as controls: age, age squared, dummy for whether part of an indigenous group, dummy for gender, dummy for whether the person was educated in a rural area or urban area, and five dummies indicating the level of education. With the estimated coefficients and the characteristics of the entire population (15 years or more), the human capital stock was estimated. The results show that the indigenous distribution is stochastically dominated by the non-indigenous distribution, the

[15] The systematic decline of the traditional agricultural sector has led to a decline in income and nutritional levels among poor indigenous rural people. In addition, pressure on the land has resulted in deforestation and soil erosion, and this has affected the rural indigenous communities.

FIGURE 5.3 Distribution of the Human Capital Stock in Guatemala, 2004



Source: Authors' calculations, based on the ENEI, 2002 and 2004.

mean is lower, it has more weight in the lower tail, and just a few reach high levels of human capital (see Figure 5.3).

The same procedure was applied to view differences in human capital accumulation between formal and informal workers (see Figure 5.3). The Mincer equation was first estimated using the Heckman procedure, and the graphs for each subsample were compiled. The mean between both groups does not differ much, although the distribution in the informal sector is more skewed to lower educational levels. Therefore, it cannot be concluded that the increase in informality has been neutral in terms of stimulating human capital accumulation. More research is needed to better understand the link between informality and growth.

The Relatively Poor Quality of Schooling

Not only is the quantity of schooling poor, but so is the quality. Guatemala has not participated in any international test. However, an alternative measure can be found in Bratsberg and Terrell (2002), who analyze the quality of education estimating the returns to schooling for immigrants to the United States who have studied in their countries of origin (using U.S. Census data). Guatemala ranks 64 (both with 1980 and 1990 U.S. Census data) out of 67 countries in terms of quality. Only Haiti, the Dominican Republic, and El Salvador have lower returns to education in the United States than Guatemala (that is, lower quality). Whereas the returns to one additional year of schooling for the entire set of immigrants between 1980 and 1990 increased by 23.1 percent, Guatemala's rate of return increased only 7 percent, below the average improvement in Central America (36.4 percent) and South America (11.4 percent).

The low return for Guatemala means that the country is not educating its workers in the same way as other countries, at least according to market needs in the United States. There might be two reasons for this: one is that education is very country-specific; the other is that quality is poor.[16] One specificity is language, but it has been shown (see Hendricks, 2002) that the differences in returns using the Mincerian approach are robust to the number of years the worker has been living in the United States and the age the immigrant moved to the United States (one might expect that the younger the immigrant, the easier it would be for him or her to learn English, and the longer the stay in the United States, the less limiting should be the language learned at home). Another piece of evidence showing that the difference should be interpreted more as a difference in quality than educational specificities is that Guatemala also ranks poorly when compared to Latin American countries with similar

[16] Hanushek and Kim (1999) find a strong correlation between the implicit quality index obtained from a Mincer equation for immigrants in the United States who have studied in their countries of origin and direct measures of school quality (standardized tests).

characteristics (including language). The evidence thus shows that Guatemala not only has a problem with the quality of education but also that the gap has been increasing relative to other countries.

Since quality tends to reduce the returns to schooling (because an additional year of low quality education is not the same in terms of labor income as an additional year of high quality education), the already high returns to schooling found in Guatemala would be even higher if quality were more in line with international levels. For instance, if Guatemala's education quality equaled the world average (the average for the 67 countries analyzed in the study), returns to education would be 2.2 times higher than the return estimated in this study. This reinforces the idea that human capital is definitely a binding constraint on growth in Guatemala.

Infrastructure

This analysis focuses on four areas of "core infrastructure," which are especially important in terms of the facilitation (or obstruction) of investment and growth economy-wide: telecommunications, electricity, roads, and seaports. A summary of findings follows:

Telecommunications

- Guatemala has a liberal regulatory environment for telecommunications and the provision of services is entirely private (except for investment in rural telephony).
- Access to telephone services has increased substantially in the last few years, but starting from a very low penetration. Thus Guatemala is still well behind the average in Latin America.
- In terms of costs, telecom tariffs are relatively low. The average local telephone tariffs are around US$0.02 per minute and the price of international calls (to the United States) ranges from US$0.10 to US$0.40 per minute, depending on the choice of operator—a tariff similar to that of New Zea-

land, but above the countries in the region such as Brazil, the Dominican Republic, Jamaica, and Uruguay.

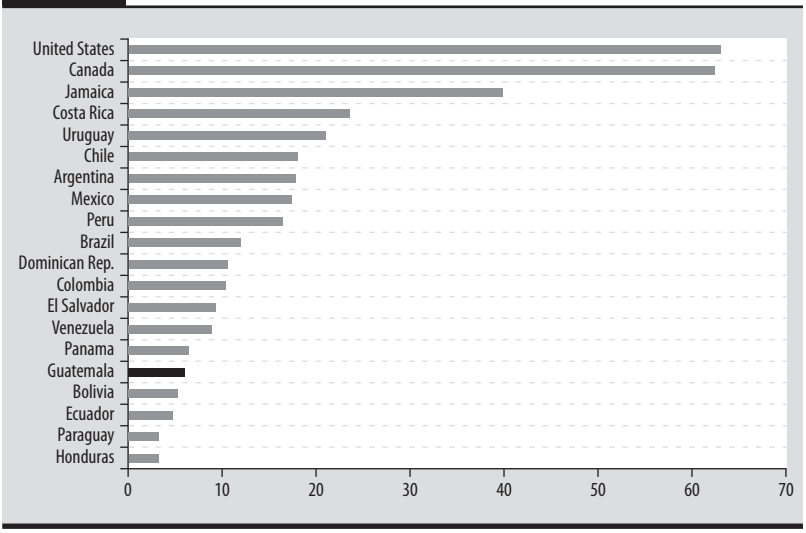
- Guatemala has a very low Internet connectivity rate. According to the World Report on Information Technology (released in early 2007), Guatemala ranks behind El Salvador, Costa Rica, and Panama in the use of information technology, although it still places ahead of Honduras and Nicaragua. Although Guatemala's ranking in Central America remained unchanged between 2006 and 2007, it improved significantly from a global perspective, moving from a ranking of 98 to 79 from 2006 to 2007. Recent estimates show that only 1.5 percent of the population enjoys regular access to the Internet, a level similar to El Salvador but very low when compared to Mexico (almost 5 percent) and Costa Rica (over 9 percent). The ratio of Internet users is around 7 percent (since many access the Internet through Internet centers), still very low when compared to the region (see Figure 5.4).

Electricity

- Electricity coverage has increased significantly since Guatemala restructured the sector in the early 1990s, particularly after the enactment of the 1996 Electricity Law.[17] The installed

[17] The 1996 Law introduced: unbundling into generation, transmission, distribution, and commercialization; competition in generation and commercialization; unrestricted access to the transmission network; partial consumer freedom to choose a supplier; and freely determined generation prices, together with regulated transmission and distribution prices. Energy prices and adjustments for capacity are passed through to consumers on a quarterly basis, taking into consideration the costs of fuel and exchange rate fluctuations. By contrast, network rates follow a price cap reset every five years. The Law also created both the National Electrical Energy Commission (CNEE) and the Administrator of the Wholesale Market (AMM). Together with the Ministry of Energy and Mining (MEM), the CNEE and AMM are responsible for sector policy and regulation. The CNEE is a semi-autonomous status entity attached to the MEM but enjoys budgetary independence (it is financed with a tax on electricity sales).

FIGURE 5.4 Internet Users in the Americas, 2007
(*per 100 inhabitants*)



Source: International Telecommunication Union.

capacity increased by 44 percent between 1996 and 2004, but at a lower pace than demand. Despite this unbalanced growth, private participation in generation has substantially reduced the incidence of capacity shortfalls and the associated blackouts common in the pre-reform years.

- There are some distortions in the price structure since medium-sized users finance the stranded costs of existing contracts and cross-subsidize social tariffs. The social tariff makes the current system unsustainable, but there is opposition to changing the situation. As a consequence, Guatemalan small and medium-sized enterprises (SMEs) pay between 25 and 70 percent more for electricity than equivalent enterprises elsewhere in Central America. Price distortions, sustainability, and political pressure are the most significant vulnerabilities of the system today. On the whole, the legal, regulatory, and institutional amendments have served the country well since the 1996 reforms, and the distortions and political vulnerabilities have not been a barrier to growth and

investment until now. Nevertheless, sector constraints may become more of a drag in the next few years.

Transportation

- Guatemala has a low density of roads and restricted access to transportation services (0.13 km of roads per km^2 and about 1.3 km per thousand people). An estimated 13 percent of households still have no access to roads (paved or unpaved). Because of geography, it would be very expensive to expand the network. However, the roads that do exist are likely to be of somewhat better quality than regional comparators since Guatemala has the highest proportion of paved roads in Central America.
- Several major road projects are on the drawing board, but they have not taken off due to financing constraints in the public sector and an unfavorable framework for private participation, which has resulted in a lack of interest by investors.[18]
- The road network and nationwide transportation infrastructure in general,[19] seem to be a binding constraint on growth and further investment. Existing infrastructure is serving the interests of large businesses fairly well (especially the largest ones, such as the sugar mill industry) so that the business community is generally satisfied with improvements in roads since the 1980s. Nonetheless, substantially

[18] This includes two of the so called ìmega-projectsî: the Transversal del Norte (a highway that would connect key areas in northern Guatemala and which taxpayers have paid for in full more than once, although the road has never been built) and the Anillo Metropolitano (the outer ring of the transportation system around Guatemala City).

[19] The railway never really took off and a decade-old attempt at privatizing it has proven to be unsuccessful. A foreign company that had acquired some rail assets is now suing the government for nonfulfillment of its obligations under the contract, which in their view has impeded their exploitation of rail assets and compliance with the company's obligations stipulated in the contract. The government has said that the contract was against the public interest and rescinded it. Legal action is ongoing, with both parties blaming each other for the failure.

expanding investment and economic activity in Guatemala would require increasing access to more extensive road and transportation networks.

Ports

- Corruption, lack of security, and low efficiency in port operations are the three top concerns voiced by port users.[20] Security concerns include both the time that freight spends in port premises as well as during subsequent transportation. This has caused diversion of container traffic away from Guatemalan ports, for example, as Salvadoran exporters sometimes choose to use Puerto Cortés in Honduras to avoid Guatemalan territory. Private sector participation in ports is limited. Puerto Barrios is private, while both Puerto Quetzal and Santo Tomás de Castilla are managed by state enterprises. The absence of a clear regulatory and institutional environment is a major barrier to private activity in ports. It thus appears that port operations may be a binding constraint on growth and investment in Guatemala.

The infrastructure sector in Guatemala is a clear example of incomplete liberalization and reform. Whereas telecommunications and electricity boomed following liberalization in the 1990s, roads and seaports remained stuck in the past and failed

[20] There are three active ports in Guatemala: Santo Tomás de Castilla and Puerto Barrios on the Atlantic, and Puerto Quetzal on the Pacific. Freight handled in Guatemalan ports has been increasing quickly, particularly in Puerto Quetzal (the largest port in Guatemala by tonnage). However, ports are very specialized in terms of the types of products which can be handled: containers and crude oil in Santo Tomás, bananas in Puerto Barrios, and sugar in Puerto Quetzal. Puerto Quetzal and Santo Tomás de Castilla rank fourth and fifth in Central America, respectively, after Puerto Limón in Costa Rica, Manzanillo in Panama, and Puerto Cortés in Honduras. The occupation rates are relatively low in Santo Tomás and Puerto Barrios (under 50 percent, against 60–70 percent for equivalent ports elsewhere), while the occupation rate in Puerto Quetzal exceeds 80 percent.

to live up to their full potential. Progress in the first two subsectors serves to make the underperformance of the latter two more noticeable.

Although the infrastructure sector is a significant binding constraint on economy-wide growth and investment, the assertion needs to be qualified somewhat in view of the earlier discussion. The infrastructure sector is characterized by successes, vulnerabilities, and failures. The specific pockets of failure and vulnerability that have been identified threaten the sustainability of the progress made elsewhere in the economy. Thus they should be treated as binding constraints under the growth diagnostic methodology.

Incomplete Linkages to the External Sector

Guatemala has made some progress in terms of trade openness, but progress is poor in comparison with other countries in the region. The country's export basket is still too concentrated and the share of sunset products remains high. The stagnation of export flows since 1990 and the sub-par economic growth record of the past few years suggest that the potential for trade in the Guatemalan economy has yet to be fully exploited. Even the dynamic *maquila* sector, which relies greatly on imported inputs, has not developed strong linkages with the rest of the economy.

Exporters in Guatemala complain about the real exchange rate. Given the nature of the inflows (remittances), however, there is little room for sustained monetary policy intervention. The growth in productivity has been too slow to compensate for the lack of competitiveness from the nominal side. Cuevas and Díaz (2007), based on a time series analysis, suggest that the view that sustained real exchange rate depreciation could boost exports in the long run is not supported by the data.

A key challenge for the future is to boost and diversify trade in order to improve economic growth and alleviate poverty. Growth of nontraditional agricultural exports has been attributed to policies to

promote diversification, access to long-term financing from public programs, and investments in infrastructure (irrigation, roads, and electricity). In this regard, private organizations and trade associations like the Exporters' Association (AGEXPORT) have played an important role too.

Open Forest Analysis

On the basis of the open forest measure (Hausmann, Hwang and Rodrik, 2007; Hausmann and Klinger, 2006), Guatemala appears to be in a relatively good position compared to other countries in the region (see Figure 5.5). Possibilities are similar to those of Argentina and Chile, but below El Salvador. The question, therefore, is why Guatemala is not exploiting these opportunities on a larger scale.[21]

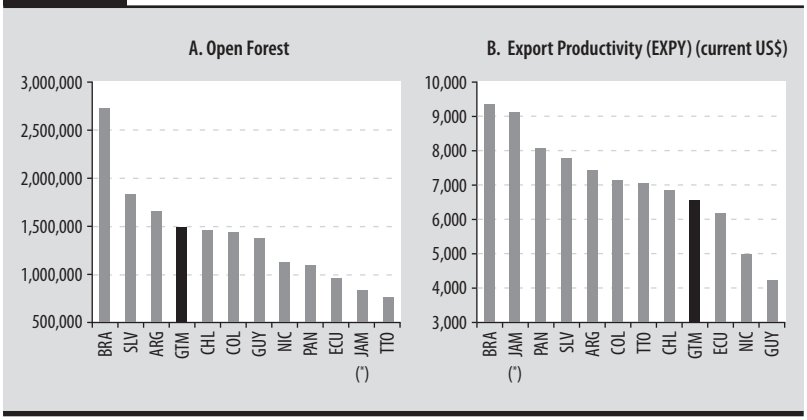
Klinger and Lederman (2006) find that Guatemala was very active from 1997 to 2002 in exporting "new products" (defined as a product that is new in the export basket, with more than $US1 million in exports). In the analyzed period, Guatemala exported 106 new products, a number that was very close to that of the top performers in the world, and better than all countries in the region.[22]

In this sense, the actual export basket per se does not seem to be a binding constraint to growth. The question is why a jump in total exports has not occurred—especially given that the government has been very active in promoting exports, creating numer-

[21] The EXPY measure is not favorable in the case of Guatemala because the degree of export sophistication is relatively poor: on average, its value is about US$6,544 at PPP, while Brazil's is US$9,342, Panama's is US$ 8,074, and El Salvador's is US$7,775. This is related to the fact that in Guatemala commodities make up a large share of total exports; in 2006, sugar, cafe, oil, and bananas represented 20 percent of total export value, and textiles (mainly *maquilas*), 27 percent. In terms of regional diversification, Guatemala's exports depend heavily on the United States, representing 51 percent of total exports in the past five years.

[22] Top world performers included Indonesia (119) and Jordan (102). Regional performers included Bolivia (89), Colombia (74), Ecuador (58), El Salvador (46), Honduras (59), Panama (51), Nicaragua (55), and Uruguay (63).

FIGURE 5.5 Open Forest Analysis



Source: Hausmann and Klinger (2006).

ous free trade zones (FTZs), and establishing a special regime for *maquila* enterprises, offering a mix of tax exemptions and other fiscal incentives.[23]

Why then are exports not growing faster? Between 1950 and 2006, exports at constant prices grew at an average rate of 4.5 percent, similar to the 4 percent growth rate of real GDP. The pattern resembles that of GDP growth; exports grew at a fast rate between 1950 through 1980 (7.1 percent annually), slowed between 1981 and 1986, and started growing again but at a lower rate (4.4 percent yearly). It thus seems that the same factors that are thwarting real GDP growth are at work in slowing export growth.

The Role of Service Exports

A drawback of the open forest analysis is that it does not take into account services, which have considerable potential in Guatemala (tourism, call centers, business process outsourcing, and medical

[23] The Export Promotion and Maquila Law (Law 29–89) applies only to exports outside the Central American Common Market (CACM), while the Free Trade Zones Law (Law 65-89) refers to exports produced in special zones.

services). As Cuevas and Bolaños (2007) point out, trade in services requires rethinking the trade paradigm and the development channels. Trade in services requires and promotes the accumulation of human capital, and thus complements the country's poverty reduction strategy. It facilitates decentralization of socio-economic activities and helps rebuild the country's social fabric. Moreover, the production of services is generally clean and does not lead to significant environmental degradation.

The general conclusion is that international trade in services has great potential to contribute to the country's development, but only if international negotiations are conducted judiciously and successfully, and if binding constraints arising at home (such as labor market rigidity, poor education outcomes, and uncertain rule of law) are also addressed as a part of a comprehensive program for sustainable development.

The issue is how Guatemala can take advantage of the emerging opportunities. Some weaknesses and potential barriers arise as a result of: policies, laws, norms, standards, and practices in partner countries; and internal constraints such as poor human capital, weak rule of law, lack of quality standards, and the poor image of the country. The government has a lot of room to improve the climate in this sector, aiming at the removal of barriers such as unduly restrictive prudential regulations (for example, in the financial sector), licensing and permits (for example, in the provision of professional services), discriminatory procurement processes (in the case of public sector entities in trade partners), tax discrimination (for example, in the repatriation of profits), restrictions on the entry and presence of business persons, and unnecessarily restrictive quality standards and requirements concerning commercial presence.

Adoption of New Technologies

Patenting activity and ISO certification are very limited in Guatemala, below what can be expected from a country of its size and level of development. In general, Guatemala's low capacity to absorb tech-

nology available elsewhere, as well as the lack of innovation in the economy represents a barrier to growth and investment. Guatemala's low level of integration into international trade and low level of FDI reduces its access to new technology. In addition, the scarcity of appropriate inputs and the lack of incentives to do so creates internal constraints to the adoption of new technologies.

Guatemala is also characterized by low research & development (R&D) expenditures and efficiency. Only four of the nine universities have developed an interest in technology and innovation. Enforcement of intellectual property rights (IPR) in Guatemala remains weak, mainly due to limited institutional capacity (registering a trademark takes about one year, while registering a patent takes three to four). The 2003 ICA undertaken by the World Bank shows that 26 percent of businesses think that patent/trademark regulation is a problem for business in Guatemala, against 18 percent on average in Central America.

Factors Lowering the Appropriability of Investment Returns

Following the recursive IRR approach, this study found a reasonably high social rate of return to investment. However, private investment is not motivated by social returns but by private ones. Also, private investors are concerned with returns on investment after risks have been taken into consideration: that is, private investors look at risk-adjusted returns. This section analyzes factors that lower the appropriability of investment returns and make investment relatively risky, thus lowering overall investment incentives.

Quality of Governance

Guatemala performs poorly on international governance indexes (ranking 111 out of the 163 in Transparency International's Corruption Perception Index). Guatemala also has a low ranking on general property rights indicators (scoring 61.3 in the Heritage Foundation's Index of Economic Freedom, with 0 the maximum and 100

the minimum protection of property rights). Guatemala also scores poorly on the recently created International Property Rights Index (ranking 68 out of 157 countries).

The World Bank's Investment Climate Survey (ICS) explores businesses' perceptions of the investment climate. Guatemala scores favorably on several criteria, including the number of inspections per year and the number of days needed to register a business. The elimination of red tape is one area where Guatemala compares well internationally. In addition, the country has made some efforts to reduce red tape: for example, through the enactment of a Foreign Investment Law that replaced a variety of instruments that had regulated foreign investment.

However, businesses still voice many concerns, including corruption, crime, regulatory and policy uncertainty, and macroeconomic instability (see Table 5.8). Guatemala scores poorly in terms of the bribe tax (corruption), time tax (regulatory burden), and confidence in the judiciary and property rights.

TABLE 5.8 Investment Climate from an International Perspective

Country	Unpredictable interpretation of regulations	Avg. bribe (% of sales)	Lack of confidence in courts	Avg. loss from crime (% of sales)	Avg. days to clear customs	Skills as major constraint	Labor regulation as major constraint
	Percentage	Percentage	Percentage	Percentage	Days	Percentage	Percentage
Brazil	66.0	—	39.6	2.8	13.8	39.6	56.9
China	33.7	2.6	17.5	2.6	7.9	30.7	20.7
Czech Rep.	56.0	2.9	47.1	3.1	4.4	9.1	3.5
Ecuador	68.0	5.4	70.8	3.5	16.4	22.3	14.1
Guatemala	**89.5**	**7.4**	**71.3**	**4.8**	**9.4**	**31.4**	**16.7**
Honduras	65.9	6.0	56.1	3.1	5.1	26.4	14.2
Indonesia	56.0	4.6	40.8	3.1	5.8	18.9	25.9
Malaysia	—	—	19.1	3.0	3.6	25.0	14.5
Nicaragua	66.4	7.0	60.4	7.0	5.8	17.0	6.9
Peru	78.7	—	34.7	10.2	7.9	12.5	—
Philippines	49.1	4.0	33.8	4.2	2.8	11.9	24.7
Russia	75.1	2.3	65.3	2.9	6.9	9.9	3.3

Source: Investment Climate Assessment survey, World Bank.
— not available

The indicators of the quality of governance, based on Kaufmann, Kraay and and Mastruzzi (2005) show that Guatemala performed worse than other countries with similar levels of GDP per capita on all of the components except for regulatory quality. Guatemala's indicators deteriorated steadily between 1996 and 2005.

Guatemala has no clearly articulated competition policy and no competition law. The constitution protects freedom of enterprise, commerce, and labor, and prohibits monopolies and privileges. However, no specific law or regulation has been approved to develop these principles and there is no institution responsible for the promotion and protection of competition.

There is widespread skepticism concerning the capacity of the judicial system to enforce contracts and resolve conflicts. Given the ineffectiveness and inefficiency of the judiciary, larger businesses opt to use alternative mechanisms to resolve conflicts. However, due to the relative high cost of alternative mechanisms, small and medium-sized enterprises are more likely to remain at the mercy of an inefficient and ineffective judiciary.

Since governance is an area in which Guatemala performs poorly, an improvement in overall governance would likely have a large pay-off.

Crime

Guatemala is one of the most violent societies in Latin America.[24] There is a significant concern in Guatemala about the high and growing level of crime. The internal conflict lasted more than four decades, with a wide variation in the level of violence over that time.

[24] Measuring the economic cost of violence is notoriously difficult and there are many alternative ways of measuring it. Balsells (2006) estimates that the economic cost of violence in Guatemala was more than 7 percent of GDP in 2005. Using a consistent methodology, CIEN (2002) estimated that the cost of violence in Guatemala approached 7 percent of GDP, compared with 1.4 percent in Peru and Brazil, 3.6 percent in Mexico, 4.9 percent in El Salvador, 6.4 percent in Colombia, and 6.6 percent in Venezuela.

Several years after the transition to democracy and the signing of the Peace Agreement, violence remains at the top of the country's agenda. The World Bank's ICA (2003) indicates that 4 out of 10 entities had been the victim of at least one criminal act in the last year, with larger firms reporting a higher incidence of crime. The vast majority of firms surveyed thought that the authorities responsible for public security were very inefficient.

Organized and street crime are considered to be major obstacles for business operation. The incidence of homicide is very high, but such incidents are not distributed homogeneously within the country. Violence in Guatemala is not exclusively an urban phenomenon, unlike Brazil or Colombia. This might simply reflect the fact that the country's level of urbanization is still relatively low. Another issue is that organized crime is often related to drug-dealing and money laundering, since Guatemala is known to be a major transshipment point for drugs. Youth gangs known as *maras*, which emerged in Guatemala in the 1980s, are extremely violent and have the capacity to terrorize entire neighborhoods in several urban centers. So far, there is no promising government strategy to address rampant crime, violence, money laundering and drug dealing associated with organized crime, nor is there a strategy aimed at resolving the socioeconomic factors that lend support to the *maras*.

Inflexible Labor Market with Scarcity of Skills

Labor markets are inflexible and there are substantial barriers to market exit (firing costs are twice the Latin America and Caribbean average, and more than 3 times the OECD average). This biases the investment mix and drives a wedge between investment returns in the formal and informal sectors. Not only are firing costs high, but hiring costs are also twice the regional average. Labor costs are in line with the regional average, and lower than other countries in the Central America region (except for Honduras).

The poor enforcement of labor market regulations does not mean that restrictive regulations do not distort resource allocation and do

not bias investment returns. In fact, the choice of level of formality by firms and households depends in part on the perception that the formal labor market is too rigid and distorted.

The demand for skilled labor seems to be higher than in neighboring countries, but since Guatemalan firms have more difficulties in finding skilled workers than comparable firms in Central America, the searching and training costs are higher. For instance, a typical Guatemalan firm takes twice as long as a typical Central American business to fill a vacancy for production workers and up to 30 percent longer to find a technician.

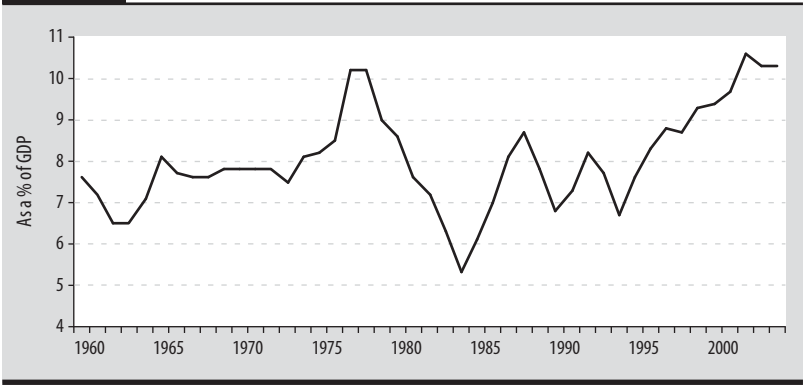
To mitigate the scarcity of skilled labor, Guatemalan manufacturing firms are investing more heavily in training than comparable businesses in neighboring countries. Labor training is in many ways a substitute for poor formal education.

The Tax Structure

The very low level of tax pressure in Guatemala is preventing the provision of public goods. More than the tax structure, the binding constraint in Guatemala is the difficulty that the government has in collecting taxes. In the Peace Agreement, the government established a goal for a tax burden of 12 percent of GDP (excluding social security and municipal taxes). To meet this goal, the government implemented several reforms that initially allowed it to increase tax revenues. However, since the end of 2002, tax revenues have fallen (see Figure 5.6). As of 2005, they were 9.6 percent of GDP. Several decisions of the Constitutional Tribunal and other actors reduced tax revenues: elimination of the recently created tax on implicit income (impuesto a la renta presunta, IEMA); reduction of the rates for several specific consumption goods (alcoholic beverages and gasoline), and modification of income tax rules.[25]

[25] For more on the tax reforms in Guatemala and their impact, see Auguste and Artana (2005).

FIGURE 5.6 Tax Revenues as a Percentage GDP, 1960–2004



Source: Banco de Guatemala. Tax revenues exclude social security contributions.

Expropriation Risk

The threat of expropriation by the government is remote in Guatemala, as the assets held and owned by both national and international investors are strongly protected by an absolutist interpretation of property rights in the country's constitution. However, the framework for the protection of property rights is often ineffective, inefficient, and corrupt, and creates an environment that has the same type of impact on economic decision-making as if the threat of expropriation by the government was widespread. Moreover, most individuals and households in rural areas simply do not enjoy ownership rights over the assets they control—a situation that influences their economic decisions in ways that do not differ much from an actual threat of expropriation.

Externalities, Spillovers, or Coordination Failures

According to the 2004 Guatemala ICA, training externalities seem to be an important limitation, especially for large and medium-sized firms. The lack of funds for training seems to be an important constraint for micro and small firms.

The low stock of human capital in the economy is one factor that limits the dissemination of information. In the case of Guatemala, the lack of economy-wide access to information is probably a greater concern than the exploitation of information externalities by free riders.

Conclusion

Guatemala faces several constraints to growth, and thus its underperformance relative to other countries is not surprising. Not only is Guatemala's recent growth record poor when compared internationally, but it is also poor when compared to its own track record. After the lost decade of the 1980s, Guatemala has not been able to recover its pre-1980s average growth rate. From 2002 to 2007 when the world economy was growing rapidly, Guatemala's GDP per capita (in PPP) almost stagnated (annual growth was 0.1 percent). Moreover, annual per capita GDP growth averaged just 0.87 percent in the last decade. Several factors underlie Guatemala's slow economic growth. The stock of human capital is extremely low when compared to other economies, even economies at the same income level. Infrastructure and financial markets are not well developed. Corruption is high and many areas of the investment climate are not good. Violence and poverty are ever-present risk factors in Guatemala.

While it is easy to list constraints on growth in Guatemala, it is considerably more difficult to establish which constraints are the most binding. Knowing to what extent a constraint is binding helps in designing an optimal sequencing of policy reforms. In many ways, the structural break observed before and after the early 1980s is the key to understanding what the reform priorities should be. Why has Guatemala been unable to recover its previous growth rate, even after a series of pro-growth reforms? What changed in Guatemala or the world? Why have pro-growth reforms failed to deliver substantially faster economic growth rates?

The main constraint (set at the top of the GDM decision tree) is a lack of investment opportunities from the perspective of private

investors. Although there are problems in financial markets, these are not binding on formal investment—and thus on growth. Also, it is clear that abundant remittances inflows are mostly consumed and are not invested. Thus private investors are not currently finding many sufficiently profitable opportunities for investment in Guatemala, so they either look for investment opportunities elsewhere or choose to consume their resources immediately. The role of the informal sector, which has a very low propensity to invest, should also be taken into consideration as a factor in constraining investment.

This does not happen by accident. The first thing to understand about Guatemala is that three decades of civil strife have had adverse effects on human and social capital accumulation. Schooling indicators are very poor, the quality of schooling is even worse, and the wage premium for educated people is extremely high, showing that human capital is indeed scarce. The country's income distribution is very unequal, poverty is widespread, and the illiteracy rate is the highest in Latin America. The world economy has changed in the last 30 years. While countries such as Costa Rica and Chile were accumulating human and social capital, strengthening institutions, and fighting corruption, Guatemala was in the midst of a civil war. While other countries in the region were better prepared to take advantage of a globalized and more competitive world economy, Guatemala's economic structure and capital mix remained stuck in the past. As a result, the Guatemalan economy has been slow in responding to the process of economic liberalization and reform that followed the transition to democracy in the 1980s and the Peace Agreements in 1997.

Nevertheless, Guatemala has some fundamental advantages that can help in overcoming binding constraints. First, its geographic location is very close to the largest economy in the world (the United States). Guatemala has made important improvements in terms of global competitiveness and the current export basket suggests that there are good prospects for increasing the product space and producing higher value-added products. In fact, Guatemala is among the countries of the world that have discovered more new export products in the last ten years.

The analysis also suggests that Guatemala needs to improve governance and strengthen the rule of law, fight corruption, and tackle violence and organized crime. In other words, it needs to provide higher quality public goods, which, in turn, would increase private returns to capital on a risk-adjusted basis, thus boosting economy-wide investment. But the government is not able to collect enough resources to provide an adequate level of public goods to complement private capital. This discourages private capital accumulation. The meager supply of public goods also reduces incentives to enter the formal sector, thus enlarging the ranks of the informal sector, which makes it even more difficult for the government to collect taxes. How can the government increase the supply of public goods if it cannot collect enough resources to invest?

Guatemala is now constrained by decades of underinvestment and political turmoil. Most of the badly needed reforms and investments do not mature in the short run and relatively long waiting periods are required to see any effects on growth. Unfortunately, it is hard to improve the business environment and quality of governance with such a poor human capital base—a situation that creates another vicious cycle.

Guatemala has implemented policies to favor investment in industries intensive in unskilled or semi-skilled labor, the *maquilas*, but these steps have not been enough to revitalize the whole economy. The very high returns to schooling show that the economy is demanding better-educated people. Could this be a starting point, a first priority for reform? The challenge remains: how can the government invest in human capital if its fiscal constraints are severe. It is tempting to call for more taxes, but this is what Guatemala has tried since 1996 with little success (through a series of Pactos Fiscales). In turn, it could be claimed that the answer is enforceability (of taxation), but weak enforcement is a direct result of the quality of government, which also needs to be improved.

It appears that, even if reforms can be prioritized on lifting the constraints that hinder economic growth the most, it does not follow that the optimal reform sequencing is likely to be politically viable.

It is also true that those reforms that are politically viable may be insufficient to address the fundamental barriers to improving growth performance in the long run.

The design of an optimal policy mix to accelerate growth and reduce poverty is not an easy task. More and better education and infrastructure, better rule of law, and a reduction in crime all demand a higher budget, and this requires a higher tax burden. However, since the Peace Agreement, the country has failed to achieve a sustained improvement in tax revenues.

A strategy to "pick the winners" seems doomed to fail because, as empirical evidence suggests, better institutions would be necessary for this policy to be successful. With low public revenues, there is a relatively low potential in Guatemala to support relatively large-scale investments in "strategic" sectors through tax breaks or government subsidies.

It follows that those policy reforms that demand little or no budget effort should be included at the top of the list. In this light, the following steps are recommended:

- Increasing the tax burden has proven to be a major task in Guatemala, but the goal should not be abandoned. It would be presumptuous to make a serious tax proposal following a methodology focused on economic growth, but tax revenues would be easier to increase if these additional revenues came from taxes that are easy to collect. Tax bases should be enlarged, although eliminating privileges is not an easy task in any country. Moreover, easy-to-collect taxes such as value-added taxes (VAT) or excise taxes might be difficult to implement politically, and they do not help improve income distribution.
- Expenditure of additional government revenues can be done in a very progressive way, thus compensating for the lack of progressivity of the tax structure. Indeed, the type of investment the government needs to undertake, such as investment in education and health, typically im-

proves the income distribution. To implement a reform of this type successfully, there should be a credible political compromise to ensure that the additional resources will indeed be spent on public education and health for the poor (especially for the indigenous population), better public infrastructure (that can not be privatized), and better law enforcement.

- Consensus on fiscal reform will be difficult to achieve if society perceives that the public sector is corrupt and inefficient. Although new "special" agencies and earmarking are usually bad ideas for the budget process, they might be analyzed in Guatemala as a potential vehicle to overcome the public's perception that higher tax payments would end in a "dark hole."
- The authorities should also focus on reducing the rate of informality. A first step would be an improvement of the labor code that introduces more flexibility in formal labor markets. Efforts to improve human capital and reduce the educational gap between indigenous and non-indigenous populations should be strengthened.
- A sound and professional regulation of infrastructure should be encouraged. Given the lack of resources, involving the private sector is a way to improve infrastructure. But as the Guatemalan experience shows, for this strategy to be successful, it is necessary to first develop the appropriate institutional framework, which is not so costly in terms of resources but otherwise very difficult to implement. User fees that compensate for economic costs charged by private (or public) companies are even more relevant in a country where increasing tax revenues is very difficult.

Guatemala is in a vicious cycle. The economy needs more and better public goods to overcome the binding constraints, but the government does not have the resources to provide them. On the other hand, historically poor governance and an absent state do not

encourage the private sector to pay more taxes. The country needs to break this cycle. Even with low resources, there are many things than can be done to improve the situation. What the country needs is the political decision (from the government and the private sector) to implement the necessary reforms. Unfortunately, this is easier said than done.

References

Auguste, S. and Artana, D. 2005. "Guatemala: Impacto Distributivo de la Reforma Fiscal 2004 y de Algunas Propuestas Recientes." Paper prepared for the Inter-American Development Bank. Washington, DC.

Balsells, E. 2006. "El Costo Económico de la Violencia en Guatemala." Guatemala City, Guatemala: United Nations Development Programme (UNDP).

Benhabib, J. and Spiegel, M. 2003. "Human Capital and Technology Diffusion." Working paper 2003–02. San Francisco, CA: Federal Reserve Bank of San Francisco.

Bils, M. and Klenow, P. 2000. "Does Schooling Cause Growth?" *American Economic Review*. 90(5): 1160–83.

Bratesberg, B., and Terrel, D. 2002. "School Quality and Returns to Education of U.S. Immigrants." *Economic Inquiry*. 20(2): 177–98.

CIEN (Centro de Investigaciones Económicas Nacionales). 2002. "Estudio sobre la magnitud y el costo de la violencia en Guatemala." Guatemala City, Guatemala: CIEN.

Cuevas, M. and Bolaños, L. 2007. "Opportunities and Risks in Liberalising Trade in Services: The Case of Guatemala." Geneva, Switzerland: International Center for Trade and Sustainable Development (ICTSD).

Cuevas, M. and Díaz, J. 2007. "Exports and the Real Exchange Rate in Guatemala: A Structural Time Series Approach." Guatemala City, Guatemala: CIEN. Mimeographed document.

Denison, E.F. 1962. "Education, Economic Growth, and Gaps in Information." *The Journal of Political Economy*. 70(5, Part 2): 124–8.

———. 1967. *Why Growth Rates Differ*. Washington, DC: Brookings Institution Press.

Hanushek, E.A. and Kim, J.K. 1999. "School Quality around the World: Evidence from U.S. Immigrant Earnings." Mimeographed document.

Harberger, A. 2005. On the Process of Growth and Economic Policy in Developing Countries". PPC issue paper No. 13. Washington, DC: U.S. Agency for International Development (USAID).

Hausman, R. and Klinger, B. 2006. "Structural Transformation and Patterns of Comparative Advantage in the Product Space." Working paper No. 128. Cambridge, MA: Center for International Development, John F. Kennedy School of Government, Harvard University.

Hausmann, R. and Rodrik, D. 2005. "Self-discovery in a Development Strategy for El Salvador." *Economía*. 6(1, Fall)

Hausmann, R., Hwang, J. and Rodrik, D. 2007. "What You Export Matters." *Journal of Economic Growth*. 12(1): 1–25.

Hausmann, R., Rodrik, D. and Velasco, A. 2005. "Growth Diagnostics." Cambridge, MA: John F. Kennedy School of Government, Harvard University.

Hendricks, L. 2002. "How Important Is Human Capital for Development? Evidence from Immigrant Earnings." *The American Economic Review*. 92(1, Mar.): 198–219.

Hopenhayn, H. and Neumeyer, P. 2004. "Latin America in the XXth Century: Stagnation, the Collapse." Universidad Torcuato Di Tella. Mimeographed document.

Kaufmann, D., Kraay, A. and Mastruzzi, M. 2005. "Governance Matters IV: Governance Indicators for 1996–2004." Working paper No. 3630. Washington, DC: World Bank.

Klinger, B. and Lederman. D. 2006. "Diversification, Innovation, and Imitation Inside the Global Technological Frontier." Policy research working paper No. 3872. Washington, DC: World Bank.

Loening, J. 2002 "The Impact of Education on Economic Growth in Guatemala: A Time-Series Analysis Applying an Error-Correction Methodology." Discussion paper No. 87. University of Goettingen, Ibero-American Institute for Economic Research.

Lucas, R. 1990. "Why Doesn't Capital Flow from Rich to Poor Countries?" *American Economic Review*. 80(2): 92–6.

Sachs, J. 2005. *The End of Poverty: Economic Possibilities for Our Time*. New York, New York: The Penguin Press.

CHAPTER 6

Growth Diagnostic: Peru

*Ricardo Hausmann and Bailey Klinger**

Peru's Growth Story

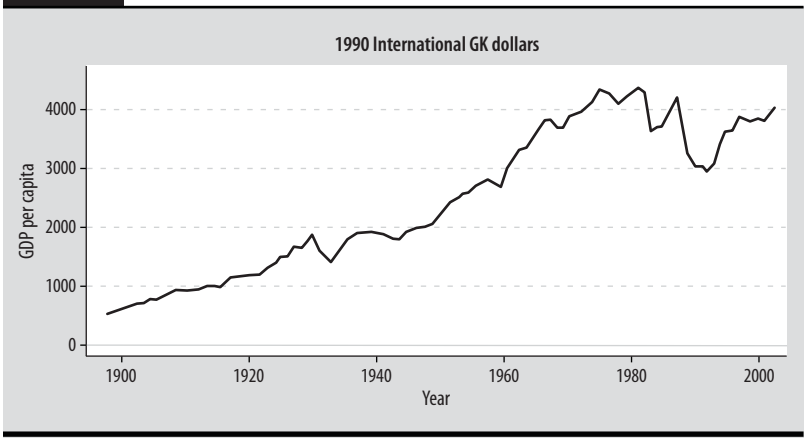
By many measures, times are good in Peru. From 2005 to 2008, Peru has been among Latin America's best performing economies in terms of GDP growth, with low inflation and a stable exchange rate. Although poverty rates remain high (above 50 percent of the population in 2004, using the national poverty line), they have been slowly falling. The country has enjoyed robust economic growth since 2002, and would appear to be in the midst of a growth acceleration.

Yet it is important to put this boom into historical perspective. Figure 6.1 shows GDP per capita in Peru over the entire twentieth century. Except for a moderate output collapse and recovery in the 1930s, around the time of the Great Depression, Peru followed a steady upward trend in output per capita until the mid-1970s, when growth stopped, and then collapsed in the late 1970s and early 1980s.

Considering Peru's long-term growth history, it becomes clear that the current growth acceleration is actually a recovery from this growth collapse. Importantly, as of 2005, the country had yet to return to its historical peak GDP per capita of 30 years before, in

* Center for International Development, Harvard University. The authors thank Felipe Kast, Reinier Schliesser, Alfie Ulloa, Rodrigo Wagner, and Andres Zahler for excellent research assistance.

FIGURE 6.1 Peru's Economic Performance, 1890–2004



Source: Maddison (2007).
Note: Figures are in 1990 international Geary-Khamis dollars (see Maddison 2007 for greater detail).

spite of the fact that global technology has allowed other countries to achieve productivity levels that are substantially higher.

This characterization of Peru's output dynamics is critical for diagnosing the constraints to future economic growth. The country is a clear case of a growth collapse. Moreover, this collapse was drawn out, and recovery has been both slow and as of yet incomplete.

These dynamics allow one to reject many potential explanations for Peru's growth constraints. For example, neither human capital nor physical infrastructure suffered a significant shock in the mid- to late-1970s that could have caused the growth collapse. In fact, school attainment levels have risen significantly. Moreover, this was not a period of significant political shocks. The growth collapse occurred in the context of a transition to democracy, and the political instability and damage to human and physical capital caused by the rise of the Shining Path guerilla movement occurred *after* this growth collapse.

The growth collapse was accompanied, but not precipitated, by a balance of payments crisis, an acceleration of inflation, and a debt crisis. Could such macroeconomic issues explain the slow and partial recovery from the deep and protracted growth collapse and

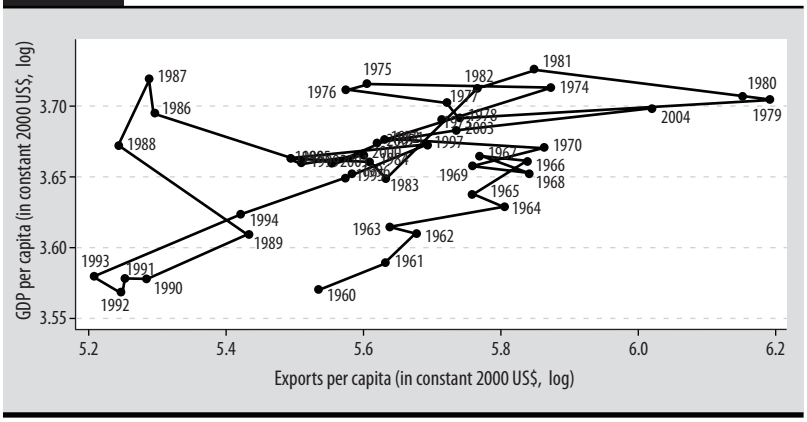
constitute the current constraint on growth, even if they did not cause the collapse? Consider an analogy: when a fan belt fails in an automobile, the collateral damage can include the virtual melting of the engine. In this case, the fan belt may be the cause of the car's collapse, but a new fan belt will no longer cure the problem, as damage has spread to other aspects of the automobile. Similarly, although Peru's growth collapse may have been caused by something else which then led to macroeconomic instability, such instability could very well be the current binding constraint, even though it was not the original cause of the growth collapse.

But for Peru, this is clearly not the case. Peru has now gone through more than a decade of macroeconomic stability, fiscal consolidation, and external creditworthiness that represents a substantial improvement vis-à-vis the situation 30 years ago when GDP per capita peaked. If macroeconomic instability was the binding constraint on growth, then a prolonged period of dramatic improvements in this area should have allowed a full recovery. After all, there is ample evidence that recoveries from macroeconomic crises tend to be relatively rapid (Calvo, Izquierdo and Talvi, 2006).

In addition, the country now has more education, more physical infrastructure, and more political stability than in the late-1970s and has still to see a full recovery. As will be argued in greater detail in a later section, these are not convincing constraints to economic growth in Peru.

A much more convincing explanation can be found in a careful examination of Peru's export dynamics. Figure 6.2 shows the evolution of exports per capita on the x-axis and GDP per capita on the y-axis. This figure shows two significant export collapses, the first starting after 1979 and the second after 1984. These export collapses preceded the two periods of sharp output decline. Peru's post-1980 woes were brought about by an export collapse, which then led to balance of payments problems and financial crises, later accompanied by political turmoil, violence, and destruction of the capital base.

FIGURE 6.2 The Evolution of Output and Exports Per Capita



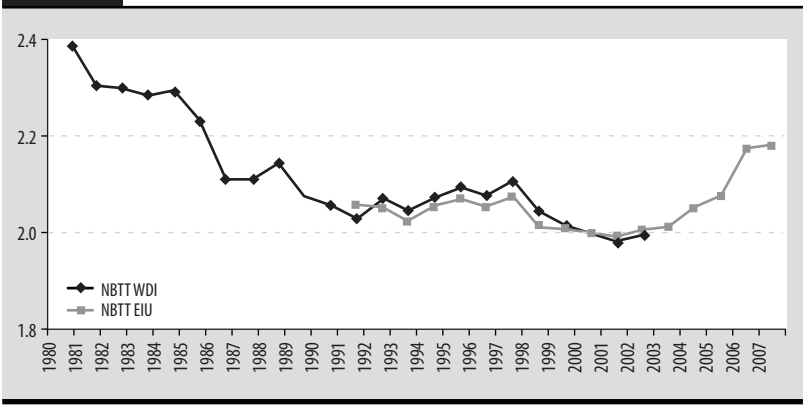
Source: World Bank, World Development Indicators (WDI).

This export collapse was quite significant. From 1979 to 1983, exports per capita fell by 40 percent, and from 1979 to 1993, by over 80 percent. In 1985, the government attempted to recover output through an expansion of domestic demand. However, this was accompanied by falling exports and the situation became externally unsustainable in 1987, which lead to a very large collapse in output during the following three years.

What caused this export collapse? It was first and foremost a terms of trade shock. Exogenous shocks to international prices in Peru's primary export sectors, notably mining and plantation agriculture, caused a steep decline in export incomes after 1980, which then led to an output collapse and significant collateral damage to the political and financial systems. Figure 6.3, which depicts the evolution of Peru's terms of trade, shows the dramatic collapse in the terms of trade of Peru after the East Asian crisis, which corresponds to an "interruption" of Peru's recovery from the deep growth collapse two decades earlier.

It is clear that output dynamics in Peru are closely linked to the export sector. Moreover, a significant cause of the export collapse was the terms of trade shocks the country suffered in the late 1970s and early 1980s. Since the early 1990s, the macroeconomic, finan-

FIGURE 6.3 Terms of Trade, 1980–2007
(*logs*)



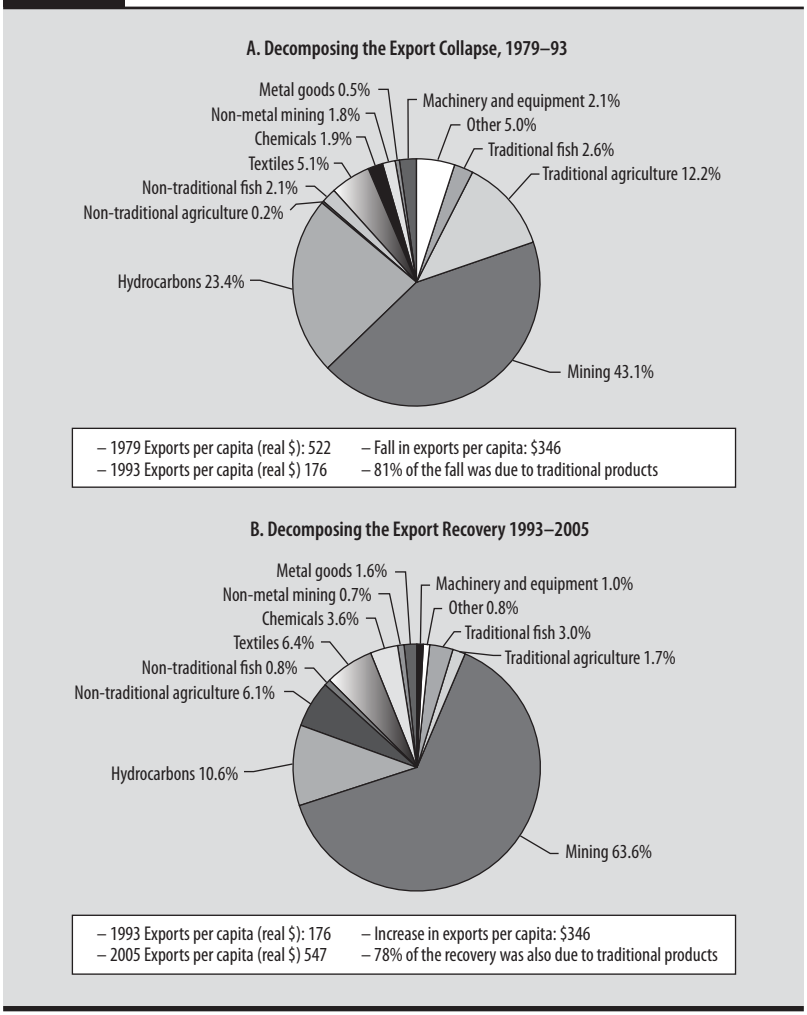
Source: WDI and Economist Intelligence Unit (EIU).
NBTT – net barter terms of trade

cial, and political situations, which were somewhat chaotic after the export collapse, have improved significantly. Moreover, since 2004, the terms of trade have recovered to levels not seen since the early 1980s. Yet Peru is barely back to its historical levels of output per capita, and relative to the rest of the world, it is well below its position in the late 1970s. True, the terms of trade are not back to the levels of the late 1970s, but over the course of almost three decades the country could have moved to other more attractive products.

This study finds that in the face of a terms of trade shock, there was no structural transformation in Peru, despite decades where relative prices, in terms of a much more depreciated real exchange rate and lower prices for traditional exports, favored the movement to new export sectors. The country was not able to discover new export activities to compensate for those that faced international headwinds. Instead, Peru simply sat in a collapse until international prices in mining and fuels improved.

This can be seen clearly in the composition of the export basket and how it changed during this growth collapse and recovery. Figure 6.4 examines two periods: 1979 to 1993 (collapse) and 1993 to 2005 (recovery).

FIGURE 6.4 The Export Collapse and Recovery, 1979–2005



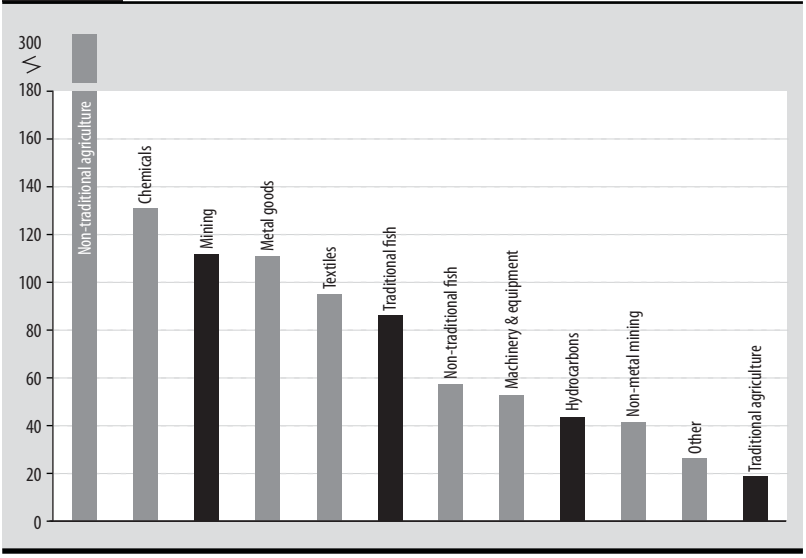
Source: Banco Central de Reserva del Peru (BCRP) and Instituto Nacional de Estadistica e Informatica (INEI), Peru.

These figures show that traditional agriculture, hydrocarbon products, and mining were the export sectors that collapsed to the greatest degree. If Peru underwent structural transformation in response to the collapse in its key export sectors, different sectors would be expected to fuel the recovery. But the sectors that led the recovery in Peruvian exports between 1993 and 2005 were the hydrocarbons and mining sectors, followed by traditional agricul-

ture. These are the very same sectors that collapsed in the 1970s and 1980s! Peru underwent very little structural transformation in response to its export collapse.

Figure 6.5 shows exports by sector in 2005 as a percentage of exports in 1979. Of Peru's previously dominant sectors, traditional agriculture did not recover from the export collapse, and the hydrocarbons sector has not completely recovered (although it should do so upon the completion of the Camisea natural gas project). Fishing and mining have now completely recovered their previous levels. There was no reorientation of productive capacities during this recovery with one exception: the emergence of the nontraditional agriculture sector, which is more than three times as large in 2005 as it was in 1979 (in per capita terms). However, Figure 6.4 shows that the nontraditional agriculture sector was of minor importance in the export recovery post-1993, contributing only 6.1 percent of the export growth. In terms of the overall export basket in 2005, nontraditional agriculture amounts to only 5.8 percent. Although a positive development, it is a small portion of the overall export

FIGURE 6.5 **Exports Per Capita by Sector, 2005 as a Percent of Exports in 1979**



Source: BCRP and INEI.

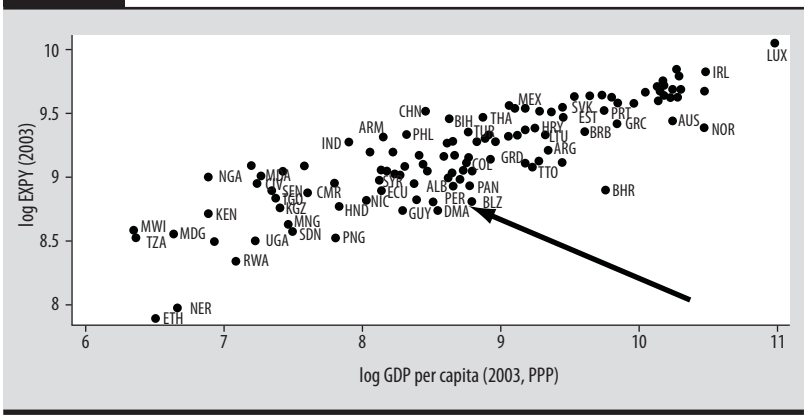
package, which remains concentrated in those sectors that collapsed during the 1980s.

This discovery of nontraditional agriculture was not nearly enough to affect the macro numbers. Compare this to the cases of Mexico or Indonesia, where a slew of new sectors were discovered that more than offset the negative effects of the decline in oil prices. Peru's dominant export sectors continue to be mining and hydrocarbons, which as of 2005 represented over two-thirds of exports, despite the incentives for discovery created by the terms of trade shock and the subsequent real depreciation.

A lack of new export sectors appearing in Peru's aggregate production function is a key drag to growth. But what constraints are to blame? This study argues that this is in part due to the nature of Peru's specialization. First, consider the country's export sophistication, which has been shown elsewhere as a key driver of growth (Hausmann, Hwang and Rodrik, 2006). This is measured simply as the GDP per capita of countries with a similar export package, called EXPY. Figure 6.6 shows actual income levels and the sophistication of the export basket (EXPY) for a cross-section of countries.

Given its level of income, Peru is specialized in an unsophisticated export basket. Moreover, since 1975, the process of "upgrad-

FIGURE 6.6 Relationship between Per Capita GDP and EXPY, 2003



Source: Hausmann, Hwang and Rodrik (2006).

ing" the export package and moving to newer, more sophisticated products has lagged in Peru. Peru began 1975 with the same level of export sophistication as Brazil, and almost a 50 percent higher value of EXPY than Colombia, but has since fallen behind both of those countries. Consistent with the evidence that Peru did not adjust its export basket in response to changes in relative prices, it has been largely stuck in an unsophisticated export package since 1975 that will not drive future growth.

Why has Peru been unable to discover a sophisticated export basket that could fuel future growth? Hausmann and Klinger (2006) investigate the determinants of the evolution of the level of sophistication of a country's exports, and find that this process is easier when moving to "nearby" products. This is based on the idea that every product involves highly specific inputs such as knowledge, physical assets, intermediate inputs, labor training requirements, infrastructure needs, property rights, regulatory requirements, or other public goods. Established industries somehow have sorted out the many potential failures involved in assuring the presence of all of these inputs, which are then available to subsequent entrants in the industry. But firms that venture into new products will find it much harder to secure the requisite inputs. For example, they will not find workers with experience in the product in question or suppliers who regularly furnish that industry. Specific infrastructure needs such as cold storage transportation systems may not exist, regulatory services such as product approval and phyto-sanitary permits may be underprovided, research and development capabilities related to that industry may not be there, and so on.

Those firms moving to new activities will therefore have to adapt to whatever capabilities exist. This study finds evidence supporting the view that the assets and capabilities needed to produce one good are imperfect substitutes for those needed to produce another good, but this degree of asset specificity will vary. The probability that a country will develop the capability to be good at producing a particular new good is therefore related to its installed capability in the production of other similar, or nearby, goods for which the

currently existing productive capabilities can be easily adapted. The barriers preventing the emergence of new export activities are less binding for nearby products that require only slight adaptations of existing capacity.

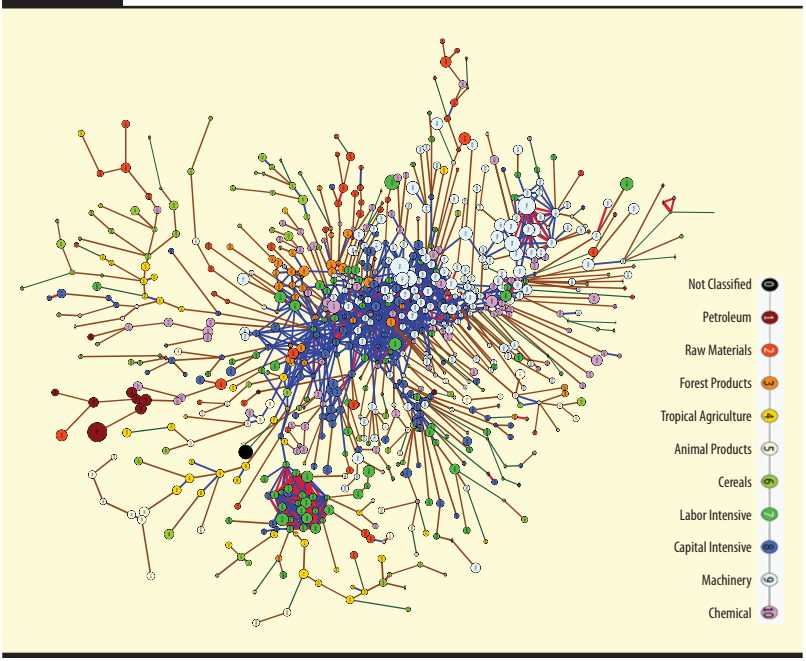
This is found by developing a measure of "near" using the probability of exporting both with comparative products, calculated using international data. These distances condition the process of discovery.

It is possible to visualize these distances by drawing a map of the international product space, which is shown in Figure 6.7. Each node is a product, its size determined by its share of world trade (Feenstra et al., 2005). In these graphs, "nearness" is shown by color-coding the linkages between pairs of products. A light-blue link indicates a proximity of under 0.4, a beige link a proximity between 0.4 and 0.55, a dark-blue link a proximity between 0.55 and 0.65, and a red link a proximity greater than 0.65. Links below 0.55 are only shown if they make up the maximum spanning tree, and the products are color-coded based on their Leamer (1984) commodity group.

Figure 6.7 makes clear that the product space is highly heterogeneous. There are peripheral products that are only weakly connected to other products. There are some groupings among these peripheral goods, such as hydrocarbons products (the large red nodes on the left side of the network), seafood products (below hydrocarbons products), garments (the very dense cluster at the bottom of the network), and raw materials (the upper left to upper periphery). Furthermore, there is a core of closely connected products in the center of the network, mainly of machinery and other capital intensive goods.

This heterogeneous structure of the product space has important implications for structural transformation. If a country is producing goods in a dense part of the product space, then the process of structural transformation is much easier because the set of acquired capabilities can be easily redeployed to other nearby products. However, if a country is specialized in peripheral products, then this redeployment is more challenging, as there is not a set of

FIGURE 6.7 A Visual Representation of the Product Space



Source: Hidalgo et. al. (2007)

products requiring similar capabilities. The process of structural transformation can be impeded due to a country's orientation in this space.

Figure 6.8 shows Peru's evolution in this product space, where a black square on top of a product indicates that it is exported with comparative advantage.

These figures show that Peru's exports are highly peripheral. More importantly, as seen in the export data examined above, there was little very little change in the deployment of Peru's productive capabilities in the product space between 1975 and 2000, a period that saw a huge export collapse and recovery. Compare this to Malaysia, which has moved significantly and purposively through the product space in the same period (Figure 6.9).

As can be seen in the figures for both Peru and Malaysia, black squares tend to emerge closer to other black squares, meaning

FIGURE 6.8 **Peru's Evolution in the Product Space, 1975, 1985, 1995, and 2000**

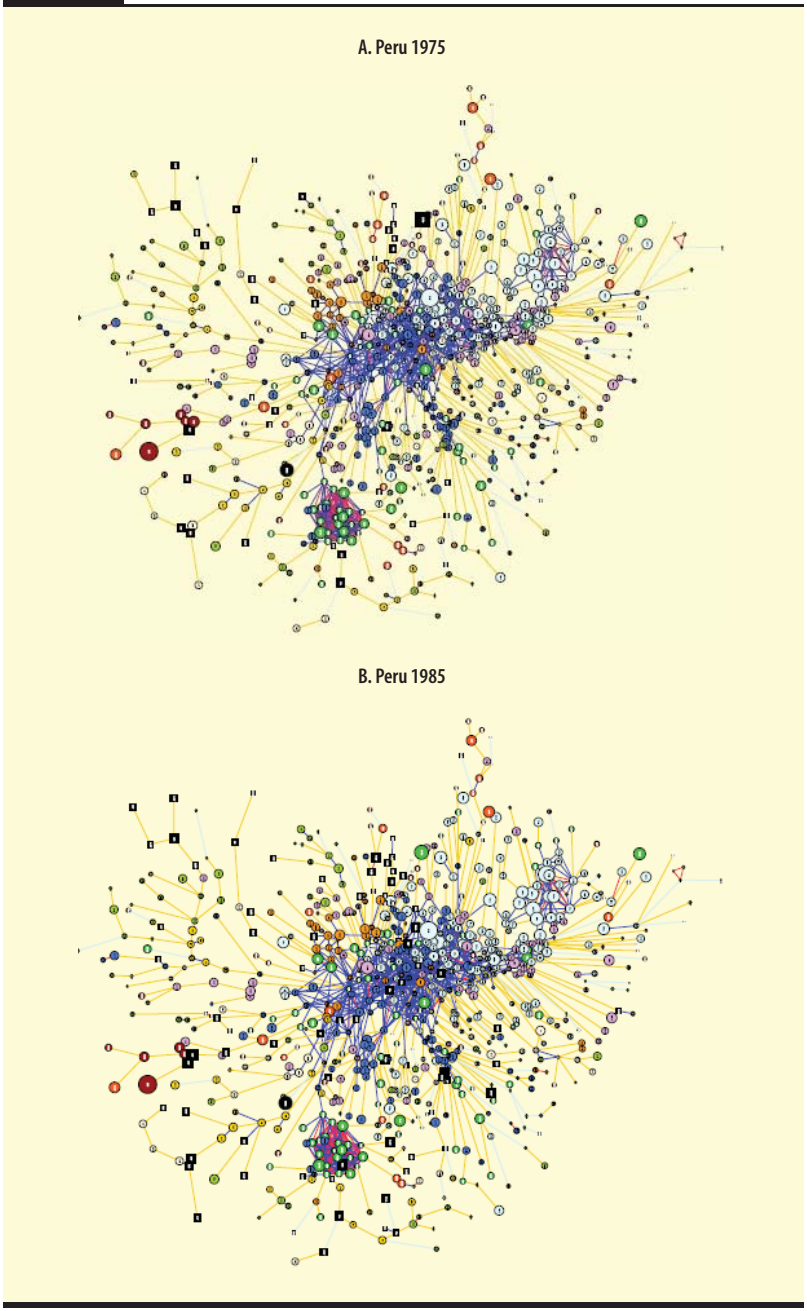
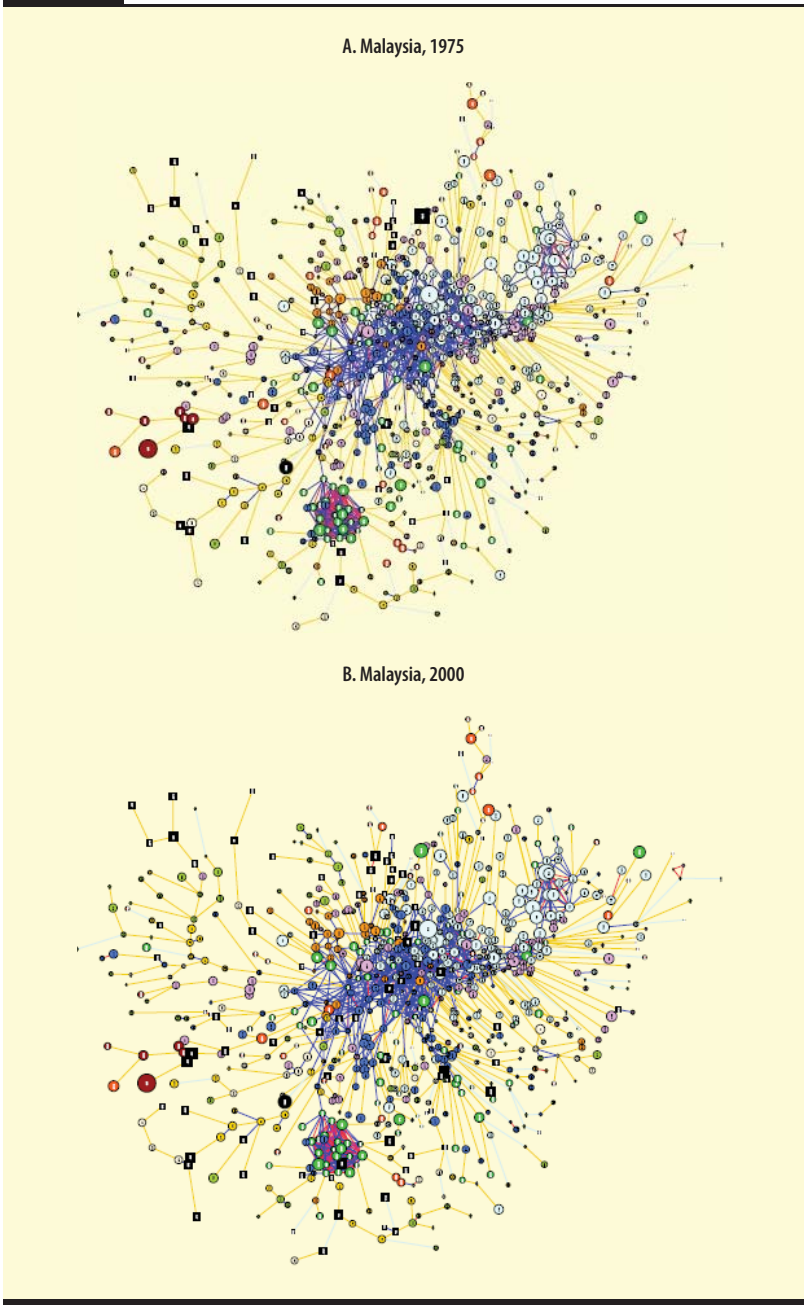


FIGURE 6.8 Peru's Evolution in the Product Space, 1975, 1985, 1995, and 2000 (*continued*)

Source: Authors' calculations using UN COMTRADE.

FIGURE 6.9 Malaysia's Evolution in the Product Space, 1975 and 2000



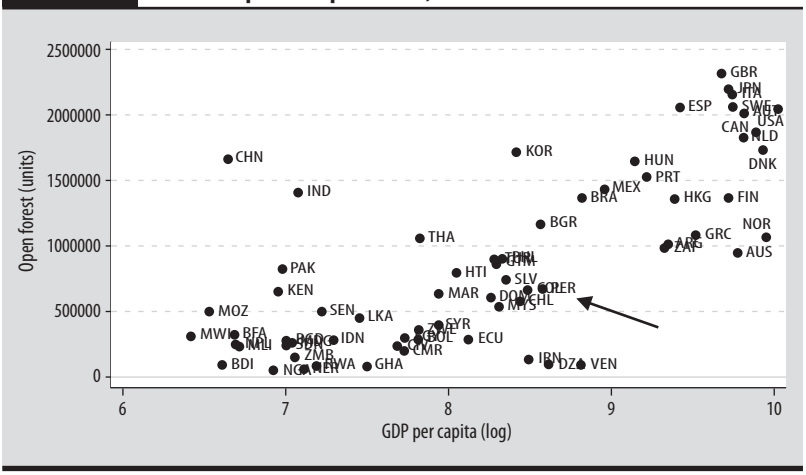
Source: Authors' calculations using UN COMTRADE.

structural transformation favors nearby products. This fact is shown econometrically in Hausmann and Klinger (2007), and it implies that Peru's opportunities for structural transformation after its main exports suffered headwinds in the late 1970s and early 1980s and were limited to what was nearby.

The country-level measure of how many attractive products are near the existing export package is called the open forest. The open forest is highly significant in determining the future growth of export sophistication (Hausmann and Klinger, 2006). Countries with a high level of open forest enjoy faster subsequent growth in export sophistication and overall economic growth. Moreover, Hausmann, Rodriguez and Wagner (2006) show that countries with a higher level of open forest experience shorter growth collapses: they are able to redeploy their productive capabilities to new export activities more quickly and easily. This is critical, as Peru is a clear case of a growth collapse with little structural transformation in response.

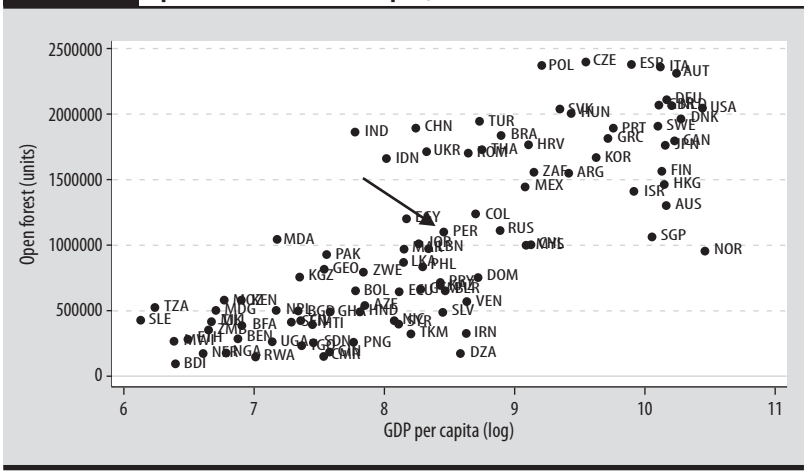
Figure 6.10 shows the open forest on the y-axis against the log of GDP on the x-axis, in 1980. Around the time Peru suffered its export collapse, it had a lower value of open forest. This figure sug-

FIGURE 6.10 GDP Per Capita vs. Open Forest, 1980



Source: Authors' calculations using UN COMTRADE.

FIGURE 6.11 Open Forest vs. GDP Per Capita, 2000



Source: Authors' calculations using UN COMTRADE.

gests that Peru did not have a very valuable option set for structural transformation when it suffered its export shock, and—consistent with the findings of Hausmann, Rodriguez and Wagner (2006)—this led to a protracted growth collapse.

What about the role of coordination failures today? Figure 6.11 shows the equivalent plot for 2000.

Peru's open forest improved between 1980 and 2000. Although in terms of export sophistication (EXPY), Peru has fallen behind, in terms of opportunities for future structural transformation (open forest), relative performance is not as bad. This suggests that there are more nearby export sectors today that the country could move toward, even though it has yet to do so. Nevertheless, Peru's option set for future structural transformation remains below that of Argentina, Brazil, Mexico, Uruguay, and even Colombia.

For the purposes of deriving policy implications, it is useful to examine what sectors make up that set of attractive nearby opportunities. Table 6.1 provides the main contributors to Peru's open forest as of 2004. These are the existing sectors in Peru that have the largest number of unexploited sectors nearby, to which Peru could conceivably move.

TABLE 6.1 Top Contributors to Open Forest, 2004

Product code	Product name	Contribution (US$)	Exports (M) (US$ millions)
7228	Other bars and rods of alloy steel	32,408	23
307	Molluscs & aquatic invertebrates	29,532	123
306	Crustaceans, fresh, chilled or frozen	27,000	26
713	Dried leguminous vegetables, shelle	24,907	15
511	Animal products, nes	23,178	6
305	Fish, salted, dried...; smoked fish	22,176	6
2835	Phosphinates, phosphonates	20,822	9
304	Fish fillets and other fish meat	18,093	48
712	Dried vegetables, whole, cut, sliced	17,524	14
711	Vegetables provisionally preserved,	17,315	10
703	Onions, shallots, garlic, leeks...etc.	15,947	14
9608	Ball point, felt, porous-tipped pens,	14,998	7
2833	Sulphates; alums; peroxosulphates	13,530	7
811	Fruit and nuts, frozen	13,514	5
801	Coconuts, Brazil nuts and cashew nut	13,050	10
710	Vegetables, frozen	13,017	22
901	Coffee; coffee husks and skins	12,017	290

Source: Authors' calculations using UN COMTRADE.

As highlighted by the rectangles, the top contributors to open forest are almost all concentrated in seafood, fruits and vegetables, and processed food products. Most of these products are in the nontraditional agriculture sector, which was the new contributor to the export recovery in the 1990s. This evidence suggests that unexploited opportunities remain in this sector, which continues to represent a small proportion of overall exports.

However, one potential difficulty is that many of the activities in this sector are intensive in rural employment, whereas a large and increasing share of Peruvians live in urban zones. According to the World Bank World Development Indicators, well over 50 percent of the population lived in rural areas in 1960, but today that number is nearing 25 percent.

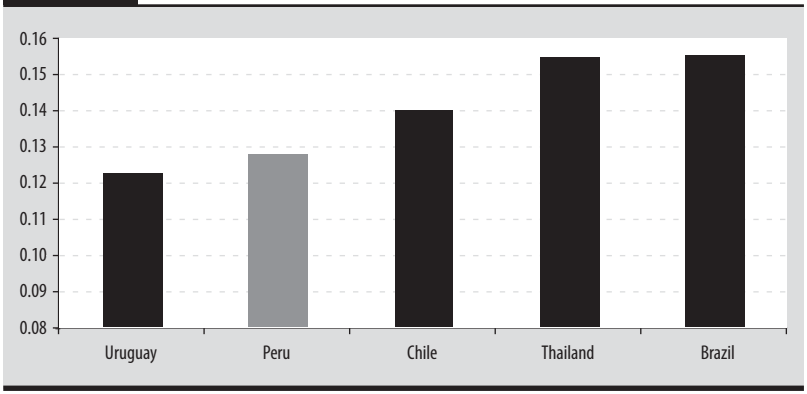
Not only are these "higher-potential" new sectors a mismatch with Peru's labor market, but the existing export sectors are, as

well. Mining, which is leading the export recovery, is extremely unintensive in labor. Even though mining contributes 60 percent of exports, it represents less than one-half of one percent of (direct) employment. Furthermore, while mining exports skyrocketed from 1991 to 2000, employment in the mining sector as a share of the working age population actually decreased from 0.7 percent in 1991 to 0.4 percent in 2000 (Encuestas Nacionales de Niveles de Vida).

Even compared to mining-focused Chile, Peru's export basket is particularly unintensive in labor. Figure 6.12 shows the labor intensity of exports, constructed using labor shares from the United States input-output table by product, weighted by their share in overall exports. Peru's export basket is less intensive in labor than Thailand's and Brazil's, but also less intensive than Chile's, whose export composition is dominated by copper, but compensated for by other, more labor-intensive sectors.

These dominant export sectors in Peru's economy generate little employment. This is important because unlike nontradable sectors, export sectors are highly scaleable. At international prices, demand is almost infinite from the point of view of Peru, meaning

FIGURE 6.12 Labor Intensity of the Export Basket, 2005



Source: UN COMTRADE and U.S. Bureau of Economic Analysis.
Note: Labor's share in total value added taken from the 1997 United States input-output table, as this is the most disaggregated source by product (241 NAICS sectors). This is translated to SITC revision 2 coding system, giving a labor share value for each export. Country values are taken as the export-share weighted value of these intensities, for the 2005 export basket.

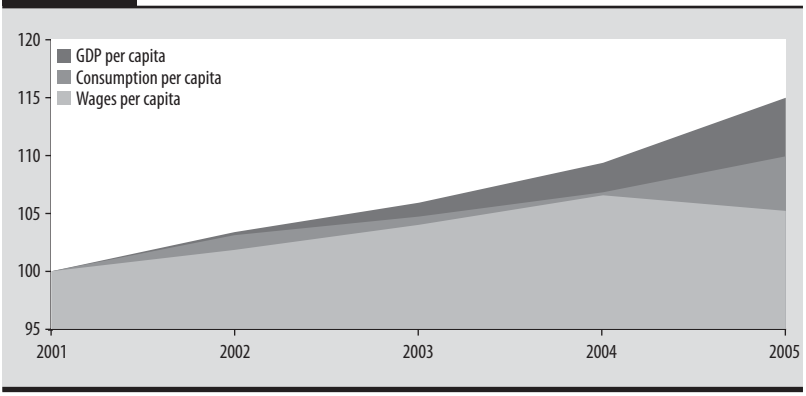
that if the sector is moderately labor-intensive, it could contribute significantly to employment generation.

Instead, mining is highly capital-intensive. Moreover, much of this capital is in the form of foreign investment, and, therefore, the returns accrue to foreign owners of that capital. This can be observed in the differences in growth rates of gross domestic product (GDP) and gross national income (GNI). Since 2001, the growth rate of overall GDP has been much faster than GNI. As such, this gap in growth rates has been increasing, and as of 2005 was well over 100 basis points, indicating a larger share of domestic product is accruing to foreigners.

The social impact of the current growth spurt has been muted because the leading sectors have been capital-intensive. This can be seen by looking at the evolution of GDP per capita in comparison with consumption per capita or the real wage bill per capita (from national accounts). Figure 6.13 shows index numbers for the three series (2001=100). Consumption has grown more slowly than aggregate output. Wages have grown at an even slower pace, and actually declined between 2004 and 2005, at the same time that economic growth was accelerating.

To summarize, this analysis reveals three key findings related to structural transformation. First, the lack of new export

FIGURE 6.13 Economic Performance in Peru, 2001–5



Source: BCRP.

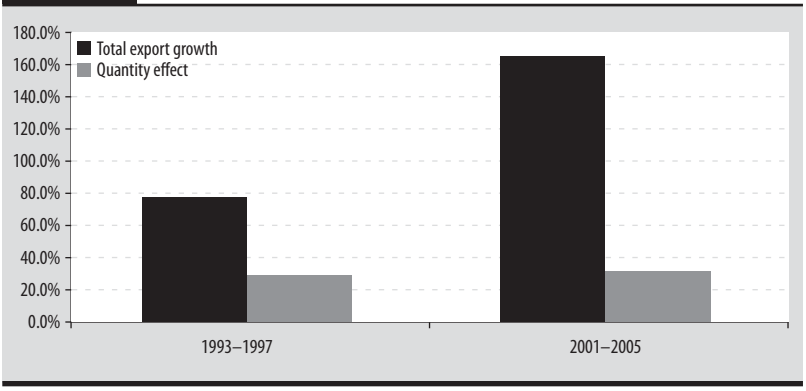
activities appearing in Peru's export basket is due in no small part to the nature of Peru's specialization. When the country's main exports faced international price shocks, there were few nearby goods to move to, and consequently the country suffered a growth collapse. Second, unlike in the 1980s, Peru is in a slightly better position today to discover new export activities, with new export sectors nearby. However, these nearby opportunities are concentrated in certain sectors that use more rural labor in an increasingly urbanized country, and the existing export activities require very little labor and are intensive in foreign capital. Structural transformation in the direction of new sectors intensive in urban labor will require longer jumps, which are difficult to achieve. The final section on policy implications provides some guidance in this regard.

In addition to the lack of new goods appearing in Peru's production function, which appears to be the most significant constraint to growth, some constraints on the aggregate production function that restrict the expansion of existing sectors can be identified: namely, uncertainty due to Peru's history of appropriation in the natural resource sector.

A symptom of this constraint is the muted supply response to the recent improvement in the terms of trade. Figure 6.14 shows recent overall export growth and the component of that growth that is through an increase in quantities, first from 1993 to 1997, then from 2001 to 2005. Very little of the current growth in exports is from increased production.

More revealing, Manzano and Winkleried (2006) show that Peru lost market share in the main export products that were hit by adverse prices. If the export collapse was purely due to a deterioration in the terms of trade, earnings should fall but market share should remain constant. In fact, given that Peru was in such a poor position to move to any alternative export goods, and failed to do so, its market share, in theory, should have increased as other more nimble countries moved to new export activities in response to the change in relative prices. What actually happened was that Peru lost

FIGURE 6.14 Overall Export Growth (left) Decomposed into Quantity Changes (right)



Source: Authors' calculations using International Monetary Fund International Financial Statistics (IFS).

market share, indicating that it was not only an exogenous shock that brought exports down.

Instead, a history of expropriation seems to precede these collapses. For example, in the agriculture sector, the agrarian reform of 1969, which by 1975 affected nearly all plantations, preceded the cotton and sugar collapse in the early 1980s. Fishing collapsed in 1972 for environmental reasons, but Peru nationalized the industry and went on to create PescaPeru in 1973 and then had to abandon it in 1976 as it was never able to return to previous levels of production. In the mining sector, the government began revoking concessions in the 1970s, and created Minero Peru. In 1973, the government completely nationalized the mining complex in Cerro de Pasco. Due to the development of the Cuajone mine in 1976, a decline in production was not immediate, but by the 1980s, copper and silver mining collapsed. The Marcona mining company, which exported iron ore, was expropriated in 1975. Iron ore production declined until its complete collapse in 1990. The same cycle can be observed in the hydrocarbons sector. First came the nationalization of the hydrocarbons sector and the creation of PetroPeru in 1968, which expanded significantly in the 1970s, thanks to the opening of the northern pipeline. But after 1980, hydrocarbons production fell significantly.

Nationalizations left a property rights regime that made it essentially impossible for international investors to invest in exploration or production in the mining or energy sectors in response to the export collapse in the 1970s and 1980s. Moreover, potential investors in other sectors were aware of this history of expropriation. Hence, investment in these sectors did not recover until the government improved the property rights regime and adopted generous levels of taxation and guarantees of tax stability for foreign investors.

The difficulty is that these concessions do not recover much of the natural rent that the government could receive from natural resource exports, limiting the impact of these activities on national income and the social benefit that could potentially be derived from it. This in turn limits the long-term political sustainability of such concessions, as could be seen in the most recent electoral cycle, where natural resource rents were a key area of contention. The perceived low sustainability of generous concessions increases the long-term risk of appropriation facing foreign investors, who then demand more attractive concessions to invest in so that they can be sure to recoup their investment before they are expropriated. This creates a vicious cycle that is difficult to break, and is a key constraint in the natural resource sector of the economy, particularly mining and hydrocarbons. Another piece of supporting evidence is that the only new activities to emerge (the nontraditional export sector) are in areas not affected by the agrarian reform and in smaller landholdings, which are not as sensitive to large-scale expropriation.

Nevertheless, in many other potential export activities, there is little history of expropriation. Moreover, as discussed below, Peru fares quite well in terms of investor confidence and governance indicators. Therefore, this study finds this constraint to be second order, and the principal binding constraint on growth to be the lack of structural transformation and few nearby urban labor-intensive export sectors.

Incompatible Constraints

This section explores other potential obstacles to growth. Few arguments are found to support the argument that inadequate access to savings has been a major constraint to growth in Peru in the recent past, as investment has been unresponsive to the greater availability of finance. There is little evidence that inadequate human capital is an obstacle, as the levels of education have increased very rapidly and the returns to schooling have remained relatively low and stable in spite of the recovery in growth.

Other potential binding constraints are explored and are found to be less relevant to the current situation of Peru. Ideally, one would want to show that changes in the binding constraint have large effects on growth. This is found in the dynamics around the export sector, but is not found in aspects such as labor regulation, taxation, macroeconomic stability, and crime (post Sendero Luminoso).

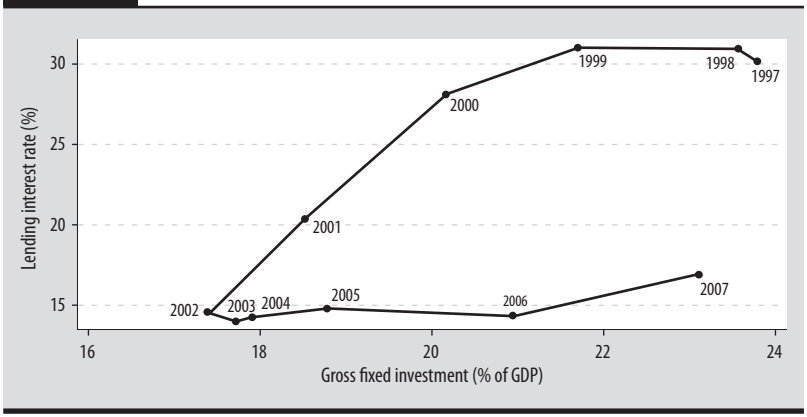
Bad Finance

As noted, problems with external balance, government debt, inflation, and the financial system happened after the export-led growth collapse. Over the past 15 years, the current account has been narrowing, the level of debt to GDP has fallen, and the cost of capital has declined. This suggests that access to savings has not been a binding constraint since 2000, as the country has had more access to finance than it has been willing to use.

Moreover, the country is not facing expensive foreign finance due to a high risk of default. The country's debt trades as if it were investment grade, and it is not far from formally achieving this status. The Economist Intelligence Unit risk score for its sovereign debt is well below other Latin American countries such as Argentina, Ecuador, Brazil, and Venezuela, and is second only to Chile and Mexico.

But most importantly, investment is not sensitive to the interest rate. Figure 6.15 shows investment on the x-axis and the lending

FIGURE 6.15 **Peru's Interest Rate vs. Investment, 1997–2007**



Source: EIU.

interest rate on the y-axis. From 1997 to 2004, the interest rate fell, and at the same time investment fell. This indicates that it was not the cost of finance that brought down the investment rate, but rather the low level of expected returns. Then from 2004 to 2007, investment rose significantly, with scant movement in interest rates. This suggests that something other than the cost of finance is limiting investment. Changes to the binding constraint should lead to large changes in growth, as the binding constraint should have a large Lagrangian multiplier. But here the opposite is seen, suggesting that although the current government's desire to achieve investment grade is not a bad idea, it is not targeting a binding constraint, and therefore will not have much of a growth impact. In fact, the difference between the cost of capital in Peru and investment-grade Mexico is now barely 20 basis points (EMBI differential, BCRP, June 2007), which is miniscule relative to the changes in interest rates already seen.

In Peru, a lack of aggregate finance is clearly not the problem. Investment is low despite good access to external finance, a low current account deficit, and little responsiveness of lending to interest rate changes. This is consistent with the detailed analysis in Braun and Serra (2006), who find that the bulk of recent GDP performance

is not explained by financial development. Therefore, this side of the decision tree can be abandoned and the discussion can move on to low returns.

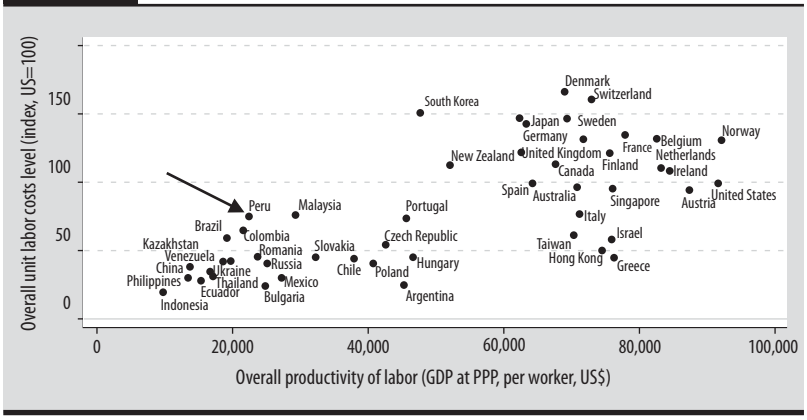
Labor and Business Regulations

The evidence in this area of the decision tree is mixed. Figure 6.16 shows that the cost of labor in Peru is high, given productivity levels. Unit labor costs are at the same levels of those in Malaysia, Portugal, and even Singapore, but productivity is much lower.

Also telling are the rates of informality in Peru. During the export and output recovery in the 1990s, the share of dependent workers (as opposed to the self-employed or employers) without social security rose from 48 percent to 57 percent of the working age population from 1991 to 2000. Meanwhile, in the same period, the percentage of those with social security fell, from 14.7 percent to 10.4 (Encuestas Nacionales de Niveles de Vida).

Yet Peru's EIU rating for "restrictiveness of labor laws" is very good: 3 out of 5, with 5 being the least restrictive. The Philippines is the only country in the world with a similar GDP per capita but a better rating (4), and Peru's rating is much better than that of China

FIGURE 6.16 **Labor Costs vs. Labor Productivity**



Source: EIU.

and India (1). Other available metrics of labor market inflexibilities, drawn from Heckman and Pages (2003), show that required social security contributions as a percentage of wages in Peru are average. At just over 20 percent, they are higher than the Dominican Republic and Venezuela, on par with Chile and Mexico, but well below those in Uruguay, Argentina, Colombia, Costa Rica, Brazil, and Bolivia. Dismissal costs in this dataset are quite low.

On the whole, there is some evidence that this constraint is binding. In particular, it may affect activities that are exposed to international competition, and hence disproportionately affect the sectors that are required for structural transformation to take place. The fact that manufacturing activities have not become internationally competitive, in spite of a rising urban population with improved educational attainment—a population that is currently employed in low productivity activities in the informal sector—points to the possibility that the current labor code is particularly constraining for this sector.

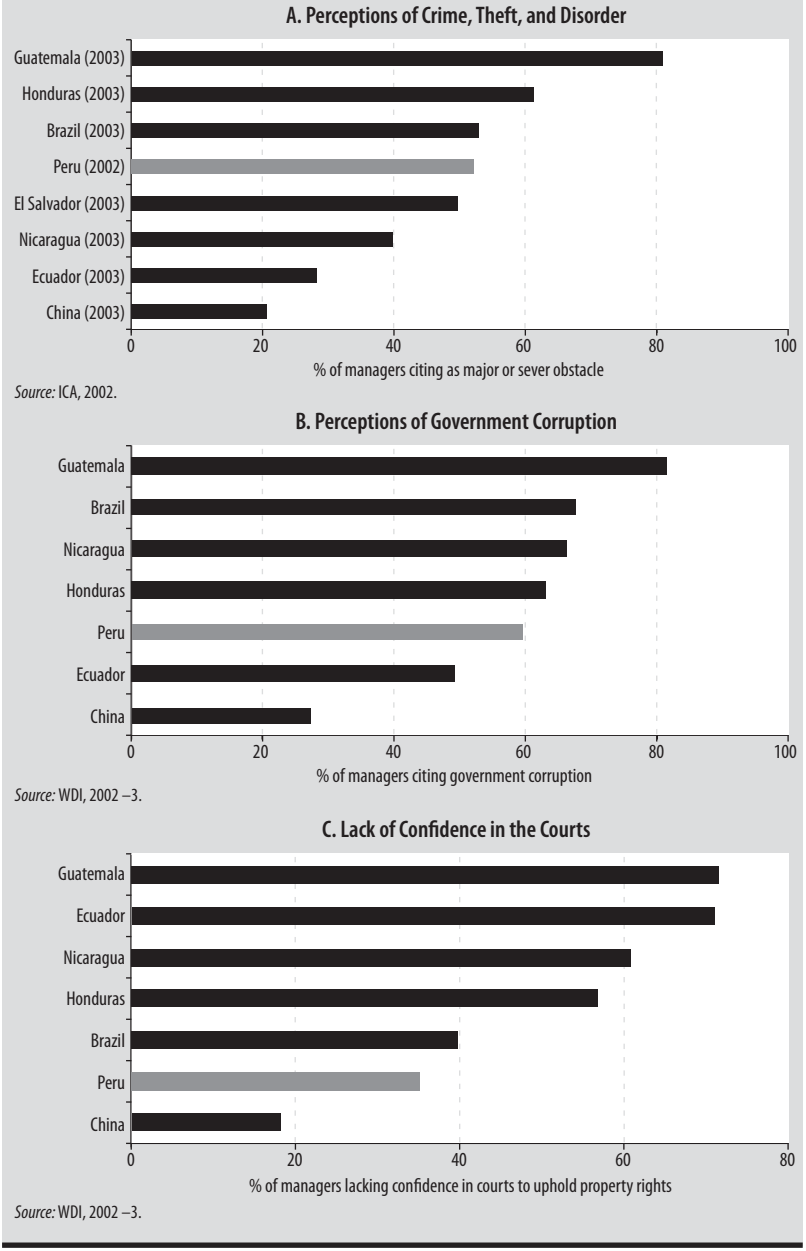
Crime and Corruption

Crime levels in Peru do not seem particularly high at present given the level of income per capita. The presence of Sendero Luminoso in the 1980s and early 1990s must have helped explain the poor output performance in that period, but much of the pay-off from the increase in security was probably already reaped in the 1990s. In the area of corruption, plenty of countries have similar or worse indicators, including Mexico and Argentina, which are significantly better-off than Peru.

Moreover, investors do not seem to find corruption a problem, as evidenced in the World Bank Investment Climate Assessment (ICA), as well as the World Bank (Kaufman) governance indicators.

Finally, both the timing and the severity of the collapse and recovery of exports and output are not consistent with a story of crime and corruption. Appropriability concerns due to crime and corruption do not seem to be important in the case of Peru.

FIGURE 6.17 Perceptions of Crime, Corruption, and the Courts



Source: Cubillos, Hazlitt and Lopez-Silva (2005).

Taxes

Informality in the labor force could be due to labor market restrictions, but also to other regulatory burdens, one of which is taxes. However, Peruvian tax rates are simple, stable, and not high by international standards. There is only one VAT tax rate, compared to three in Argentina and two in Uruguay, which at 19 percent is also lower than those two countries (Cubillos, Hazlitt and Lopez-Silva 2005). Corporate income is taxed at 27 percent, which is higher than Chile (16.5 percent) and Bolivia (25 percent), but lower than Colombia (38.5 percent), Costa Rica (36 percent), Uruguay and Argentina (35 percent), and Mexico and Brazil (34 percent) (Cubillos, Hazlitt and Lopez-Silva 2005). These figures make it hard to argue that Peru is a high-tax environment.

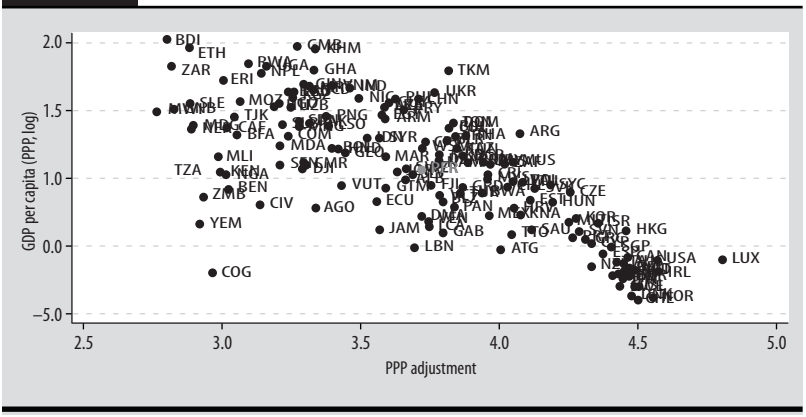
The constraint may not be the current tax rate, but perceived risks of this tax rate changing in the future. However, the EIU measure of tax policy risk is lower for Peru than for Brazil, India, Turkey, the Ukraine, Indonesia, Colombia, Argentina, Ecuador, Venezuela, and Argentina. Mexico and Chile are the only countries with a lower risk rate (EIU), suggesting that appropriability concerns due to taxes are not a binding constraint on growth in Peru.

Macroeconomic Risks

Macroeconomic volatility has been quite low, particularly since 2000. Moreover, while perceptions of political risk rose in the 1990s with the events leading to the closure of parliament in 1992 and the resignation of Alberto Fujimori in 2002, so did foreign investment and overall investment. This is a signal that such changes were not perceived as threatening to economic activity.

One area of concern, however, is the level of the real exchange rate and its effects on the returns to exploring new tradable activities. Unlike infrastructure, which is highly specific to particular activities, the real exchange rate affects all tradable activities. But like infrastructure, the real exchange rate is a potential explanation for

FIGURE 6.18 **PPP Adjustment vs. Log GDP per Capita, 2004**



Source: WDI.

the lack of movements to new, nearby export activities, identified above.

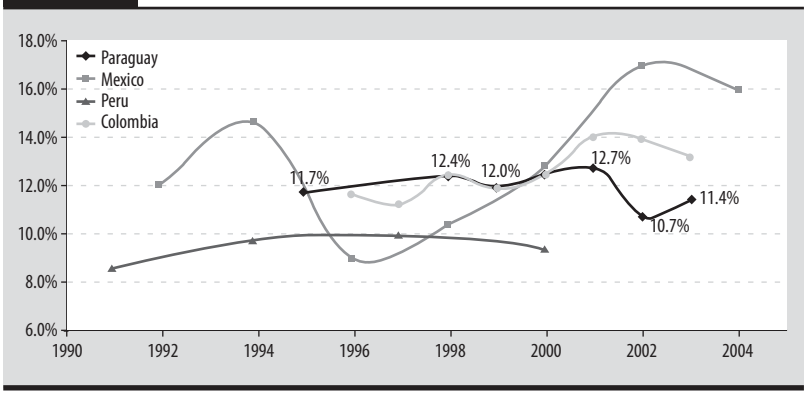
Figure 6.18 uses the purchasing power parity (PPP) adjustment as an internationally comparable indicator of the level of the real exchange rate. It is clear from the figure that Peru does not have a weak real exchange rate that would help in the process of discovering new export opportunities. Therefore, this may be an area of concern. At the same time, it is difficult to argue that the exchange rate is overvalued, which would discourage export diversification.

Education

As evidenced by the years of education among Peruvians of different ages, the supply of education among those entering the workforce increased sharply between 1975 and 2005. Those born in 1940 had an average of 6.2 years of schooling, whereas those born in 1980 had an average of 10.8 years. This compares very favorably with the same 1980 cohort in Mexico with 9.9 years, and Colombia with 9 years (Encuestas Nacionales de Niveles de Vida).

But while the supply has risen, the market "price" of education has not. The returns to education are neither high by international

FIGURE 6.19 Mincerian Returns to Education, Urban Males



Source: Encuestas Nacionales de Niveles de Vida.

standards nor rising significantly. Indeed, returns to education for urban males in Peru fell in the second half of the 1990s, and are lower than those of Mexico, Colombia, and Paraguay (see Figure 6.19). This is inconsistent with the fact that the shadow price of a binding constraint should be high and rising: if the supply of skilled workers was binding, firms would be offering such workers increasingly higher wages. This is not the case in Peru.

These figures are difficult to reconcile with a hypothesis that the provision of education is a binding constraint to Peru's economic growth.

Infrastructure

The possible role that infrastructure may play in the story is worth pondering. In some benchmarks, infrastructure quality does not seem terrible. Given its level of income per capita, Peru's infrastructure quality rating by the EIU is exactly what would be expected. Moreover, in Peru's Investment Climate Assessment, the average ratings for the degree to which telecommunications, electricity, and transportation were a constraint to growth were all less than 1.

In other benchmarks, however, Peru fares worse. In the World Economic Forum's *Global Competitiveness Report* (2005), Peru is

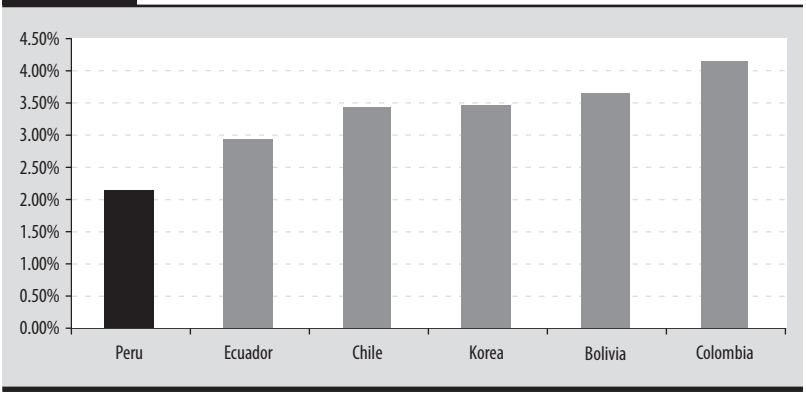
well below the Latin American average in all types of transportation infrastructure. In rail the gap is minimal: 1.6, compared to 1.64 for Latin America as a whole. But in ports, Peru rates 2.1, compared to 3.06 for Latin America as a whole. In air, Peru rates 3.2, compared to 4.3 for Latin America as a whole.

Moreover, public investment in Peru is less than 30 percent of its historical peak levels in the 1970s. Although it is true that many areas of investment reflected in the 1975 figures are now in the private sector, public investment in Peru remains low internationally. As a share of GDP, it is less than two-thirds that of Chile and Korea (see Figure 6.20). This does not capture the deterioration in the public capital stock over the past 30 years.

This suggests that there might have been a significant reduction in the effective supply of infrastructure, as the cumulative amounts seem insufficient to maintain the public capital stock.

But most importantly, when considering coordination failure, much of the coordination already discussed was in determining what sector-specific public goods are required by a particular activity. Infrastructure is a major public good that is highly sector-specific. A clear example is in the gas industry, where pipelines and ports are highly

FIGURE 6.20 Public Investment as a Share of GDP, 2001



Source: World Bank WDI and IMF *Government Finance Statistics*.
Note: Data are for 2001, with the exception of Bolivia, which is for 1994, and Korea, which is for 1997 (the most recent year available). Calculated as central government capital expenditures from IMF *Government Finance Statistics* divided by GDP from WDI, all in current local currency units (LCU).

specific and generate few positive spillovers for other activities. The types of infrastructure needed by nontraditional agriculture in terms of roads and logistics is very different from those that would be required by an urban-based manufacturing industry such as automotive, electronics, and apparel, or by a service outsourcing sector. Even within the nontraditional agriculture sector, requirements are diverse: the type of infrastructure needed for fresh fruit is quite different from that needed for paprika. Therefore, these two constraints—infrastructure and coordination failures—are highly related, as it is sector-specific infrastructure that must be coordinated by the government to allow structural transformation to occur, particularly when there is the need to move to products that are farther away in the product space. Given the government's limited capacity to provide requisite infrastructure and sector-specific public goods, this may have limited the capacity of the economy to achieve structural transformation. In this sense, infrastructure and structural transformation may be constraints reflective of a similar underlying problem.

However, the fact that the main urban center is next to a port, as opposed to the case of Colombia, Mexico, or South Africa, suggests that the required infrastructure for an urban-based manufacturing process should not have been hard to achieve—further suggesting that the dominant constraints may have been elsewhere.

Policy Implications

Peru's recent growth performance has been impressive, with growth in per capita GDP hovering around 5 percent per year in 2004–6. But that performance has been deteriorating over time. Over the past decade (including 2004–6), per capita GDP grew at about 2 percent. Over the long run, Peru is reaching the levels of GDP per capita it had already achieved in the 1970s. This has happened in spite of massive improvements in human capital, macro stability, and financial markets. Moreover, GDP per capita overstates the improvement in welfare, as it has grown much faster than consumption, formal employment, real wages, and national income.

The recent recovery in GDP has been fuelled by a recovery in exports that are highly capital-intensive, as exemplified by the mining sector. Despite massive growth in mining output, employment in this sector has actually declined. Moreover, since much of the invested capital is foreign-owned, the income accrues to foreigners thereby limiting its impact on national income.

Just as the growth recovery was export-led, the previous collapse between 1979 and 1993 was also export-led. With the exception of nontraditional agriculture, the sectors that collapsed and those that recovered were much the same. Moreover, the mining and gas sectors are trapped in a vicious circle where low tax and royalty rates are required to compensate foreign investors for the expropriation risk they perceive, given Peru's history and recent political rumblings. But low tax and royalty rates increase the incentives for the polity to vote for expropriation. The appropriability risks probably also help explain the growth collapse and its duration, as it must have discouraged supply in the traditional industries, which lost market share, and in structural transformation precisely at the time when the export collapse required the economy to discover new products through which to integrate to the global economy.

Overshadowing the problems of appropriability is the main binding constraint on growth: a lack of discovery of new export activities that are intensive in urban labor. If these activities were identified, the fact that the global market is so large means that the activities could be scalable and represent significant additions to the demand for labor. If Peru were to achieve a significantly sized urban-based export sector, the marginal productivity in that sector would determine the dollar wage rate for the country: the higher the productivity of that sector, the greater the standard of living of the labor force, independently of the sector of employment.

Ideally the object of policy is to identify the potential new areas of export dynamism and provide them with the requisite general and specific public inputs that may be required. This information is not readily available and requires entrepreneurs to risk their capital to find out. The willingness of entrepreneurs to engage in such activi-

ties depends on the expected returns and on their appropriablility. In general, these activities suffer from coordination and information externalities. Coordination externalities imply a chicken- and-egg problem in which providers of the required specific nontradable inputs for new activities do not exist because there is no demand for the inputs they produce. But without these inputs, the activity that would demand them cannot exist. This is particularly serious for publicly provided inputs (such as specific property rights, regulations, market access rules, and infrastructure), as the government must solve an information problem (it does not know what is needed) and an incentive problem (even if there is a need, what are the incentives to respond to the need and mobilize the required resources).

Since the first best is not attainable, the second best is characterized by distortions or interventions that increase the expected return of these activities. One such variable is the real exchange rate. It acts as a production subsidy on all tradable activities. Hausmann, Hwang and Rodrik (2006) present a model where a temporary real depreciation triggers search for higher productivity tradable activities and causes faster growth. A recent paper by Rodrik (2007) shows empirically that undervaluation does promote economic growth.

Having said this, it is clear that the real exchange rate is an endogenous variable. Influencing it requires acting on its determinants. In the context of a floating exchange rate with an inflation-targeting regime, the real exchange rate will be affected by the balance between fiscal and monetary policy: a tighter fiscal policy means that the interest rate required to achieve the inflation target can be lower, and this tends to imply a weaker exchange rate. Hence, the macroeconomic strategy can help. In addition, the empirical evidence suggests that central banks have certain degrees of freedom, especially in circumstances in which the domestic currency is not a perfect substitute of the dollar. In this case, the composition of base money—whether it is backed by foreign assets or domestic credit—does matter for the level of the exchange rate. As shown by Levy-Yeyati and Sturzenegger (2007), central banks that intervene

to prevent appreciation tend to achieve a more competitive exchange rate and this leads to higher growth.

As discussed above, the level of the real exchange rate in Peru is not particularly weak for a country at its income level. A strategy to achieve a more competitive rate, compatible with the inflation target, should be part of the country's macro strategy.

Besides the exchange rate, the total cost of labor in terms not only of direct wages but also levies on the wage rate and onerous dismissal procedures may discourage formal employment—and this is the kind of employment contract that an exporting firm needs to have. While in the nontradable sector the cost of labor can be passed on to the consumer, in the tradable sector it limits expected profits.

However, while formal employment is low and declining as a share of total employment, and while this may bind more in the tradable sector, the evidence of the importance of this constraint for Peru is mixed. The overall restrictiveness of the labor market appears to be average, but dismissal costs and social security contributions appear relatively high. Further studies may be required to identify potential reforms in this area.

The real exchange rate and the labor market rules affect activities across the board. But the problems faced by structural transformation may require a more focused set of interventions that allow the government to learn the sector-specific goods required by new activities and create the incentives to provide them. If the obstacle is the inadequate provision of a specific public good, no amount of depreciation will overcome this.

Hence, a second line of action is to develop the capacity of the state to identify and solve potential coordination failures. This requires a form of public-private cooperation that allows for the identification of those obstacles and a system of incentives for the government to react. It will also require the fiscal space to do so. More importantly, it requires a framework that will make such cooperation legitimate vis-à-vis the rest of society. The pitfalls to avoid are capture, rent-seeking, and the generalized perception that such a policy constitutes welfare for the rich. Instead, a focus on exports

and jobs, especially urban export jobs (that is, jobs that are not dependent on natural resources), should constitute that focus of the cooperation. Hausmann and Rodrik (2006) and Hausmann, Rodrik and Sabel (2007) have a set of recommendations in this regard.

The analysis of the product space suggests that the nearby products are in nontraditional agriculture, seafood, mining, and food processing. Promoting these areas is likely to become feasible as obstacles and opportunities are identified through dialogue with participants in existing activities. Issues such as transport infrastructure, logistics, sanitary and phyto-sanitary regulation, food safety standards, agricultural research, and international market access negotiations are likely to be relevant.

However, this strategy is unlikely to be sufficient, as the position of Peru in the product space does not offer a "stairway to heaven" in terms of structural transformation. Moreover, the nearby products generate few urban jobs where the bulk of the additional labor supply will be concentrated. Small jumps to new sectors that are nearby will not solve the problem: new areas of the product space must be explored. Because they are far away from current production, many of the necessary inputs in terms of property rights, skills, infrastructure, and regulation will not exist.

Therefore, the third priority area for policy is to encourage strategic jumps by encouraging investors to search for opportunities in Peru. Here a public sector development bank that could act as a public venture capitalist might be quite beneficial.

The development bank would have the role of scannning the opportunity set of new activities and and socializing part of the risk. Through its willingness to participate, it would garner the attention of potential entrepreneurs in exploratory activities whose costs need to be discovered. As part of the public sector, it could inform the rest of the government when it found obstacles that could be removed through the adequate provision of public inputs. Fundación Chile is a good example of such an entity. In other settings, the purposeful promotion of certain sectors such as the electronics cluster in Malaysia and Israel, the tourism industry in Mexico, the automotive

industry in Thailand, and the promotion of foreign investment in Ireland attest to the importance of creating the specific conditions required for particular sectors to operate at world-class productivities. Hausmann, Rodrik and Sabel (2007) propose the use of development lending to create the interest in this exploration, inform the public sector about opportunities and obstacles, and help coordinate the requisite public inputs.

Finally, the history of nationalization, collapse, and privatization with highly generous terms to private investors to compensate for the uncertainty must be broken. The achievement of a more sustainable property rights regime for foreign investment is required to depoliticize the issue and create a more secure basis for future investment. Highly generous concessions to foreign firms are not politically sustainable in the longer term, even though they were required to regain international confidence. However, unilateral changes to previous agreements will serve only to increase the negative impact of uncertainty about appropriability. Therefore, the government should continue to work with this sector to grandfather existing agreements with some marginal gains, but to create a more sustainable environment for new investments. These policies are underway, and should continue, along with efforts to build public support, with the aim of ensuring long-term political sustainability.

References

Braun, M. and Serra C. 2006. "Understanding Economic Growth in Peru, 1970–2005: The Financial Sector." Paper prepared for the Center for International Development/CAF workshop, November 16, Cambridge, MA.

Calvo, G., Izquierdo A. and Talvi, E. 2006. "Sudden Stops and Phoenix Miracles in Emerging Markets." *American Economic Review*. 96(2): 405–10.

Cubillos, N., Hazlett, C. and Lopez-Silva, M. 2005. "Growth Diagnostics: The Case of Peru." Paper presented in PED309, November 4, Kennedy School of Government, Harvard University, Cambridge, MA.

Feenstra, R., Lipsey, R., Deng, H., Ma, A. and Mo, H. 2005. "World Trade Flows: 1962–2000." Working paper No. 11040. Cambridge, MA: National Bureau of Economic Research.

Hausmann, R. and Klinger, B. 2006. "Structural Transformation and Patterns of Comparative Advantage in the Product Space." Working paper No. 128. Cambridge, MA: Center for International Development, Harvard University.

———. 2007. "The Structure of the Product Space and the Evolution of Comparative Advantage." Working paper No. 146 (extended and revised version of working paper No. 128). Cambridge, MA: Center for International Development, Harvard University

Hausmann, R. and Rodrik, D. 2006. "Doomed to Choose: Industrial Policy as a Predicament." Blue Sky Conference Paper (September). Cambridge, MA: Center for International Development, Harvard University

Hausmann, R., Hwang, J. and Rodrik, D. 2006. "What You Export Matters." Working paper No. 11905. Cambridge, MA: National Bureau of Economic Research.

Hausmann, R., Rodriguez F. and Wagner, R. 2006. "Growth Collapses." Working paper No. 136. Cambridge, MA: Center for International Development, Harvard University.

Hausmann, R., Rodrik, D. and Sabel, C. 2007. "Reconfiguring Industrial Policy." Cambridge, MA: Center for International Development, Harvard University.

Heckman, J. and Pages, C. 2003. "Law and Employment: Lessons from Latin America and the Caribbean." Working paper No. 10129. Cambridge, MA: National Bureau for Economic Research.

Hidalgo, C., Klinger, B., Barabasi, A.-L. and Hausmann, R. 2007. "The Product Space Conditions the Development of Nations." *Science Magazine*. 317(5837): 482–7.

Leamer, Edward E. 1984. *Sources of Comparative Advantage: Theory and Evidence*. Cambridge, MA: The MIT Press.

Levy-Yeyati, E., and Sturzenegger, F. 2007. "Fear of Appreciation." Policy research working paper No. 4387. Washington, DC: World Bank.

Maddison, A. 2007. "World Population, GDP and Per Capita GDP 1–2003 AD." Groningen, The Netherlands: Groningen Growth and Development Centre, University of Groningen. (http://www.ggdc.net/maddison/)

Manzano, O. and D. Winkelried. 2006. "Natural Resources, Primary Exports, and Comparative Advantage." Prepared for the CID Peruvian Growth Puzzle Conference, November 16, Cambridge, MA.

Rodrik, D. 2007. "The Real Exchange Rate and Economic Growth." Cambridge, MA: John F. Kennedy School of Government, Harvard University. Mimeographed document. (http://ksghome.harvard.edu/~drodrik/RER%20and%20growth.pdf).

World Bank. 2005. *World Development Indicators*. Washington, DC: World Bank.

World Economic Forum. 2005. *Global Competitiveness Report*. Geneva, Switzerland: World Economic Forum.

CHAPTER 7

Nicaragua: Remembrance of Growth Past

*Manuel R. Agosin, Rodrigo Bolaños, and Félix Delgado**

Introduction

Nicaragua has the lowest per capita GDP in Latin America after Haiti. This has not always been the case. In 1960, Nicaragua's per capita income almost matched that of Costa Rica, which was the most economically advanced country in the Central American region. Its GDP per capita in purchasing power parity (PPP) terms was about one-third the U.S. level. By 2006, Nicaragua's GDP per capita had dropped to just 10 percent of the U.S. level.[1]

In the early 1970s and the late 1990s, Nicaragua had to cope with two huge natural disasters: the 1972 earthquake and Hurricane Mitch in 1998. In between, the country experienced a socio-political catastrophe: much of the backwardness of Nicaragua can be accounted for by the events that took place during the 1980s, when the country underwent a civil war and a very traumatic attempt to change the economic and social rules of the game on a grand scale.

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* Manual R. Agosin is with the Department of Economics, Universidad de Chile. Rodriqo Bolaños is an independent consultant based in San José, Costa Rica. Félix Delgado is with the Consejeros Económicos y Financieros S.A., San José, Costa Rica.

[1] Penn World Tables and World Bank, World Development Indicators (WDI).

However, even after the reestablishment of democracy and a full market economy in 1990, the rate of growth has continued to be unsatisfactory. The average annual growth of per capita GDP in the 1994–2006 period was scarcely 2 percent, and it has proven impossible to go back to the per capita output growth of the 1961–77 period (3 percent).

In order to explain the country's poor growth performance, this study uses the decision tree approach of Hausmann, Rodrik and Velasco (2005, HRV), while modifying it in some ways to take into account Nicaragua's specific characteristics and problems. Given the paucity of data, the use of sophisticated statistical or econometric techniques is not very plausible. Consequently, the study is supported by economic intuition and interpretation of the scant information available. Though the study looks at the most important prices, which indicate where the most important distortions are, the focus extends beyond price data, since there are constraints that are not related to any observable market price.[2]

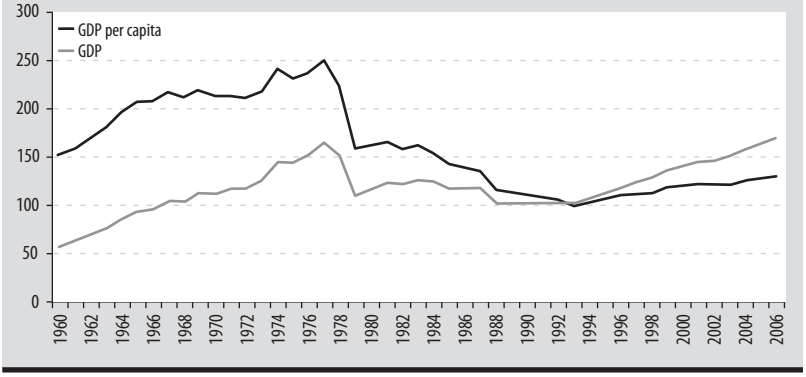
The chapter addresses the main candidates to be considered binding constraints. The sections that follow analyze the costs of, and access to, credit, macroeconomic risks, governance problems, self-discovery (in the terminology of Hausmann and Rodrik, 2003) and the problems of coordination, human capital, and infrastructure. But before each of these potential constraints is discussed, the study examines what Nicaraguan businessmen have to say about the problems they face when making investment decisions. The last section presents the conclusions.

The Stylized Facts of Nicaraguan Development

Despite the economic recovery observed since 1994, per capita GDP in 2006 was 15 percent lower than that attained in 1960 and

[2] For example, entrepreneurs could face interest rates that are too high relative to investment returns, but they may also simply lack access to credit—even if they were willing to pay market interest rates.

FIGURE 7.1 Trends in GDP and Per Capita GDP, 1960–2007
(*1993=100*)



Source: Central Bank of Nicaragua.

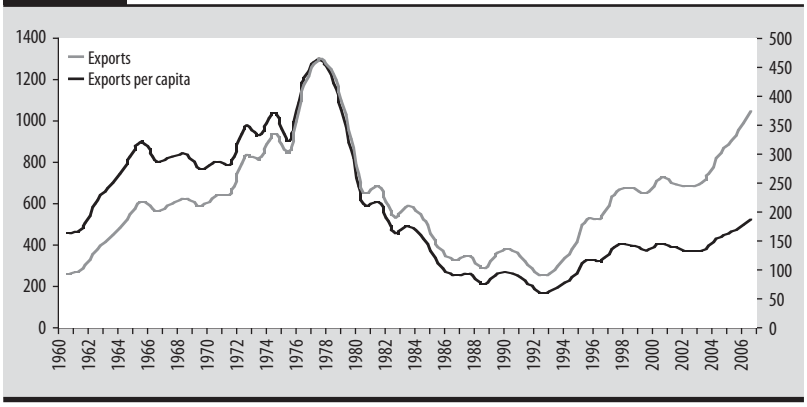
only half of that of 1977 (Figure 7.1). The entire drop in GDP is due to the decrease that took place during 1978–93. This period was marked by acute internal conflicts, including a civil war, and changes in the definition of the basic rules of the game of the economic system. The turmoil experienced during the 1980s, with a severe drop in production and a financial crisis marked by hyperinflation, exemplifies the combination of factors that discourage investment and impede economic growth. Although this period was particularly traumatic, subsequent growth was unable to replicate performance achieved during 1961–77, nor was the country able to recover the ground lost in per capita output during the 1978–93 period (Table 7.1).

TABLE 7.1 Growth of GDP and Per Capita GDP, 1960–2006
(annual average, in percent)

Period	GDP	GDP per capita
1961–77	6.3	3.0
1978–93	–3.0	–5.5
1994–2006	4.1	2.0

Source: Central Bank of Nicaragua.

FIGURE 7.2 Total and Per Capita Exports of Goods and Services, 1960–2006



Source: Central Bank of Nicaragua.
Note: Total exports (left axis) are in US$(2000) millions. Per capita exports (right axis) are in US$(2000). Nominal values were deflated by the U.S. producer price index (2000=100).

Data for labor productivity are available only from 1980 onward. During the 1980–94 period, labor productivity in the economy as a whole dropped to less than half, and has recovered only slightly since then.

The behavior of exports has been even more dramatic than that of output. Exports per capita in 2000 dollars peaked in 1977 (US$466) and dropped dramatically until reaching only U$61 in 1992 (Figure 7.2). Even in 2006 they had not recovered the 1977 levels. Not even total exports had been able to do so in real terms.

It is virtually impossible to make a reasonably sensible decomposition of growth between the accumulation of physical and human capital, the increase in the labor force, and the increase in total factor productivity (TFP). The disturbances of the economy between 1977 and 1993 make it very risky to make this type of calculation. Even for more recent years, the quality of the data leaves much to be desired. A very broad calculation reveals that the increase in TFP has been practically zero since 1993 and that the two most important factors accounting for growth are physical capital accumulation and the increase in the years of schooling of the labor force (see Agosin, Bolaños and Delgado, 2008).

Trends in private investment and total investment, beginning in 1970, can be observed from Economic Commission of Latin America (ECLAC) data. Since 1994, there have been important increases in both private and total investment (Table 7.2). These increases occurred over and above the abnormal increases in public and private investment made in 1998–2000 to meet the reconstruction requirements that followed Hurricane Mitch. It is difficult to fully understand the increase in private investment. Part of it corresponds to investments in the export processing zones (EPZ) in the assembly of clothing with foreign parts (the so-called *maquiladoras*). Another part is due to investment in nontradables, which are very visible in the city of Managua (malls, hotels, residential construction). These two sectors are dominated by foreign investors.

In any event, as shown in Table 7.2, private investment has not exceeded 16 percent of GDP once investments associated with reconstruction after Hurricane Mitch are subtracted. This amount is not that large considering that 1994–2006 was a period of recovery from a real economic catastrophe, a period in which all aggregate magnitudes contracted dramatically. In light of this fundamental trait of the Nicaraguan economy, the rate of private investment can in no way be considered as satisfactory. With a more certain, stable, and supportive business climate, Nicaragua could have experienced a much more important recovery of private investment than actually took place. To make things worse, public investment figures

TABLE 7.2 Gross Fixed Capital Formation: Total, Private, and Public, 1970–2005
(as a percent of GDP at 1994 prices)

Period	Total	Public	Private
1970–77	16.7	6.2	10.5
1978–93[a]	16.4	8.2	6.8
1994–2005	23.0	6.1	17.0
1994–2005[b]	21.9	6.0	15.9

Source: Authors' calculations, based on ECLAC figures.

[a] Public and private investment averages exclude 1984–9.

[b] Excluding figures for 1998–2000, the reconstruction period after the Hurricane Mitch.

in Nicaragua are artificially high, since much of what is classified as capital expenditures (perhaps as much as one third of the total during 1990–2006) are actually current expenses.

The country has been, and continues to be, very vulnerable to shocks in the terms of trade. Until the beginning of the current decade, coffee dominated the exports basket. Currently, clothing *maquila* is the main export item, while the behavior of the price of oil is the most important factor that determines the evolution of the terms of trade. Nicaragua does not produce oil; morever, it depends heavily on oil imports for the production of its energy. Hydrocarbons represent 12 percent of total imports. On the other hand, China's eruption in the international markets has represented a strong negative shock to Nicaragua's terms of trade by reducing the prices of clothing and increasing the price of raw materials, particularly oil.

Nicaragua's terms of trade have gradually deteriorated since 1997, the first year for which data are available from the Central Bank of Nicaragua. The strong deterioration in 2001 reflects the world coffee crisis. The recovery in the terms of trade in 2002 and 2003 was cut short beginning in 2004, due mainly to the escalation of oil prices.

Another important feature of the Nicaraguan economy has been the increase of remittances. In 2000 they represented 8.2 percent of GDP; by 2006 they had increased to 12.2 percent. Finally, Nicaragua is the country in the region that is most dependent on official development assistance from developed countries; at present, these flows represent 3.0 to 3.5 percentage points of GDP. Approximately 80 per cent of the investments in education, health, housing, and water and sanitation are financed with foreign grants and soft loans from bilateral donors or multilateral financial agencies. This high dependency is reflected in the large and chronic twin budget and current account deficits.

Both remittances and official development assistance tend to appreciate the real exchange rate. The authorities have tried to keep the real exchange rate constant by means of monthly devaluations.

However, the deterioration in the terms of trade has made real exchange rate depreciation unavoidable. The trend toward depreciation in 2001–05 reversed slightly in 2006, perhaps because of the high levels of remittances.

Summing up, Nicaragua's growth experienced a strong set-back in the 1980s. The growth rate since then has been lower than during the period prior to the convulsions of the 1980s. When corrected for possible overestimation, private investment has been modest. The terms of trade have been very unfavorable over the last decade, and the economy and the public sector continue to be highly dependent on external aid. Without such additional resources, it is likely that both the economy and the public sector would be affected very adversely.

What Do Nicaraguan Entrepreneurs Have to Say?

It is important to ask the interested parties (that is, the entrepreneurs) why private investment is low. However, this inquiry has limitations and biases that need to be taken into account. In the first place, entrepreneurs are aware of the private cost that the constraints to investments impose on them, but not necessarily of their social costs (that is, the costs borne by other agents in the economy). Second, it is important to adjust the answers to account for what has been termed the "kvetch factor": the propensity such agents have to complain about practically every issue. Finally, any questionnaire leaves out those entrepreneurs who are truly affected by constraints to investment: those who are not around to reply to the questionnaire.

With these caveats in mind, information contained in the World Bank's Productivity and Investment Climate Private Enterprise Survey (ICS) was examined: specifically, two surveys on Nicaragua, one conducted in 2003 and the other in 2006. Responses to the module on constraints to investment were tabulated with a view to determining the order of importance of the constraints faced by the firms. Entrepreneurs were asked to rate 18 constraints (decreased to 16 in

TABLE 7.3 Degree of Restrictiveness of Eighteen Factors in Nicaragua's Business Climate
(average reply according to size of business)

	2006			2003		
Variable	Small	Medium	Large	Small	Medium	Large
Corruption	2.67	2.55	2.35	2.70*	2.73*	2.17
Electricity	2.49	2.74	2.88	1.57*	2.03	2.37
Economic and regulatory uncertainty	2.35	2.44	2.51	2.46	2.55	2.51
Economic instability	2.03	2.18	2.18	2.39	2.38	2.09
Anti-competitive practices	1.84	1.76	1.54	2.20*	2.38*	1.54
Access to financing	1.41*	1.37	1.31	2.30	2.19	1.80
Tax rates	1.28*	1.58	1.83	1.49	2.04	1.89
Crime, theft, and disorder	1.21	1.29	1.33	1.91	1.83	1.37
Transport	0.99*	1.31	1.69	0.62*	0.89*	1.40
Training of workers	0.94*	1.34	1.74	0.89	1.40	1.20
Permissions and leaves of absence	0.79	0.89	1.32	0.46*	0.95	0.91
Access to the land	0.71	0.53	0.88	0.90	0.99	0.86
Legal system/resolution of conflicts	0.69*	1.00*	1.76	1.13*	1.91	2.06
Regulation of customs and trade	0.69*	0.92*	1.45	0.39*	0.95	1.31
Labor regulation	0.52*	0.72	1.02	0.47*	0.73	0.94
Tax management	—	1.24	1.68	0.83*	1.27	1.37
Cost of financing	—	—	—	2.46	2.51	2.09
Number of firms	308	128	42	289	128	35

Source: World Bank (2007c, 2003 and 2006 surveys).
Note: 0 indicates that the factor is not a constraint and 4 that the constraint is very important.
— not available
* The average for small or medium-sized firms differs from the average for large firms at a 5 percent level of significance.

the 2006 survey), ranging from 0 for those that were not significant to 4 for those that were very important.[3]

Table 7.3 presents the answers for Nicaraguan firms, classified according to size into three groups: small firms (from 1 to 20 employees); medium-sized firms (from 21 to 99 employees); and large firms (more than a 100 employees).

[3] Unfortunately, one of the obstacles eliminated in the list for 2006 was the cost of credit, a factor that the entrepreneurs had identified as important in the 2003 survey. The other was telecommunications, which Nicaraguan businessmen did not mention as an important obstacle in the 2003 survey.

The responses are arranged from the highest to the lowest score in 2006 for small firms. The four most important constraints (in the order assigned by small firms) are: corruption; electricity; economic uncertainty and economic regulation; and macroeconomic instability. Access to financing does not appear among the most important obstacles in 2006, although it was in 2003. As is to be expected, the importance of this obstacle increases as firms diminish in size. Interestingly, in 2003, small and medium-sized firms, though not the large ones, stated that the cost of financing was one of the most important obstacles to investment. It is not clear how perceptions evolved with respect to this factor because it was not included in the 2006 questionnaire. Access to financing seems to have improved, or other factors appear to be more relevant for entrepreneurs in 2006 than in 2003. On the other hand, as the problems associated with the cost and access to electricity have become more acute, the importance that entrepreneurs assign to them as an obstacle to investment has increased. So much so that in 2006, medium-sized and large firms mention it as the main obstacle to investment, while small firms mention it as the second obstacle.

Some obstacles appear as significantly less important for small firms (and, to a certain extent, for medium-sized firms) than for large firms. These include the legal framework and the resolution of conflicts, tax rates, customs regulations, and labor regulation. It should be expected on an a priori basis that these factors would be more important for large firms, which must contend with them more often in the courts of law, have a far greater tax burden, or must resort to the customs office more often. But, in general, these problems do not appear to be of major importance in entrepreneurs' perceptions.

The obstacles that affect entrepreneurs have a common denominator: the weakness of the rule of law, which, as discussed later, is reflected not only in areas strictly related to legal matters or corruption but also in the stalemate surrounding the issue of the supply and cost of electricity.

Even though the topic of road infrastructure does not seem to be important for any group of firms, it is worth noting that large firms

accord it a degree of importance (tenth constraint), while small and medium-sized firms placed this factor almost at the end of their lists. The value of the indicator is not only greater, but the difference with that of the smaller firms is statistically significant. The shortcomings in infrastructure affect exporters or firms with a nationwide customer base; it is possible that most of them are large.

As will be discussed later, these responses are quite consistent with those that are obtained from growth diagnostics following the HRV methodology. One constraint that receives little attention from firms (except the large ones) but that does seem to be important is the infrastructure of roads, ports, and airports. This may be due to the fact that the firms surveyed are located mainly in urban areas. Rural producers likely would have ascribed a far greater importance to these shortcomings.

The Cost of Financing and the Constraints to Credit: Are They Binding Constraints to Investment?

To an important extent, the cost and availability of credit determine the level and composition of investment. Assuming that there are good investment projects in the country, the capacity of the private sector to undertake them will depend on the interest rate at which entrepreneurs can obtain credit. It is quite obvious that interest rates vary according to the characteristics of potential debtors and the collateral that they can post. Larger firms and those with a stronger credit record, or those that can post appropriate collateral, will have privileged access to credit. The first step in analyzing this subject is to observe the behavior of interest rates. Subsequently, the issue of access to credit is examined.

Interest Rates

The Nicaraguan financial system features a high rate of dollarization of assets and liabilities. In March 2007, 83 percent of the portfolio of credit of the banking system was denominated in dollars.

Therefore, to answer the question whether interest rates are high or low it is necessary to examine dollar rates. As can be seen in Table 7.4, lending rates for credits denominated in dollars are high, though not excessively so. The last figure available when this study was being prepared (January 2007) was nearly 12 percent, which represents a margin of 3.5 percentage points above the lending rate in the United States (prime rate). The spread between lending and deposit rates in dollars was also quite significant (5 percent), but much lower than what is observed in other countries (see details below).

The lending rate showed a meaningful downward trend from 2001 to 2004. Through early 2007, the rate increased gradually, reflecting the economic recovery and more restrictive monetary policy. However, the spread with regard to the United States prime rate has continued to decrease until very recently. The recent spread between lending and deposit rates has been well below the levels prevailing during the 1990s, although it also has increased gradually in the recent past.

TABLE 7.4 Interest Rates, 1994–2006 (US$)

Year	Deposit	Lending	U.S. prime rate	Spread with U.S. prime	Domestic spread
1994	7.0	14.6	7.1	7.5	7.6
1995	8.1	15.9	8.8	7.1	7.8
1996	10.3	18.7	8.3	10.4	8.4
1997	9.8	18.2	8.4	9.7	8.3
1998	10.0	18.1	8.4	9.8	8.1
1999	10.5	14.8	8.0	6.8	4.3
2000	10.8	15.7	9.2	6.5	5.0
2001	10.5	17.2	6.9	10.3	6.8
2002	8.6	14.0	4.7	9.3	5.5
2003	7.4	11.4	4.1	7.3	4.0
2004	6.0	10.6	4.3	6.3	4.6
2005	6.1	10.7	6.2	4.5	4.6
2006	6.5	11.0	8.0	3.0	4.5
2007 (Jan)	6.9	11.9	8.3	3.6	5.0

Source: Central Bank of Nicaragua and International Monetary Fund (2007).

TABLE 7. 5 Financial Indicators, Nicaragua and Lower-middle-income Countries *(2003–2005 averages)*

Variable	Nicaragua	Lower-middle-income countries[a]
GDP (PPP) per capita (current U.S. dollars)	3,495	3,351
Real lending interest rate (percent)	6.0	10.7
Interest rate spread (percent)	8.9	10.2
Credit to private sector (percent of GDP)	25.8	25.2
M2 (percent of GDP)	39.2	41.7
Gross fixed investment (percent of GDP)	26.7	23.5
Gross internal saving (percent of GDP)	10.1	—
Private	10.8	12.4
Public	–0.7	—

Source: World Bank (WDI, 2007d) and Central Bank of Nicaragua.
— not available
[a] Countries with per capita GDP (at PPP) of US$2,000–$5,000.

What is really surprising is that the figures for interest rates and spreads are not higher. This is confirmed when comparing Nicaraguan interest rates with those of countries having a similar level of income. Table 7.5 shows ex post real lending rates (the nominal rate minus the increase of consumer prices in the same year) for Nicaragua and for a group of 26 lower-middle-income countries, whose per capita PPP incomes were between US$2,000 and US$5,000 in 2003–05. Nicaragua's real lending rate and spread are substantially lower than the countries against which it is compared. Nicaragua does not seem to have a high cost of credit, at least for firms that have access to the formal financial system.

Credit and Financial Depth

Financial markets tend to ration credit.[4] Thus, in order to find evidence that access to credit is a binding constraint on growth, it is necessary to go beyond the observation of interest rates and evaluate a series

[4] There is a wealth of literature on this topic. See Stiglitz and Weiss (1981); Fazzari, Hubbard and Petersen (1988); Hubbard (1998). For several countries in Lain America, see Galindo and Schiantarelli (2003).

of quantity indicators. Estimating an investment model with credit constraints (as done by Fazzari, Hubbard and Peterson, 1988) would shed light on this important subject. It is already a stylized fact of this literature that small firms face access constraints to external funds that are far greater than those faced by large firms. Stated in a different manner, small firms resort to a greater extent to cash flow to finance investment than large firms. This study tried to estimate an investment equation for Nicaragua with data from the ICS survey. Unfortunately, however, that survey does not contain complete data on investment, making it impossible to estimate a model of this nature.

The survey does contain information about the proportion of internally generated cash flow that is used to finance working capital and new investments. Resorting to this information, an econometric exercise was performed for all the firms in the surveys available as of September 2007 (144 surveys in 74 countries, totaling 65,632 observations). In Nicaragua's case, two surveys are available, one for 2003 and the other for 2006. The literature on this topic concludes that all firms, regardless of size or the degree of development of the country in which they operate, face financing constraints in their investment decisions and must resort first and foremost to internally generated resources to finance investments. This is all the more true if the firm is small in size, as small firms usually do not have collateral or a credit record that would give them access to domestic financial markets. It is to be expected that liquidity constraints will be greater the lower the degree of development of the country's financial markets. Indicators of financial development tend to be correlated with per capita GDP. This is the case with credit to the private sector relative to GDP, the relative size of stock exchanges, or the variety of financial instruments that are available to firms and households.[5] It could well be that access constraints are reflected to a greater extent in the proportion of

[5] The econometric analysis controlled for the level of development in an indirect manner, including country fixed effects and a dummy variable to reflect the per capita income group to which the country belongs (according to the World Bank's classification).

internal resources that finance working capital, since, as a rule, firms would rather have lines of credit for this type of expenditure.[6]

The purpose of this exercise was to ascertain whether there is an inverse relationship between the size of a company and the percentage of internally generated resources used to finance working capital and new investments. Within this context, an attempt was made to determine whether Nicaraguan firms in 2003 and 2006 on average used a greater proportion of internal resources than firms from other countries included in the sample, after controlling for factors that might affect the use of internally generated resources. This would indicate that access to credit in Nicaragua is a greater obstacle to investment than in other countries included in the sample.

Table 7.6 shows the results. The exercise classifies firms into the following size categories: microenterprises (with fewer than 10 workers), small firms (11–50), medium-sized firms (51–200), large firms (201–500), and very large firms (more than 500 workers). The ordinary last squares (OLS) estimations used sample fixed effects (that is, for each combination of country and year for which the sample was taken) and fixed effects by economic sector. Other dummy variables included one for export-oriented firms, one for foreign-owned firms (with at least 10 percent foreign ownership), and a set of dummies for the country's level of development. To control for the degree of development of financial markets, the proportion of credit to the private nonbanking sector to GDP was added as an explanatory variable.

The relationship between a firm's size and use of its own resources is inverse; the larger the firm, the lower its use of internally generated resources and the greater its use of resources obtained from financial markets to finance working capital and new investments. Export firms have better access to financial markets than firms that do not export: foreign firms resort more to the financial resources generated internally, probably contributed by the parent company. All these effects are very significant statistically and very robust to changes in the equation's specification.

[6] The authors thank Christian Daude for this observation.

TABLE 7.6 Equations Explaining the Proportion of Internal Resources Used to Finance Working Capital and Investment
(ordinary least squares)

	Working capital	Investment
Constant	73.95 (22.51)**	59.31 (13.06)**
Credit to GDP	–0.08 (–3.28)**	0.04 (1.07)
Low-income countries	5.13 (1.11)	31.42 (5.82)**
Lower-middle-income countries	–18.83 (–3.31)**	–11.78 (–1.23)
Higher-middle-income countries	9.31 (2.31)*	7.20 (1.15)
Microenterprises	5.2 (10.86)**	5.84 (9.00)**
Medium-sized firms	–2.46 (–4.65)**	–2.57 (–3.81)**
Large firms	–3.44 (–4.83)**	–4.74 (–5.36)**
Very large firms	–4.84 (–5.83)**	–5.59 (–5.47)**
Export firms	–1.76 (–4.08)**	–1.23 (–2.18)*
Firms with foreign capital [a]	1.55 (3.12)**	3.43 (5.28)**
Nicaragua, 2003	5.35 (0.96)	(22.44) (2.34)*
Nicaragua, 2006	19.59 (3.80)**	21.18 (2.31)*
R^2	0.191	0.149
Number of observations	35,545	39,457

Source: Authors' estimations based on World Bank (2007c).

Note: Fixed effects by sector are not shown. Country-year fixed effects by country are not shown, except for Nicaragua. Omitted variables: Small firms, other industries, and high-income countries. Countries are assigned to income levels according to the World Bank classification.

[a] Foreign ownership is at least 10 percent.

** The respective parameters differ from zero at the 1 percent level of significance.

* The respective parameters differ from zero at the 5 percent level of significance.

The results relative to the depth of financial markets and the country's level of development are less robust.[7] The ratio of credit to GDP is inversely related to the proportion of a firm's own resources used to finance working capital by the firms in a country, though the quantitative effect is small: an increase of 10 percentage points in the share of credit to the private sector in GDP induces firms in that country to reduce the use of their own resources for financing working capital by less than 1 percent. The effect of changes in the ratio of credit to GDP is not significantly different from zero in the equation that explains the proportion of firms' own resources used in financing investment.

There is also evidence that the level of development of a country has an impact on the use of internally generated resources. Firms in low-income countries use a considerably higher proportion of their own resources to finance investment than firms from higher-income countries, whereas firms in lower-middle-income countries resort considerably less to their own resources than the firms located in poorer or wealthier countries.

The firms in Nicaragua resort to a considerably higher percentage of internally generated resources than the firms in other countries. While in 2003 Nicaraguan firms did not use more of their own resources to finance working capital than firms in other countries (the coefficient for the fixed effect "Nicaragua 2003" is not significantly different from zero), in 2006 they did so. The coefficient for Nicaragua 2006 is positive and significant. In financing working capital, the Nicaraguan firms used 20 per cent more of their own resources, on average, than firms in other countries, after controlling for all other variables that might affect the use of such resources. In respect to the financing of new investments, the Nicaraguan firms used 22 percent more internally generated resources than the average for all the other firms in the surveys, again after controlling for variables

[7] Of course, these variables are correlated: the higher the country's level of development, the higher will be its financial depth, measured as the proportion of credit to GDP or in some other manner.

that might affect the use of internally generated resources. As the coefficients associated with firm size for Nicaragua turned out to be not significantly different from zero (for all sizes other than small firms), it would seem that neither larger firms nor microenterprises differ much from firms in other countries. Any liquidity constraints that are more intense in Nicaragua than in other developing countries are concentrated in Nicaragua's small firms.

An indirect way to infer whether the growth of an economy could be constrained by access to credit is to measure its degree of financial depth. Table 7.5 compares Nicaragua to countries of its own income group with respect to two indicators of financial depth: credit to the private sector as a proportion of GDP and the stock of money and quasi-money (M2), also as a proportion of GDP. Both variables, as well as other indicators of financial depth, are strongly correlated with the level of per capita income. For instance, in developed countries, these variables usually exceed the value of GDP. In the case of Nicaragua, the two indicators are quite close to the mean for lower-middle-income countries. It seems that the financial constraint that Nicaraguan entrepreneurs might be facing is not more acute than the constraint faced by their counterparts in countries of the same income level. This, obviously, does not mean that Nicaragua is not facing problems of access to financing for investment. It only indicates that the problem is not greater than the norm; it is generalized among developing countries and tends to be more acute in those cases in which the degree of financial development is lower.

Combining these two results, it can be said that, even though firms in Nicaragua in general seem to not face liquidity constraints that are greater than those encountered by firms in countries with the same level of economic development, its small firms could have more difficulties in obtaining external financial resources than firms from countries with similar income levels.

This analysis might seem to contradict the responses given by business people to the World Bank survey, in which access to financing does not appear among the obstacles that concern them

most. Moreover, access to financing occupied a less prominent place among the concerns of business people in 2006 than in 2003. However, it is important to note that the newer surveys deleted the question regarding the cost of financing, which in 2003 was included among the obstacles highlighted by business people. Moreover, subjectively, other barriers could appear as more significant nowadays—which does not mean that investment is not constrained by access to financing.

Table 7.5 shows that domestic saving in Nicaragua is lower than in other countries with similar income levels. Specifically, public saving is highly negative. The unavoidable conclusion is that it is necessary to strengthen saving, beginning with public saving. This is a conclusion derived from looking at figures on flows. If one looks at stocks, it is important that the volume of public debt held by domestic banks should diminish gradually, so as to leave those banks with more resources to lend to the private sector.[8]

Of course, an increase in domestic saving does not necessarily mean that financial resources will reach small and medium-sized businesses that currently have no access to credit. To this end, measures having a more direct bearing on the problem will be needed.

In conclusion, Nicaragua has levels of financial depth that are comparable to those of countries with similar levels of income. In addition, firms in general do not seem to be more constrained in terms of access to credit than those in countries with similar levels of development. However, there is some evidence that small firms use a larger proportion of internally generated resources to finance working capital and investment than firms with similar characteristics in developing countries generally. Moreover, small and medium-sized firms perceive the cost of and access to credit as one of the main limitations to their growth. National savings are low, the financial system is highly dollarized, and public sector borrowings from the banking system are important, which is probably crowding out credit to the private sector. In other words, the banking system might be more aggressive in

[8] When the discussion turns to the problem of public debt, the issue of public debt held by domestic private banks will be addressed.

seeking private customers if it did not have in its portfolio a significant proportion of public securities yielding high returns.

Is External Saving Insufficient?

As mentioned, Nicaragua is highly dependent on external saving in the form of bilateral grants or soft credits from the multilateral banking system, plus direct foreign investment. The public sector does not have access to private international capital markets; indeed, as a condition for having accepted debt relief recently, it has deliberately foregone tapping private international markets. In the private sector, only the very large entrepreneurial groups have ready access to international capital markets.

Private external financial resources are not available for those sectors that could contribute most to growth by discovering new export opportunities ("self discovery," in the terminology of Hausmann and Rodrik, 2003) because they are dominated by small firms that are least likely to have any access to international financial markets. This is a task in which multilateral financial institutions might play an important role and that has not been addressed adequately.

In the past, Nicaragua has been quite attractive to foreign direct investment (FDI), which is the most significant item of the financial account of the balance of payments. In the 1997–2005 period, with the sole exception of 2001, Nicaragua received a net annual volume of FDI of more than US$200 million, which represented between 5 and 9 percentage points of GDP. As a proportion of output, FDI to Nicaragua by far exceeds the average for Central America as well as that of any individual country in that region.

Low Private Returns for Economic Activity: Are Macroeconomic Risks Binding Constraints?

There is no doubt that Nicaragua is exposed to a series of important macroeconomic risks. The question is whether these macroeconomic risks are binding constraints on economic growth. To answer that

question, this section analyzes the constraints that may arise from that source. The discussion is focused on external equilibrium, reflected in the current account deficit as well as in the evolution of fiscal deficit and public debt. It is in these two aspects, external and fiscal equilibrium, that the country shows its greatest macroeconomic vulnerabilities.[9]

External Vulnerability

Macroeconomic instability—particularly in small and open economies such as Nicaragua—is often the result of the size and volatility of the current account deficit.

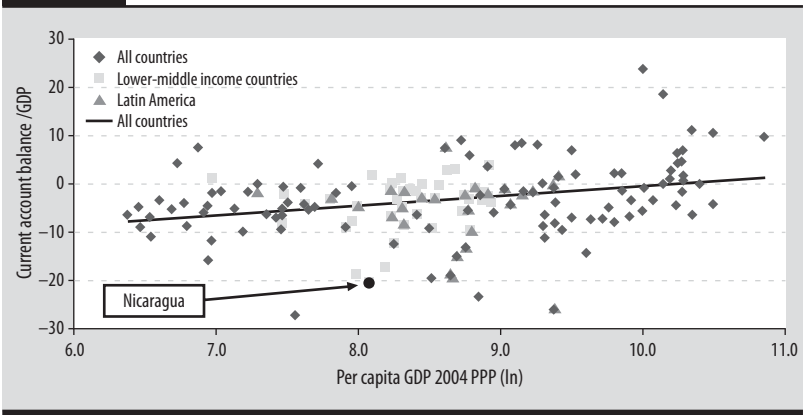
The problem of Nicaragua's external sustainability has gradually moderated since the beginning of the 1990s, when the current account deficit exceeded 40 percent of GDP. In recent years, the deficit has been on the order of 16 percent of GDP, which represents progress toward sustainability; however, this level is in itself too high and depends to a great extent on the goodwill of bilateral donors and on multilateral soft loans.

Although Nicaragua has had a high level of external debt (which will be discussed in the next section), its influence on key variables (economic growth and price stability) has been limited because the debt has not been served according to the original contractual terms. The persistent reduction of the current account deficit has gone hand in hand with the processes of debt relief of bilateral and multilateral external debt, which have benefited Nicaragua. In addition, part of the still huge external imbalance is financed by official development assistance; to the extent that this assistance may not continue indefinitely, it constitutes an important source of macroeconomic vulnerability.

Nicaragua's current account deficit has been exceeded only by small island economies such as Grenada, Sao Tome & Principe, and St. Kitts & Nevis. Its exceptionally high level, shown in Figure

[9] After the hyperinflation of the 1980s, the inflation rate in Nicaragua fell and has fluctuated around the 10 percent per year mark in recent years.

FIGURE 7.3 Balance of Payment Current Account Balance (average 1996–2005) versus Logarithm of Real GDP Per Capita (2004), corrected by PPP



Source: World Bank (WDI, 2007d).

7.3 and, above all, the underlying causes of the imbalance, make Nicaragua relatively more vulnerable than other countries of the same income group.[10]

Public Debt as a Source of Vulnerability

The burden of external debt on macroeconomic conditions has been very high over the last 20 years. In 1990, external debt represented nearly eleven times real GDP. The substantial decrease that took place in 1995 in the ratio of external debt to GDP which was associated to a great extent with debt forgiveness on bilateral debt by countries in the former Soviet bloc, still left the level of external debt close to two times GDP, which allowed Nicaragua to be included in the Highly-Indebted Poor Countries (HIPC) initiative.

As mentioned, the vulnerability derived from the problem of public debt has gradually diminished because of the relief provided

[10] While interest payments in the current account may be largely eliminated under the various schemes of multilateral debt relief already approved or in the works, such payments are already less than 1 percent of GDP; hence, debt relief would have a relatively small effect on that deficit.

under HIPC and the Multilateral Debt Relief Initiative (MDRI), led by the Inter-American Development Bank. These initiatives allowed Nicaragua to reduce its balance of external public debt from 160 percent of GDP in 2000 to 68 percent of GDP by 2007 (US$3.85 billion).[11] On the other hand, within the context of the Paris Club, Nicaragua is negotiating an additional write-off of the remainder of its outstanding bilateral debt, consisting mainly of commercial debt.[12] If all these negotiations were to come to fruition, external debt would decline to 35 percent of GDP. Total public debt would then be on the order of 58 percent of GDP (World Bank, 2007a, p. 21).

Domestic debt is a risk factor insofar as the fiscal accounts and contingencies that hinge upon them may accelerate its future growth. According to the Central Bank of Nicaragua, by the end of 2006 domestic debt reached US$1.233 billion (23 percent of GDP), although it has been falling from the more than 30 percent of GDP level existing before 2004. For the most part, domestic debt instruments are indexed to the U.S. dollar. Most of this debt (81 percent) is a government liability and the remainder corresponds to the central bank. These amounts do not consider the internal debt of other public sector agencies.[13]

The main source of these obligations originates in the Bonos de Pagos de Indemnización (BPI), which the government issued at the beginning of the 1990s to compensate the parties affected by the seizure of their properties in the 1980s. Another component corresponds to the domestic debt of the central bank in the form of

[11] The information on external debt comes from estimates by the Central Bank of Nicaragua, and by Consejeros Económicos y Financieros S. A. (CEFSA, San José, Costa Rica). These estimates do not consider all the relief foreseen in the framework of HIPC, but do include the relief that Nicaragua had obtained in the framework of MDRI, as of April 2007.

[12] Debt relief on close to US$1.5 billion of bilateral debt is still pending. Added to total relief, this would bring the balance of external debt to slightly less than 40 percent of GDP. Of this, 40 percent (US$610 million) corresponds to debt with Costa Rica and 14 percent (US$216 million) to debt with Honduras. Debt to Libya, Iran, and Algeria is about US$589 million.

[13] Information from the Central Bank of Nicaragua and the Ministry of Finance and Public Credit (2007a, b) and World Bank (2007a).

Certificados Negociables de Inversión (CENI), issued by the Bank as part of its open market operations and also as liabilities issued in connection with the rescue of the banking system in the aftermath of the banking crisis of 2000–01.

It should be expected that the government would attempt to restructure private debt with banks. This was carried out once without any major problems in 2003 and should not face any major complications this time. This would be akin to a game with a cooperative solution having the highest payoff for both parties. The importance of reducing internal debt is clear in light of the fact that in 2005 its service involved 21 percent of the income of the nonfinancial public sector.

Discouragement of future private investment would probably not come from the high level of public debt, which is falling because of debt relief, but from the institutional weaknesses that led to the high debt levels in the past and that have not gone away. There is still a risk that these weaknesses could lead to new episodes of unsustainable external indebtedness and to the accumulation of an ever-growing domestic public debt. To this must be added the contingent debt of the pension system, the commitment to transfer fiscal resources to municipalities (without a corresponding transfer of spending obligations), and the growing subsidies for electricity and public transport. Moreover, banking supervision and regulation do not yet ensure against new banking crises, which would lead to renewed calls on public resources. New expropriations leading to higher levels of debt cannot be ruled out, either.[14]

Dependence on Foreign Aid

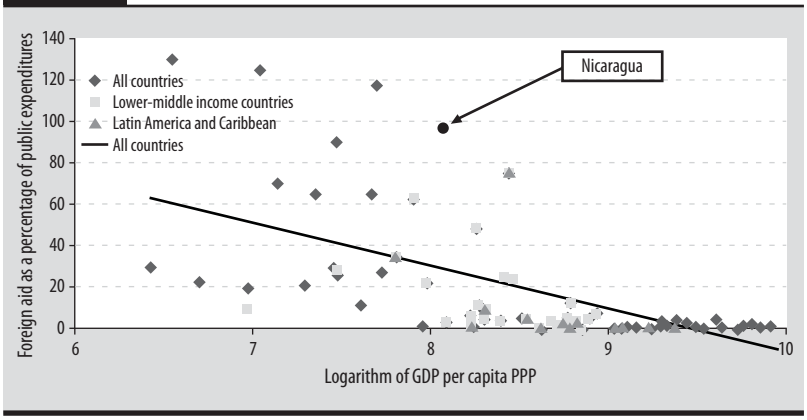
Foreign aid, frequently for the financing of investment projects, represents more than 60 percent of gross fixed capital formation. This is the highest proportion among Latin American and Caribbean countries, and one of the highest in the group of lower-middle-income countries

[14] See World Bank (2007a, pp, 20–4) and Bolaños (2006, pp. 21–30).

to which Nicaragua belongs. In general, external aid finances a high proportion of public expenditures. Figure 7.4 compares the ratio of foreign aid to public expenditures for Nicaragua and a group of 76 countries for which there is information for the 1996–2005 period. The proportion in Nicaragua, close to 100 percent, is not only the highest among lower-middle-income countries and countries in Latin America and the Caribbean, but also one the highest of all 76 countries in the sample.

To sum up, the dependence on foreign aid is quite high in Nicaragua and could become an important source of economic vulnerability because its availability depends on unilateral decisions of countries and agencies that grant foreign aid. This is in addition to the macroeconomic risks discussed earlier related to the fiscal situation and its contingencies. Economic agents in Nicaragua may face important constraints on investment if they perceive these risks as potential taxes on the returns to investment. As can be seen in Table 7.3, firms of all sizes include uncertainty regarding the economic and regulatory environment and macroeconomic instability among their four main constraints.

FIGURE 7.4 Foreign Aid as a Percentage of Public Expenditures versus Logarithm of Real GDP Per Capita PPP 2004



Source: World Bank (WDI, 2007d).
Note: Foreign aid as a percentage of public expenditures is the average for 2000–4. The logarithm of real GDP per capita PPP 2004 is expressed in international US$(2000).

Low Returns to Economic Activity: Governance and Corruption

The problems of governance and corruption are central to considerations about the private appropriability of returns to investment in Nicaragua. Several studies have argued that there are serious problems in Nicaragua regarding governance and corruption, which have a negative bearing on growth and development because they diminish the profitability of investment in fixed physical, human, technological, and organizational capital.[15] Furthermore, business people, academics, politicians and intellectuals, in various interviews, state that this topic has the highest importance among the constraints to growth.

This study draws on the data on governance and corruption in the World Bank governance indicators for 1996–2006 (Kaufmann, Kraay and Mastruzzi 2007a, b), which in turn use a great number of indexes constructed by the World Bank and many other agencies around the world.[16] All these indexes are closely and positively correlated with social and economic development; therefore this study has attempted to locate Nicaragua in relation to its level of per capita income (in PPP terms).[17] The finding that Nicaragua is below the trend line in some of these indexes would be evidence that this aspect is particularly problematic for the performance of private investment.

The three panels of Figure 7.5 were developed on the basis of the six average governance and corruption indexes of the World

[15] See World Bank (2004, p. 34). This study finds that the problems in the field of governance are not due so much to problems in laws or regulations as to inefficient public administration and to a civil service that is unable to enforce laws and regulations. The civil service is highly politicized and the hiring, permanence, and incentives of the public bureaucracy are not results-based. Furthermore, the politicization of the judiciary and supervisory agencies, together with disputes among powers, lead to inconsistent and changing rules, recurrent crises, and high levels of corruption in the use of public resources.

[16] The indexes are calculated for 1996, 1998, 2000, 2002, 2003, 2004, 2005, and 2006. The averages shown in the figures that follow include the years available.

[17] For per capita GDP, the measure expressed in international US$(2000) from the World Bank's World Development Indicators is used.

Bank for the 2005–6 period. They attempt to place Nicaragua in the context of a regression between each index and per capital GDP.[18] For three of these indicators, Nicaragua does not differ substantially from what could be predicted for its per capita income. These indicators are voice and accountability (political rights, civil liberties, and independence of the press); political stability (the possibility that government may be overthrown or replaced by unconstitutional means); and regulatory quality (the incidence of anti-market policies, inadequate financial supervision, or excessive regulation).

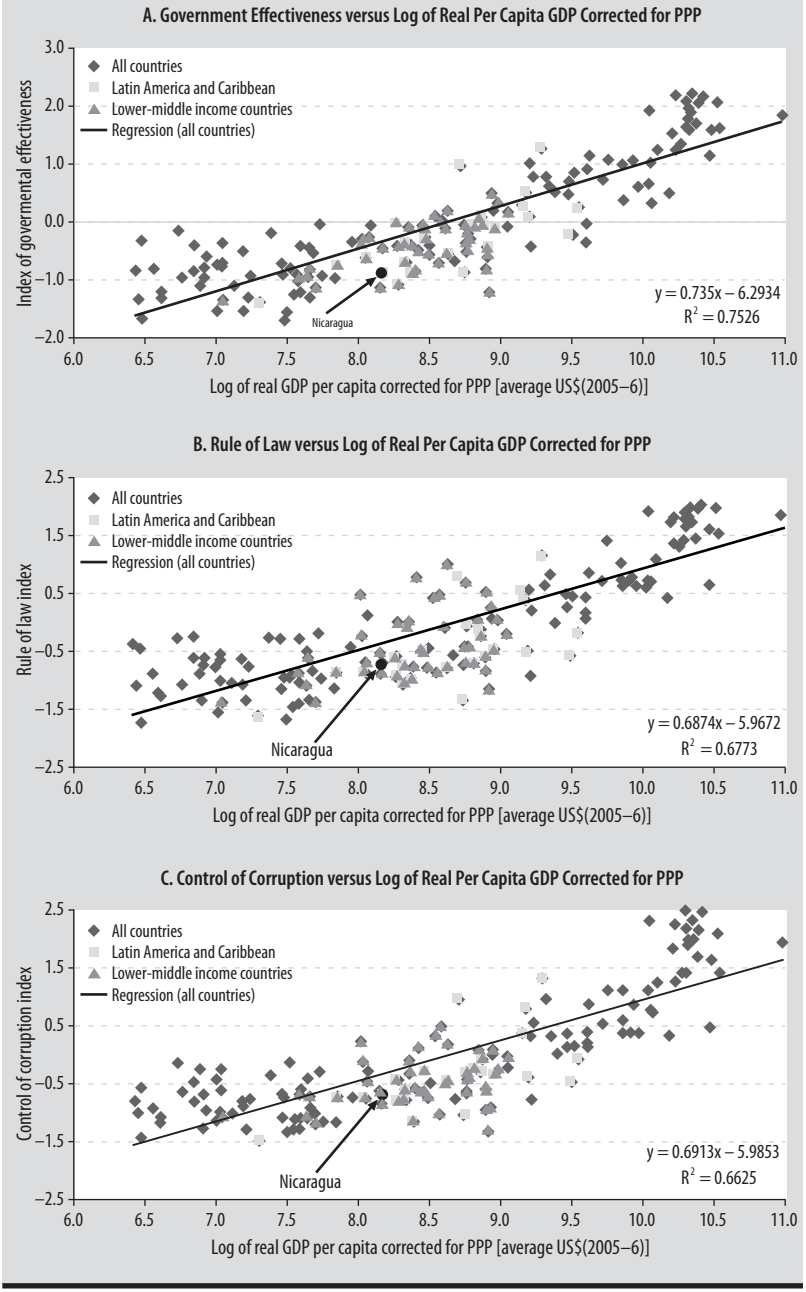
Nicaragua falls well below what could be expected for its relative level of economic development for three other governance indicators:

1. Government effectiveness (Panel A): The quality of state bureaucracy, competencies and independence of civil servants, and the credibility of the government's commitment to execute its policies.
2. Rule of law (Panel B): The degree to which citizens trust and respect the laws, including perceptions regarding the incidence of violent crimes, the effectiveness and predictability of the judiciary, and the enforceability of contracts.
3. Control of corruption (Panel C): Respect by citizens and the state for government institutions, including measurements of the perception of corruption, defined as the exercise of public power for an individual's personal benefit.

These three governance problems are intimately related. Controlling corruption would improve the rule of law and the quality of bureaucracy. Improving the quality of bureaucracy would improve the rule of law. Encouraging meritocracy and discouraging the

[18] From the World Bank data covering 216 countries, data was used for the 158 countries for which fairly complete information was available. The data are from Kaufmann, Kraay and Mastruzzi (2007b) and the methodologies used to obtain the indexes are described in Kaufmann, Kraay and Mastruzzi (2007a).

FIGURE 7.5 Governance Indexes in which Nicaragua Lags, 2005–6



Source: Authors' calculations, based on information in Kaufmann, Kraay, and Mastruzzi (2007b).

politicization of the bureaucracy and the judiciary would control corruption, improve the quality of the bureaucracy, and strengthen the rule of law.

This analysis, and available evidence confirm one of this study's hypotheses: reforms to increase governance and reduce corruption in Nicaragua could be some of the most effective in lifting binding constraints on growth. It is quite likely that other reforms—including improving infrastructure, lowering the cost of credit, improving access to financing for small and medium-sized firms, and greater macroeconomic stability—may not achieve the desired effects on economic growth without steps to improve governance and reduce corruption. Improvements in governance in the areas in which Nicaragua has gaps would help increase the profitability of private investment by lowering the premiums that investors demand in order to offset the risks that stem from weak governance.

Self-discovery Coordination Problems: How Important Are They and What Is the Main Problem?

Given the quality of data for Nicaragua, it is not possible to determine the strength of self-discovery or to undertake a very sophisticated analysis of the determinants of recent discoveries. Following Hausmann and Rodrik (2003), this study will focus on an analysis of exports to try to determine if any export diversification has occurred in recent years. There is evidence of an interesting, though somewhat incipient, process of export diversification centered on agriculture and agribusinesses.

Traditionally, Nicaragua was an open export economy. Its most important export products until the end of the 1970s were coffee, meat, and sugar. The economic disruptions of the 1980s had a very strong impact on exports. As shown in Table 7.7, Nicaragua emerged from that period with a ratio of exports to GDP of about 15 percent (measured in 1994 with the national accounts in 1996 córdobas). This ratio must be considered extremely low, in the light of the small size of the country's population (5.6 million inhabitants in 2006).

TABLE 7.7 Ratio of Exports to GDP and Rates of Annual Growth of Exports and GDP *(percent)*

	Ratio of exports to	Rates of growth	
Year	GDP	GDP	Exports
1994	15.6	—	—
1995	18.0	5.9	22.1
1996	19.7	6.3	16.2
1997	21.6	4.0	14.4
1998	22.1	3.7	5.8
1999	23.2	7.0	12.4
2000	25.0	4.1	12.5
2001	26.1	3.0	7.3
2002	25.0	0.8	-3.5
2003	26.6	2.5	9.2
2004	29.4	5.1	16.1
2005	29.8	4.0	5.3
2006	30.9	3.7	7.8

Source: Central Bank of Nicaragua Web site.
Note: Prices are in 1996 córdobas.
—not available

Since the recovery took hold in the mid-1990s, exports have led growth. While GDP grew at an average annual rate of slightly more than 4 percent between 1995 and 2006, exports grew by more than 10 percent over the same period. This is the reason why the ratio of exports to GDP has doubled and is now above 30 percent.

Though an important part of this story is the clothing *maquila* boom, other new exports have appeared, and some traditional exports, such as coffee and meat, have rebounded. Complete data for exports or a long series that could serve to perform a more detailed analysis are not available. However, CETREX (Centro de Trámites de Exportaciones, the Exports Expediting Center) publishes figures for the 20 most important exports and for a variety of products under the heading "others." These figures are shown in Table 7.8. The products are arranged according to their export value in 2006.

Both *maquila* and agricultural products take advantage of the country's comparative advantage: its unskilled labor force and rich

TABLE 7. 8 Twenty Main Exports, Maquila and "Others," 2000–2006
(US$ million)

Product	2000	2002	2004	2005	2006
Net *maquila*	76.1	76.1	167.0	222.2	262.0
"Others"	103.5	103.5	149.2	185.7	211.8
Coffee	165.4	165.4	125.9	125.8	210.3
Beef	49.5	49.5	110.0	118.9	151.3
Milk products	25.0	25.0	30.9	31.2	62.5
Gold	27.4	27.4	48.0	44.1	58.3
Cane sugar	36.4	36.4	34.4	69.4	55.5
Lobsters	71.4	71.4	46.7	36.6	46.8
Peanuts	29.6	29.6	40.4	44.5	44.6
Beef cattle	25.7	25.7	36.4	43.0	39.3
Farmed shrimp	33.8	33.8	27.3	35.7	39.2
Beans	7.5	7.5	20.2	27.5	37.1
Tobacco	13.5	13.5	18.5	17.6	19.9
Fish	11.2	11.2	13.1	17.1	18.6
Other soda beverages	2.8	2.8	0.5	8.0	17.5
Instant coffee	7.2	7.2	9.2	11.1	13.3
Metals and their manufactures	3.2	3.2	7.9	6.9	11.8
Sea shrimp	20.2	20.2	12.4	18.9	11.4
Bathroom appliances	5.5	5.5	10.9	10.7	11.4
Wheat products	0.9	0.9	12.7	10.2	10.4
Oil derivatives	6.3	6.3	9.5	12.1	5.1
Bananas	11.3	11.3	14.1	14.0	3.2
Total, including net *maquila*	**733.5**	**733.5**	**945.2**	**1,111.1**	**1,341.3**
Total, excluding net *maquila*	**657.4**	**657.4**	**778.2**	**889.0**	**1,079.3**

Source: CETREX Web site.

agricultural land. It is particularly interesting that exports have diversified without any deliberate decision by the government. The growth of agricultural products has occurred spontaneously, without any support from the authorities other than keeping the real exchange rate fairly constant.[19]

[19] The nominal exchange rate has been adjusted periodically in Nicaragua so as to keep the real exchange rate constant. The monetary authority announces an advanced adjustment relative to expected inflation for the following period. Despite this, the authority was unable to avoid an important depreciation of the effective real

On the other hand, since the 1990s, the government has encouraged the growth of *maquilas* through policies favoring export processing zones (EPZ), which allow firms within the zones to import inputs free of duties. In addition, those firms are exempt from income tax, as in many Latin American and Caribbean countries. This sector has also benefited from a series of international trade preferences. Until 2005, this sector grew under the protection of restrictions imposed by the United States on textile and apparel imports under the Multifiber Arrangement. This agreement expired on January 1, 2005, with a commitment by the importing countries to convert quantitative restrictions into tariffs. It must be borne in mind that the Central American countries had privileged, though restricted, access to the U.S. market within the framework of the Caribbean Basin Initiative and its successors. Therefore, an important part of the growth of *maquila* should be considered trade diversion favoring Central America and the Caribbean countries—to the detriment of Asian countries, whose exports were often strongly restricted by quotas. Consequently, *maquila* exports cannot be considered a real export discovery.

The dismantling of the quota system in textiles and apparel and the entry of China (and more recently, Vietnam) to the World Trade Organization (WTO) has had a negative impact on the export of clothing to the United States originating from the entire Central American and Caribbean region, with the exception of exports from Nicaragua. The adverse effect on Central America and the Caribbean was mitigated when the Central American Free Trade Agreement (DR-CAFTA, which includes the Dominican Republic) liberalized the access of apparel to the North American market (with some transitory exceptions). The Agreement required that fabrics originating from either the region or the United States be used in their manufacture, providing that such fabric is made with thread

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exchange rate from 2001 to 2005. Since then, the effective real exchange rate has appreciated moderately. The levels of the real exchange rate since the mid-1990s do not seem to have been an obstacle to the development of new exports.

from the region or the United States. Since neither the region nor the United States produces fabrics or thread at competitive costs, this restriction has not favored the competitiveness of the apparel produced in Central America or the Dominican Republic. As the less developed country within DR-CAFTA, Nicaragua benefits from the preferential treatment given by a larger quota to make use of fabrics originating outside the region (which, in practice, means China). This, and low Nicaraguan labor costs, have contributed to the strong growth of apparel exports since 2005.

In recent years, some firms producing other goods have moved into the EPZ, notably producers and exporters of electric cables for vehicles. These products do not have the problems of competitiveness that the apparel industry faces and they are genuine export discoveries. Obviously, these exports include an element of subsidy because producers are not subject to the income taxes that are levied on firms that are not located within EPZ. This subsidy could be seen as a temporary boost to the discovery of new export possibilities. To be so, it must eventually be withdrawn.

The very concept of the EPZ can be seen as a creative way of solving problems of governance (uncertainty of property rights) and coordination between the ultimate exporter and the producers of nontradable services and sectoral public goods—problems that normally conspire against the development of new export sectors. Within the EPZ, firms face less red tape; do not have to worry about property rights for land; and have ready access to electricity, urbanized land, and port services. The existence of the enabling EPZ and the economies of agglomeration promote investments in nontradable services that cater to their needs.

Although hard evidence is not available, the fact that exports have been able to grow and diversify in recent years, despite the obstacles faced by businesses (particularly if they are small and are in the agricultural sector), would seem to be evidence of a remarkable effort at self- discovery. In other words, there is no dearth of entrepreneurship in Nicaragua. The scarcity lies in the enabling environment that would support an even stronger increase in exports.

Therefore, the fundamental market failure impeding new exports in Nicaragua seems to be coordination. Public and private decisions need to be coordinated better to remove the main stumbling blocks that cannot be addressed by individual producers: the absence of sectoral public goods (ensuring food safety, complying with phytosanitary standards in destination countries); poor logistics (the difficulties of purchasing produce from small producers, cold storage, contacts with importers in destination countries, quality consistency); the poor quality of rural infrastructure; the limited capacity of airports and ports; the scarcity or nonexistence of credit; and so forth. Farmers who produce export goods depend on distributors, as they themselves do not have a scale of production sufficient to export directly. Therefore, marketing and extension services are essential to the take-off of these sectors. If these problems were resolved, it is possible that a great deal of additional self-discovery could occur. In other words, the basic problem is one of coordination, and here public officials and business associations have a large role to play.

As mentioned, the problems related to poorly defined property rights are an important obstacle to growth in Nicaragua. These problems cannot be solved quickly nationwide. But in agriculture, the titling of land (and the payment of compensation when appropriate) could be an important impetus to the development of activities that could turn out to be very dynamic. Regularizing property rights in agriculture and carrying out a cadastre would be very important steps forward. The clarification of property rights could help relax credit constraints, since it would enable farmers to use their property as collateral.

Public and private coordination is also lacking in tourism, a nascent sector in Nicaragua. Conditions for tourism are interesting and varied; they resemble those of other countries in the region that have been successful in this sector, particularly Costa Rica. Some hotels that are part of international chains have started to install facilities along the Pacific coast. What is needed is infrastructure, a legal framework, credit, and so forth: the same type

of coordination that is holding back the development of agro-industrial exports.

Social Returns: Is Education a Binding Constraint?

To determine whether education, or the availability of human capital, is a binding constraint in Nicaragua, this study begins by examining the available quantitative indicators of education. As shown in Table 7.9, in 2000, Nicaragua's share of the population aged 15 or older who had attended primary education (43.1 percent) was slightly above the 41.5 percent level reported for all lower-middle-income countries (LMIC). However, the share of those who had completed primary education (9.6 percent) was slightly below the share for lower-middle-income countries (13.1 percent). The figures for Latin American and Caribbean countries (LAC) were similar to those of the LMIC. The situation is about the same in the case of post-secondary and tertiary education.

However, for secondary education, the percentages for Nicaragua are lower than those for the lower-middle-income and LAC countries. For the total population aged 15 or older, 19.8 percent had some secondary education (3.0 percent had complete secondary education) in Nicaragua, while the percentage in LMIC was considerably higher (28.1 percent, with 8.4 percent having completed secondary education). The percentages for LAC and LMIC almost match, while the indicators for Nicaragua are similar to those of Central America and the Dominican Republic (CA&DR). The scarcity of workers with secondary education may be an obstacle to investment in manufacturing sectors for export.[20]

If the scarcity of human capital were a constraint to growth, it should be reflected in high rates of return to education, particularly secondary and higher education. Table 7.10 presents data for some countries with the rates of return for primary, secondary, and higher

[20] The figures for women are similar to those for men. However, the differences with the comparable countries are less.

TABLE 7. 9 Schooling of Total Population, Male and Female, 15 Years and Older, 2000

Group, region, country	Population 15 years and older (thousands)	Without schooling (percent)	Primary (percent)		Secondary (percent)		Tertiary (percent)		Average years of schooling
			Total	Complete	Total	Complete	Total	Complete	
Nicaragua	**2,913**	**28.9**	**43.1**	**9.6**	**19.8**	**3.0**	**8.3**	**4.3**	**4.6**
All countries	34,171	22.8	35.2	12.8	31.2	11.2	10.8	4.9	6.3
High income, OECD	2,218	15.4	27.4	13.2	42.1	17.3	15.1	7.3	7.8
High income, non-OECD	31,426	3.3	27.9	14.9	45.6	21.2	23.2	9.5	9.6
Low income	37,915	52.0	33.1	7.8	13.3	3.0	1.6	0.8	2.8
Lower-middle-income income (LMIC)	**49,758**	**21.6**	**41.5**	**13.1**	**28.1**	**8.4**	**8.8**	**4.2**	**5.8**
High-middle-income	19,688	8.7	39.9	16.7	40.4	13.6	11.0	5.8	7.8
Eastern Asia and Pacific	156,206	21.3	42.2	19.2	29.2	10.8	7.4	3.7	5.9
Europe and Central Asia	27,229	5.7	35.6	20.8	47.2	15.7	11.5	7.5	8.7
Latin America and Caribbean	**14,662**	**15.7**	**45.1**	**12.7**	**28.2**	**8.5**	**11.0**	**5.0**	**6.2**
Middle East and Northern Africa	20,242	31.6	31.0	10.5	28.0	9.0	9.4	4.0	5.4
Southern Asia	150,252	48.9	24.8	8.3	23.6	7.8	2.8	1.4	3.8
Sub-Saharan Africa	7,694	45.4	36.4	8.1	16.4	3.5	1.8	0.8	3.4
Central America and Dominican Republic	**3,970**	**23.4**	**46.2**	**11.8**	**19.0**	**6.2**	**11.4**	**5.2**	**5.4**

Source: Barro and Lee (2000).

Total = percentage of people who indicated that the corresponding level is higher than what they reached, whether or not they completed it.

Complete = percentage of people who indicated that they had completed the corresponding level.

education taken from the World Bank's data base (EdStats, World Bank 2007b). It presents estimates for 1985 onward (the most recent data are for 1999). The observations for Nicaragua correspond to 1996 and the values are 13.6 percent for primary education, 10.4 percent for secondary education, and 14.7 percent for higher education. Even though intercountry comparisons must be made with great caution due to differences in methodology and the years for which the estimates are available, the data for Nicaragua would seem to be close to the average for all the countries in the sample. In any case, they are not the highest shown in the table.

What is striking is that the return to secondary education is not high enough, judging by the low levels of secondary education suggested by the figures in Table 7.9. This result may be due partly to low educational quality. The Public Expenditure Reviews for Nicaragua (World Bank 2001, 2007a) identify problems of this type. For instance, in secondary education the proportion of teachers with a low level of training has been increasing, while in primary education, the proportion of teachers with a low level of training has been decreasing.[21]

In conclusion, although the indicators of human capital accumulation in Nicaragua are below those of comparable countries, returns to education suggest that Nicaragua is not facing a binding constraint stemming from the availability of educated workers. The binding constraints must be sought elsewhere.

Low Social Returns: Is Infrastructure a Constraint?

Developing the infrastructure of developing countries can yield high economic and social returns, several studies have found. However, in many of these countries, fiscal adjustment has tended to reduce public investment rather than current expenditure. In many cases, this has led to a decrease not only in the rate of economic growth, but also of the solvency of the government, as it reduces or does

[21] See World Bank (2007a, p. 31).

TABLE 7.10 Rates of Return to Education by Level, Various Years

Country	Region	Income group	CA&DR	Year	Primary	Secondary	Higher
Argentina	Latin America and the Caribbean	High-middle-income		1989	8.4	7.1	7.6
Bolivia	Latin America and the Caribbean	Lower-middle-income		1990	13.0	6.0	13.0
Brazil	Latin America and the Caribbean	Lower-middle-income		1989	35.6	5.1	21.4
Chile	Latin America and the Caribbean	Lower-middle-income		1989	8.1	11.1	14.0
China	Eastern Asia and Pacific	Lower-middle-income		1993	14.4	12.9	11.3
Colombia	Latin America and the Caribbean	Lower-middle-income		1989	20.0	11.4	14.0
Korea, Rep. of	Eastern Asia and Pacific	High income, OECD		1986	—	8.8	15.5
Costa Rica	Latin America and the Caribbean	High-middle-income	CA&DR	1989	11.2	14.4	9.0
Ecuador	Latin America and the Caribbean	Lower-middle-income		1987	14.7	12.7	9.9
El Salvador	Latin America and the Caribbean	Lower-middle-income	CA&DR	1990	16.4	13.3	8.0
Spain	Europe and Central Asia	High income, OECD		1991	7.4	8.5	13.5
United States	North America	High income, OECD		1987	—	10.0	12.0
Estonia	Europe and Central Asia	High-middle-income		1995	14.0	2.2	10.3
Ethiopia	Sub-Saharan Africa	Low income		1996	14.9	14.4	11.9
Philippines	Eastern Asia and Pacific	Lower-middle-income		1988	13.3	8.9	10.5
The Gambia	Sub-Saharan Africa	Low income		1997	33.5	12.1	—
Greece	Europe and Central Asia	High income, OECD		1993	—	6.5	5.7
Honduras	Latin America and the Caribbean	Lower-middle-income		1989	18.2	19.7	18.9

(*continued on next page*)

TABLE 7.10 **Rates of Return to Education by Level, Various Years** (*continued*)

Country	Region	Income group	CA&DR	Year	Primary	Secondary	Higher
Hungary	Europe and Central Asia	High-middle-income		1993	— 6.0	2.6	
Indonesia	Eastern Asia and Pacific	Lower-middle-income		1989	—11.0	5.0	
Jamaica	Latin America and the Caribbean	Lower-middle-income		1989	17.77.9	—	
Mexico	Latin America and the Caribbean	Higher-middle-income		1992	11.8	14.611.1	
Nepal	Southern Asia	Low income		1999	15.78.1	9.1	
Nicaragua	**Latin America and the Caribbean**	**Lower-middle-income**	**CA&DR**	**1996**	**13.610.04**	**14.7**	
New Zealand	Eastern Asia and Pacific	High income, OECD		1991	—12.4	9.5	
Papua New Guinea	Eastern Asia and Pacific	Low income		1986	12.819.4	8.4	
Paraguay	Latin America and the Caribbean	Lower-middle-income		1990	20.312.7	10.8	
United Kingdom	Eastern Asia and Pacific	High income, OECD		1986	8.67.5	6.5	
Singapore	Eastern Asia and Pacific	High income, non-OECD		1998	16.710.1	13.9	
Turkey	Europe and Central Asia	High-middle-income		1987	——	8.5	
Uruguay	Latin America and the Caribbean	High-middle-income		1989	21.68.1	10.3	
Venezuela	Latin America and the Caribbean	High-middle-income		1989	23.410.2	6.2	
Vietnam	Eastern Asia and Pacific	Low income		1992	13.54.5	3.1	
Yugoslavia	Europe and Central Asia	Lower-middle-income		1986	3.32.3	3.1	
Zimbabwe	Sub-Saharan Africa	Low income		1987	11.247.6	–4.3	

Source: World Bank (2007b, 2007d).

— not available

not improve the government's long-term payment capacity. Slower economic growth and lower public investment have led to lower fiscal revenues, due to lower rates of growth in tax collection or in revenues for the sale of public services.[22]

Electricity is one problem area. The increase in the price of hydrocarbons and opaque and ineffective subsidy policies have resulted in a combination of very high prices for nonsubsidized users and in blackouts and interruptions in the supply of electricity. This situation is an important constraint on investment in manufactures for export and the domestic market, as well as in the generation and transmission of electricity. It also contributes to the fiscal vulnerabilities that were discussed earlier.

In addition, Nicaragua is suffering from transportation bottlenecks. Port services are insufficient; in many cases, it is cheaper for Nicaraguan producers to take their products to ports in neighboring countries. The network of well-paved and well-maintained roads is limited. These problems increase transport costs and constitute binding constraints on growth.

Most infrastructure indicators are lower in Nicaragua than in countries with a similar degree of development. This may be one of the stumbling blocks faced by the rural sector in diversifying its production and exports. Furthermore, some of the problems are related to the lack of private investment due to the microeconomic risks mentioned earlier.

Table 7.11 shows infrastructure indicators for energy, telecommunications, and transport for Nicaragua and compares them against indicators for the relevant income group (LMIC) and LAC for 2000 and 2004.

Table 7.11 presents only those infrastructure indicators for which the World Development Indicators data base had observations for Nicaragua, LMIC, and LAC in 2000 and 2004.[23] The last

[22] See Easterly and Servén (2003).

[23] In accordance with World Bank methodology, the aggregate data weigh the values of each country on the basis of its participation in the regional value of the

four columns show how Nicaragua compares against the LMIC and LAC countries. A plus sign (+) indicates that Nicaragua has a better indicator than the region or income group against which it is compared. A minus sign (–) indicates that it has a worse indicator. The minus signs predominate. Public and private infrastructure appear to be strong binding constraints on growth.

The discussion that follows highlights problems in the most urgent areas: electricity, roads, and ports. Shortcomings in telecommunications are also huge, as Table 7.11 shows.

Electricity Infrastructure

Nicaragua's problems in the electric energy sector have become even more acute over the past two or three years. Generation and distribution problems have led to a decrease in supply, which has led to expanded periods of rationing and has worsened disputes between the government and some private firms that participate in different parts of the supply system. Constraints arising from the lack of investment in infrastructure may well be interacting with constraints on growth stemming from microeconomic risks (such as governance, stability of the rules of the game, and the reliability of the judiciary).

The installed capacity for electricity generation is low. Moreover, Nicaragua's use of its hydroelectric potential is inefficient. As a result, it has one of the world's highest dependencies on oil and its derivatives as sources of electricity generation and some of the highest electric energy costs (see OLADE, 2004).

The above-mentioned characteristics of the Nicaraguan electric energy system are reflected in high electricity prices to end users,

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variable. When data are missing, they are estimated with the information available for the country so as to maintain the comparability of the series. See the ìaggregation rulesî of the WDI in *http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,contentMDK:20452046~menuPK:64133156~pagePK:64133150~piPK:64133175~theSitePK:239419,00.html*. The table also presents other unweighted indicators.

TABLE 7.11 Infrastructure Indicators for Nicaragua, Lower-middle-income Countries, and Latin American and the Caribbean, 2000 and 2004

	Lower-middle-income countries (LMIC)		Latin America & Caribbean countries (LAC)		Nicaragua		Nicaragua versus			
							LMIC		LAC	
Variable	2000	2004	2000	2004	2000	2004	2000	2004	2000	2004
Energy										
GDP per unit of energy used (constant US$ PPP at 2000 per equivalent kg. of oil)	–4.1	4.5	6.2	6.2	5.9	5.2	+	+	–	–
Electricity										
Consumption of energy (KWh per capita)	1,490	1,447.7	1,584.5	1,673.8	349.4	416.6	–	–	–	–
Transmission and distribution losses (percent of output)	11.9	10.0	16.3	16.7	29.9	24.4	–	–	–	–
Electricity produced from hydroelectric sources	23.2	23.4	60.2	56.3	9.2	11.4	–	–	–	–
Electricity produced from oil (percent of total)	6.8	8.0	17.3	14.0	81.6	75.2	–	–	–	–
Telecommunications, general										
Investment in telecommunications (percent of income)	26.9		26.3		5.9		–		–	
Revenues from telecommunications (percent of GDP)	2.7		3.1	4.3	2.6		–		–	
Telecommunications, telephony										
Main telephone lines (for every 1000 people)	127.0	186.8	145.0	177.4	33.4	41.9	–	–	–	–
Subscribers to fixed lines and mobile phones (for every 1000 inhabitants)	203.8	431.9	266.1	495.9	51.8	186.0	–	–	–	–
Population covered by mobile telephones (percent)				89.9		60.0				–
Average cost of telephone call to the USA (US$ for every 3 minutes)	2.9	2.1	2.5	1.8	3.2		–		–	

(*continued on next page*)

TABLE 7.11 Infrastructure Indicators for Nicaragua, Lower-middle-income Countries, and Latin American and the Caribbean, 2000 and 2004

	Lower-middle-income countries (LMIC)		Latin America & Caribbean countries (LAC)		Nicaragua		Nicaragua versus			
							LMIC		LAC	
Variable	**2000**	**2004**	**2000**	**2004**	**2000**	**2004**	**2000**	**2004**	**2000**	**2004**
Telephone failures (for every 100 lines)	27.0		24.5			4.8				
Telephone subscribers per employee	187.9	444.0	244.5		113.8		–		–	
Mobile telephone subscribers (for every 1000 people)	76.9	245.1	121.1	318.6	18.4	144.2	–	–	–	–
Price of fixed telephone residential package (US$ per month)	10.1	8.3	15.7	9.5	17.7	13.1	–	–	–	–
Price of mobile telephone package (US$ per month)		9.8		9.1		16.0		–		–
Telecommunications, Internet										
Internet users (for every 1000 people)	24.7	73.2	38.2	117.0	10.2	24.4	–	–	–	–
Broad band subscribers (for every 1000 people)	0.1	15.0	0.4	9.6	0.1	1.0	+	–	–	–
Safe Internet servers (for every million inhabitants)		1.5		8.5		2.7		+		–
International voice traffic (for every 1000 people)	16.7	14.4	38.7		35.6	65.0	–	–	+	
Other indicators										
Households with television (percent)	84.8		77.7		58.5		–	–	–	–
Personal computers (for every 1000 people)	29.1	44.8	48.7	88.3	24.4	39	–	–	–	–
Paved roads (percent of total)					11.1					

Source: World Bank (2007d); Estache and Goicoechea (2005).
Blank cells=data not available

regardless of whether they are industrial commercial or residential customers. Table 7.12 compares prices in Nicaragua to those of LAC and Central America and the Dominican Republic (CA&DR).

Since 1994, prices to end-users have been significantly higher than those of the other regions against which Nicaragua can be compared. Moreover, as is shown in the lower half of Table 7.12, the relative price differences between Nicaragua and LAC and CA&DR have increased significantly between 1994 and 2004, as the annual growth rates in prices have been much higher in Nicaragua than in the average for these two regions.

For instance, the prices in Nicaragua for the industrial sector in 1994 were 1.4 times higher than the weighted average of the region (LAC), and that ratio increased to 2.4 times by 2004. Without any weighting, the increase is not as dramatic (from 1.0 to 1.5 times).[24] The comparison with CA&DR is similar, with the indicators moving from close to 1.0 to between 1.4 and 1.5. This trend is also confirmed by the comparisons with prices of other lower-middle-income countries.[25] Nicaragua not only has electricity prices that are among the highest in the world, but the difference has grown with time.

Available evidence indicates that coverage and quality of electric services in Nicaragua are not good. Figure 7.6 shows, based on data for 2004, that Nicaragua has a low per capita level of electricity consumption relative to its per capita GDP (the observation for Nicaragua is below the trend line calculated for all countries). Also, the percentages of energy losses in transmission and distribution are higher in Nicaragua than in countries with a similar per capita income (see also Table 7.11, which shows that losses in Nicaragua are 2.5 times greater than those of LMIC and 1.5 times greater than those of LAC). One of the main complaints of Unión FENOSA, the private company that operates an important concession for the dis-

[24] The drops in prices in Argentina and Venezuela during that period explain a good part of the difference.

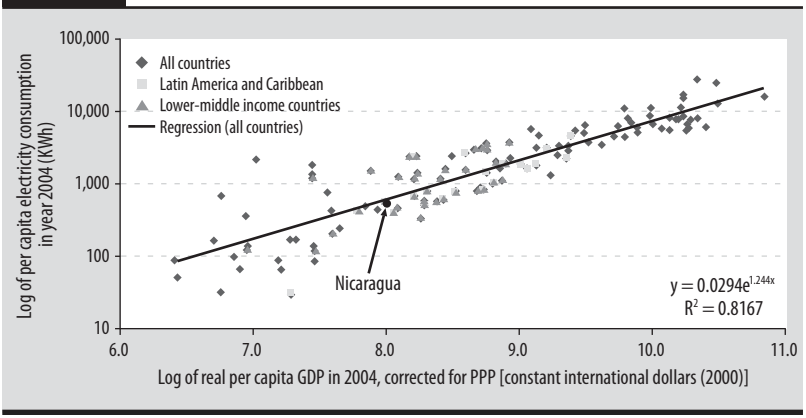
[25] Unfortunately, most LMICs for which information on energy prices is available in the WDI are in LAC.

TABLE 7.12 Electricity Prices by Consumption Sector and Rates of Growth, Latin America, 1994 and 2004
(current US cents per KWh and percent)

Region	1994			2004			Annual growth rate 1994–2004 (percent)		
	Industrial	Commercial	Residential	Industrial	Commercial	Residential	Industrial	Commercial	Residential
Average prices									
Nicaragua	8.5	11.0	10.2	12.9	16.6	14.3	4.2	4.2	3.4
LAC (weighted)	6.1	10.9	7.7	5.4	9.0	8.1	–1.3	–1.9	0.5
LAC (unweighted)	8.6	11.0	9.0	8.5	11.0	10.4	–0.1	–0.1	1.5
CA&DR (weighted)	9.1	10.3	7.9	9.8	11.9	11.5	0.7	1.5	3.7
CA&DR (unweighted)	9.2	10.1	7.6	9.3	11.1	11.0	0.1	0.9	3.8
Relative prices									
Nicaragua/LAC (weighted)	1.4	1.0	1.3	2.4	1.9	1.8			
Nicaragua/LAC (unweighted)	1.0	1.0	1.1	1.5	1.5	1.4	4.4	4.3	1.9
Nicaragua/CA (unweighted)	0.9	1.1	1.3	1.3	1.4	1.2	3.5	2.7	–0.3
Nicaragua/CA&DR (unweighted) without Nicaragua	0.9	1.1	1.3	1.4	1.5	1.3	4.1	3.3	–0.4
CA&DR (unweighted) without Nicaragua /LAC (weighted)	1.5	0.9	1.0	1.7	1.2	1.4	1.4	2.8	3.3
CA&DR (unweighted) without Nicaragua/LAC (unweighted)	1.5	0.9	0.8	1.1	1.0	1.1	0.9	0.9	2.3

Source: Authors' elaborations, based on OLADE (2003, 2004) reports.
Note: Each country is weighted by its energy consumption.
LAC = Latin America and the Caribbean
CA&DR = Central America and the Dominican Republic

FIGURE 7.6 Per Capita Consumption of Electricity and GDP Per Capita, 2004
[international US$(2000)]



Source: World Bank (2007d).

tribution of electric energy, is related precisely to high energy losses and to the fact that energy theft goes unpunished. This problem of losses and energy theft may in part explain the high prices, which are needed to recover the costs of the energy that is actually sold to and paid for by consumers.

Nicaragua has severe limitations in its supply of electric energy. Low installed capacity and a high concentration in one of the most expensive sources to generate electric energy, along with serious problems of losses in transmission and distribution, have made electricity prices in Nicaragua among the highest in the world. Given the lack of incentives to invest and the sector's opaque institutional arrangements, it does not seem that this constraint will be mitigated in the foreseeable future. The policy conclusion is that clarifying the institutional framework could well be an investment with high returns.

Road, Highway and Port Infrastructure

Public infrastructure in transport in Nicaragua also faces serious limitations. Table 7.13 shows that Nicaragua has a density of roads

TABLE 7.13 Density of Roads by Population and Territorial Extension, 2002

Region or group of countries	Density of roads per population (km of roads for every 1,000 inhabitants) 2002	Density of roads by geographic extension (km of roads for every 1,000 km^2) 2002
Nicaragua	**3.5**	**154.1**
All countries	10.5	1,276.6
High income, non-OECD	5.7	5,109.4
High income, OECD	22.9	1,296.5
Low income	5.2	255.0
Lower-middle-income (LMIC)	**4.9**	**254.9**
High middle-income	12.6	1,240.5
Eastern Asia & Pacific	6.4	275.5
Europe and Central Asia	10.4	701.9
Latin America and the Caribbean (LAC)	**6.7**	**990.4**
Middle East and Northern Africa	2.4	187.8
South Asia	2.8	435.8
Sub-Saharan Africa	6.3	291.0
Central America and Dominican Republic	**6.2**	**422.8**

Source: Estache and Goicoechea (2005).

Note: The data are simple averages of the individual observations of the countries that make up each group or region. Therefore, they cannot be compared to the data shown in tables based on the WDI, where the aggregate data are weighted.

far below that of comparable countries (LMIC, LAC, and CA&DR). The density, as of 2002, was especially low when measured in terms of geographic extension—and the most recent information available does not show any contrary trend. Nicaragua has a density of 154 km of road for each 1000 km^2 of extension: 50 percent of the level in LMICs, only 16 percent of that observed in LAC, and nearly one-third of that in CA&DR. The most severe lack of roads is in the rural areas, where the problem of poverty is all the more acute. For all the above reasons, roads also show important deficiencies that limit economic growth in Nicaragua.

Summing up, the indicators examined show that Nicaragua faces serious problems due to the lack of basic infrastructure. The two categories of infrastructure that show the greatest deficits, and that can be considered binding constraints on growth and private

investment, are the supply and cost of electricity and the availability of adequate roads, highways, and ports.

Conclusion

A useful way to begin this concluding section is by stating which problems do not seem to be binding constraints to growth. The macroeconomic problems faced by the country seem to be solvable: recent debt relief has reduced the burden of debt service and the efforts at fiscal adjustment have reduced the intensity of the macroeconomic imbalance. Inflation has decreased and is now within tolerable limits. However, this does not mean that the country is not facing macroeconomic problems. If fiscal efforts are not intensified, particularly in relation to increasing the tax burden and reducing the weight of the actuarial deficit of the pensions system and other contingent public liabilities, public debt could once again become unsustainable. This was an agonizing problem for the government until only recently. Furthermore, a reduction of external aid, very unlikely though always possible, could have very serious consequences for public investment, particularly in the social sectors, and would call for adjustment to cut the current account deficit, given the country's limited access to international capital markets. This lends urgency to efforts to place the operations of the public sector in good financial standing.

The high levels of dollarization of financial liabilities and assets make the macroeconomic system very vulnerable to shock in the terms of trade, which have been very frequent in the past. Therefore, a high priority for the authorities should be to reduce the dollarization of the financial system, perhaps by introducing a financial instrument indexed to inflation. The long-term solution is to eliminate fiscal unsustainability, which is the cause of the public's preference for assets denominated in foreign currency.

In a lower-income country like Nicaragua, both the availability and quality of education are barriers to growth in the long term. But the moderate returns to education do not suggest that education is a

binding constraint to growth. If the country manages to accelerate growth, the availability of human capital will undoubtedly become a constraint to continuing to make progress. Hence the efforts in education made in recent years must be continued. But at this time, the availability of human capital is not retarding growth.

It does not seem that Nicaragua's access to external financial resources is blocked. Foreign direct investment has been quite robust (though unstable) over the last decade. The evidence is less clear with respect to the access and cost of credit from domestic sources, particularly for businesses beyond the few large groups. There is also some evidence that small firms in Nicaragua have less access to credit than firms of the same size in other countries, after controlling for other factors affecting the use of credit. But it is more useful to examine this topic not as a constraint in itself but as an element of the syndrome that appears to be one of the major constraints on growth: the coordination problem that affects the development of new activities.

Uncertain property rights, the lack of clarity regarding the rules of the game, the weak rule of law, the politicization of the judiciary and other powers of the state, as well as corruption, seem to be more serious problems in Nicaragua relative to other countries with similar per capita incomes. Of course, the mere identification of these problems will not solve them. They are complex and there are powerful interests that generate and sustain them. Nor do they have a technocratic or immediate solution.

On the other hand, some problems associated with infrastructure seem to be particularly serious. Cases in point are the supply and cost of electricity, the discouragement of investment in electricity generation, and the poor quality and insufficient coverage of road, port, and airport infrastructure. Once again, the magnitude of the problems seems to be such that they do not lend themselves to an easy solution.

In some countries, researchers have detected that the absence of self-discovery—that is, activities that detect new comparative advantages that countries can explore and develop—is a binding

constraint to private sector investment. In the case of Nicaragua, the development of an important number of new exports (and of tourism services, though still at a lower scale) in the current decade suggests that there is no scarcity of good ideas among small and medium-sized entrepreneurs, particularly in the rural sector. The main problem seems to be the small relative size of each one of these new products and exports. This would indicate that investment and growth are being held back by a coordination problem between private agents and the state, which must provide the sectoral public goods without which development of the sector becomes impossible.

Perhaps an incremental way of broaching the set of problems that have been identified as binding constraints is to focus attention on this coordination problem in specific sectors, particularly agriculture and tourism. It could well be that the problems of governance, infrastructure, and credit, overwhelming if they are considered for the entire economy, may be easier to handle from the standpoint of the sectors with an export potential. This would imply steadfast action on many fronts: granting property titles to rural tenants; orienting investments in infrastructure to those areas where the centers of production are located; facilitating the investment of firms that may act as marketing agents and exporters of these products; improving ports and airports with the infrastructure that these producers need; strengthening the state agencies responsible for enforcing the standards of quality and safety of exported foodstuffs (or, what is probably more effective, promoting this same activity through business associations such as APENN); and concentrating the improvement of access to credit in the rural sector. The latter would tend to occur spontaneously with a successful program to grant property deeds in both rural and tourism areas.

This does not mean that no attention should be paid to other sectors. There has also been an increase in exports from the EPZ that are no longer the conventional *maquila*. But with a state, like Nicaragua, that has such limited capacities, it is far better to concentrate on public actions in a limited number of activities with a very high social return.

References

Agosin, M., Bolaños, R. and Delgado, F. 2008. "Nicaragua: a la búsqueda del crecimiento perdido." Washington, DC: Inter-American Development Bank, Research Department.

Barro, Robert J. and Lee, Jong-Wha. 2000. "International Data on Education Attainment. Updates and Implications." (August). Database available at http://www.cid.harvard.edu/ciddata/ciddata.html.

Bolaños, Rodrigo. 2006. "Nicaragua: Creación de capital social por medio de la reforma fiscal". Washington, DC: Inter-American Development Bank, Regional Operations Department 2. (January).

Central Bank of Nicaragua. http://www.bcn.gob.ni/index.asp.

Central Bank of Nicaragua and Ministry of Finance and Public Credit. 2007a. "Informe de Deuda Pública. Year 2006." (April). Available at http://www.bcn.gob.ni/publicaciones/deuda/anual/2006/

Easterly, William and Luis Servén, editors. 2003. *The Limits of Stabilization: Infrastructure, Public Deficits and Growth in Latin America*. Washington, DC: World Bank and Stanford University Press.

Estache, Antonio and Ana Goicoechea. 2005. "Infrastructure Economic Performance. Access to Database in Excel Format." Available at http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/0,,contentMDK:20595103~pagePK:64214825~piPK:64214943~theSitePK:469382,00.html Accessed August 6, 2007.

Fazzari, D., Hubbard G. and Petersen, B. 1988. "Financing Constraints and Corporate Investment." *Brookings Papers on Economic Activity* 1988(1): 141–95.

Galindo, A. and Schiantarelli, F., editors. 2003. *Credit Constraints and Investment in Latin America*. Washington, DC: Inter-American Development Bank, Red de Centros de Investigación.

Hausmann, R. and Rodrik, D. 2003. "Economic Development as Self-discovery." *Journal of Development Economics*. 72: 603–33.

———. 2005. "Self-discovery in a Development Strategy for El Salvador." *Economía*. 6: 43–101.

Hausmann, R., Rodrik, D. and Velasco, A.. 2005. "Growth Diagnostics." Cambridge, MA: John F. Kennedy School of Government, Harvard University. Mimeographed document.

Hubbard, G. 1998. "Capital Market Imperfections and Investment." *Journal of Economic Literature*. 36: 193–225.

IMF (International Monetary Fund). 2007. "Estadísticas Financieras Internacionales." Washington, DC: International Monetary Fund.

Kaufmann, D., Kraay, A. and Mastruzzi, M.. 2007a. "Governance Matters V: Governance Indicators for 1996–2006." Available at http://web.worldbank.org/WBSITE/EXTERNAL/WBI/EXTWBIGOVANTCOR/0,,contentMDK:21045419~menuPK:1976990~pagePK:64168445~piPK:64168309~theSitePK:1740530,00.htm.

———. 2007b. Data in http://info.worldbank.org/governance/kkz2005/tables.asp. Accessed September 2007.

OLADE (Organización Latinoamericana de Energía). 2003. "Energía en Cifras". Available at http://www.olade.org/energiaCifras.html.

———. 2004. "Informe Energético" (October). Available at http://www.olade.org/informe.html.

Psacharopoulos, G. and Patrinos, H.A. 2002. "Returns to Investment in Education. A Further Update." Policy research working paper No. 2881. Washington, DC: World Bank.

Stiglitz, J.E. and Weiss, A.. 1981. "Credit Rationing in Markets with Imperfect Information." *American Economic Review*. 71: 393–410.

World Bank. 2001. "Nicaragua: Public Expenditure Review." Washington, DC: World Bank.

———. 2004. "Nicaragua. Development Policy Review. Sustained Broad-based Growth". Draft. Report No. 29115-NI. Washington, DC: World Bank, Central American and Latin America and the Caribbean Department.

———. 2007a. Nicaragua: Public Expenditure Review." Decision Meeting Draft, May 29. Washington, DC: World Bank.

———. 2007b. EdStats (World Bank Comprehensive Database of Education Statistics). Available at http://devdata.worldbank.org/edstats/td.asp.

———. 2007c. Productivity and Investment Climate Private Enterprise Surveys. Available at http://iresearch.worldbank.org/InvestmentClimate/main.html

———. 2007d. World Development Indicators (WDI). Available at http://publications.worldbank.org/register/WDI?return percent5furl= percent2fextop percent2fsubscriptions percent-2fWDI percent2f.

CHAPTER 8

Trinidad and Tobago: Economic Growth in a Dual Economy

*Daniel Artana, Sebastián Auguste, Ramiro Moya, Sandra Sookram, and Patrick Watson**

Introduction

Trinidad and Tobago is a middle-income,[1] energy-rich country with relatively strong institutions and political stability. It is the most industrialized economy in the English-speaking Caribbean, with a population of 1.3 million and a territory of 5,128 km^2. It is part of the Caribbean Community (CARICOM), a regional cooperative Trade and Common Market agreement that became operational in August 1973. Its energy sector accounts for more than 40 percent of GDP and 80 percent of exports, but only 5 percent of employment. It is the most important world provider of ammonia and methanol, as well as the largest supplier of liquefied natural gas to the United States. The country is currently enjoying a period of unprecedented prosperity because of high energy prices: economic growth has averaged 7.7 percent per year since 1994 and socioeconomic indicators are improving.

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* Daniel Artana, Sebastián Auguste, and Ramiro Moya are affiliated with the Fundación de Investigaciones Económicas Latinoamericanas (FIEL) in Buenos Aires, Argentina. Sandra Sookram and Patrick Watson are affiliated with The University of the West Indies.

[1] Per capita GDP was US$10,440 in 2005.

Trinidad and Tobago has the features of a dual economy. The energy sector is a source of self-financed investment, making it independent of national savings and fiscal revenues. However, the benefits of large investments in the sector do not easily spill over to the rest of the economy. Beyond the labor-intensive plant construction phase, the booming energy sector is not creating a comparably large number of jobs. This duality results in a wealthy sector with excellent growth prospects, with the rest of the economy lagging behind.

Many of the economic problems and constraints to growth that the country has faced historically are common to other oil-and-gas-rich countries: problems such as elevated macro volatility and underdevelopment of the non-energy private sector. In addition, the country in the past has had a highly procyclical fiscal policy, which exacerbated the macro volatility and underinvestment in infrastructure.

An important puzzle to be solved is why resources from the oil and gas sector do not flow to the non-oil tradable sectors. These two sectors are not independent: the abundance of natural resources and the development of the oil and gas sector might be the most important cause for the underdevelopment of other sectors, a phenomenon called Dutch Disease. However, the problem of countries abundant in natural resources is more general than the Dutch Disease problem. For instance, the fact that most of the government's revenues comes from oil and gas, and not from general taxes, might affect fiscal responsibility, public expenditure might be more inefficient, and institutions might be weaker. Any growth-related problem associated with natural resource abundance will be referred to as the "natural resource curse."

The country has made some effort to diversify the economy and reduce the macro volatility during the last 12 years. There have been several reforms in an attempt to avoid procyclical fiscal policy and a stabilization fund has been created. The current government has actually outlined a program to achieve a Vision 2020 goal to become a developed country by 2020. A key objective of Vision 2020

is sustained and balanced growth, where the benefits from growth spread out to the entire population. What additional steps should Trinidad and Tobago make to achieve sustainable growth? How can the country achieve balanced growth? How can the country benefit the most from oil and gas revenues? Is it possible that the current macro prosperity is concealing constraints on growth? What are the risks that Trinidad and Tobago faces in achieving sustained growth? These are the type of questions that this chapter addresses, using the growth diagnostic methodology (GDM) developed by Hausmann, Rodrik and Velasco (2005). According to this methodology, to identify policies that foster economic growth, it is necessary first to identify the constraints that limit investment, and then establish a priority order. The most binding constraints are defined as those that, once removed, will have the largest impact on economic growth.

The set of binding constraints is not static, but changes as the economy evolves. After the elimination of one binding constraint, new binding constraints might emerge. It is therefore possible that the numerous reforms Trinidad and Tobago has undergone in the last two decades have modified the set of constraints on growth, and new constraints are now binding, or may become binding in the near future. For this reason it is important to analyze the case of Trinidad and Tobago in a dynamic setting, to further understand the history of the economy and its future. Further, the current high energy prices and strong economic growth might be concealing constraints that could be binding or could become binding if the oil price boom ends or oil reserves are depleted.

A shortcoming of the growth diagnostics methodology is that it does not provide guidance on how to identify potential binding constraints so as to permit policy design that can curtail the effect of such constraints. Since the constraints are identified using stock and flow variables, only those binding constraints that are reflected in the data today can be identified. Because the growth process results from past and current decisions, which have been taken in different economic environments, the signals being sought in the data contain information about old and new constraints, and

some of them might no longer be binding. For these reasons, the signal extraction should be based on decisions made under recent conditions: more than analyzing the actual growth process, this study will focus on the most recent decisions of firms and families to identify the current binding constraints. To do this, this study will complement the standard GDM analysis with a business survey particularly targeted at the non-energy sector. The justification for making a specific differentiation between the energy and non-energy sectors lies in the fact that these sectors might face different binding constraints. The energy sector is robust enough, with a production technology different enough, to overcome several constraints. If Trinidad and Tobago wants to achieve more balanced economic growth and reduce dependence on energy, it has to identify the constraints facing the non-energy sectors. This is the main objective of this study.

The rest of this chapter is organized as follows. The next section briefly describes the main characteristics of the economy of Trinidad and Tobago. The third section briefly summarizes the growth diagnostic framework used in this study and the prior beliefs regarding Trinidad and Tobago's problems, using a growth decision tree. The fourth section analyzes the binding constraints on growth from the business perspective, where it is shown that most of the business concerns are related to the lack of opportunities. The fifth section analyzes the access to and cost of financing. The sixth section explores the binding constraints through the analysis of survey data. The seventh section examines the issue of social returns. The eighth section looks at appropriability. The ninth section attempts an open forest analysis of the country's potential for diversification. The tenth section looks at the issues of capacity, innovation, and learning. The eleventh section concludes the paper.

Trinidad and Tobago: Stylized Facts

The sugar-based economy of the nineteenth century became oil-based in the twentieth century, with the discovery of oil in Trinidad. Oil

and oil-related exports eventually dominated the economy, which resulted in the transformation of much of the population from a rural to an urban one. Trinidad and Tobago has frequently escaped the wrath of major devastating hurricanes and the major shocks the economy has suffered have almost always been related to energy price fluctuations.

The economy of Trinidad and Tobago is highly dependent on the oil and gas industry. In 2006, the petroleum industry (including petrochemicals) accounted for approximately 45 percent of GDP, in current prices and at factor costs (or 41.2 percent, in real TT$.). Services are the other important sector, with a GDP share of 48.7 percent (government services represent 14.6 percent of total services). Manufacturing and agriculture, together, account for the remaining 6.3 percent of GDP.

The recent economic history of Trinidad and Tobago shows a period of relatively high growth with stable international oil prices (1950–73), a period of high growth with high oil prices (1974–82), a long period with negative (per capita) real growth (1983–93), and the recent growth boom.

The share of the petroleum industry in total GDP (on average, 34 percent in the last 40 years) has increased significantly in the current boom, from a relatively low 25 percent in 1985–1994 to 45 percent at present. By contrast, the share of the nonpetroleum sector has been steadily decreasing. Although the petroleum share has been positively correlated with energy prices, the current situation is more related to new discoveries in gas-related industries (the discovery of new gas reservoirs, but also new products such as urea, liquefied natural gas, ammonia, and methanol), rather than prices. Since 1991, 90 percent of net capital formation has been directed to the petroleum industries. As a consequence, the dependency on the energy sector has increased.

As a result of the dependence on energy, the Trinidad and Tobago economy has been very volatile, both in nominal and real terms. Per capita real GDP in the last 50 years has been one of the most volatile among a set of comparable economies (only Kuwait

and Saudi Arabia, other oil producer countries, are as volatile as Trinidad and Tobago). Economic cycles also have a peculiar shape, with large amplitudes and long recovery periods. The recent development of the gas industry might not be strong enough to isolate the economy from energy price shocks, since prices are highly correlated

While its business platform is sound, Trinidad and Tobago firms lack the necessary strength, and with the exception of the energy sector, no healthy clusters have been developed and few local firms can provide sophisticated services to foreign energy companies (Fairbanks et al. 2006). Energy income has not led to the development of world-class companies. Whereas oil and gas revenues have financed local consumption, they have contributed little to investment in the country's future productive capacity. The country gains a considerable amount of revenue from the oil and gas-related industries, but sophisticated upstream energy industries (such as geological modeling, deep-sea drilling, or equipment manufacturing) have developed little, and downstream industries have focused on low-end commodity goods (such as PET plastic to create inexpensive patio furniture).

Trinidad and Tobago has been enjoying trade and current account surpluses and large inflows of foreign direct investment. Although the central bank has been accumulating reserves,[2] there has been a moderate real exchange rate appreciation, mainly through inflation.

The energy and non-energy sectors grew fairly evenly until the late 1990s. The strong increase in energy prices accelerated growth, but distorted the balance. Since 2000 the growth rate of the energy sector has been almost double the rate of the non-energy sector. The average growth rate for the non-petroleum sector in the 2000–04 period was 3.75 percent, compared to 6 percent in the 1994–09 period. Some sectors such as tourism fell from a 4.9 percent annual

[2] Foreign assets increased from US$1.4 billion in January 2000 to US$8.6 billion in January 2007.

growth rate for 1994–09 to –3.4 percent in the 2000–04 period. In this period, the petroleum sector alone accounted for almost 65 percent of total GDP growth, and, together with the services sector, for 93.5 percent of real GDP growth.

Is this a break in the balance or just a temporary situation? What particular conditions does the non-energy sector face so that it does not grow at the same rate even when oil prices are skyrocketing? Is there any relationship between the energy sector's fortunes and the deceleration in the non-energy sectors? Is this a sign of Dutch Disease? This interrelationship between the energy and non-energy sector, and the particular conditions in the non-energy sector long-run growth, are the keys to understanding Trinidad and Tobago.

Growth Diagnostic Methodology

The growth diagnostic methodology (GDM), proposed by Hausmann, Rodrik, and Velasco (2004), decomposes economic growth in the following way:

$$\underbrace{g}_{\textit{Economic growth}} = \sigma \left\{ \underbrace{\underbrace{(1-\tau)}_{\textit{appropriability}} \quad \underbrace{\rho}_{\textit{social returns}}}_{\textit{private return to accumulation}} - \underbrace{r}_{\textit{cost of financing accumulation}} \right\}.$$

In the case of a dual, natural resource-abundant economy such as Trinidad and Tobago's, an aggregate view is not enough to understand the growth opportunities and binding constraints: the growth opportunities of each sector and their interactions need to be understood, since the constraints may be different for non-energy and energy activities. The main features of the dual economy and growth are summarized in Figure 8.1.

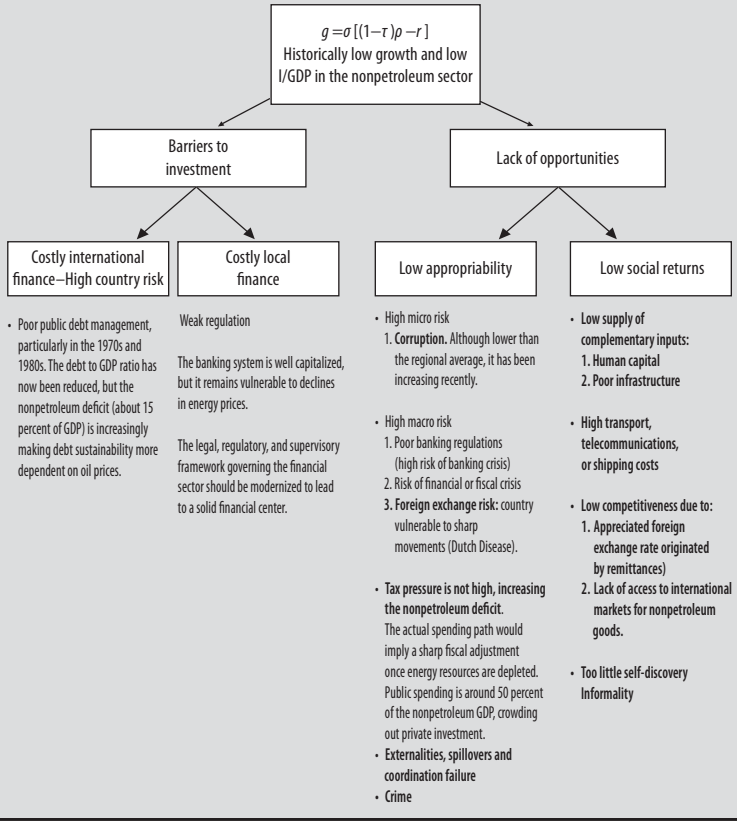
A major concern for Trinidad and Tobago is the diversification of economic activity, and preparing for the time when oil and gas reserves are depleted. The binding constraints on growth in the

FIGURE 8.1 Duality and Economic Growth in Trinidad and Tobago

Petroleum Sector	Nonpetroleum Sector
Currently high growth and high investment	Currently high growth boosted by the high international prices for oil and gas.
Growth opportunities depend on international price for oil and gas, and proven reserves (currently 12 years)	Growth in this sector is due to services (which explains almost 80 percent of the accumulated growth in the non-petroleum sector between 2002 and 2006)
Growth possibilities in services related to the petroleum sector and downstream industries	Lack of growth autonomy (growth has been highly dependent on the petroleum sector)
The government objective, as stated in Vision 2020, is to develop downstream petrochemical plants that use semi-processed inputs (under the assumption that they could be imported once energy reserves are exhausted).	Tradable sector underdeveloped.

Source: Authors.

FIGURE 8.2 Growth Diagnostic Tree for Trinidad & Tobago



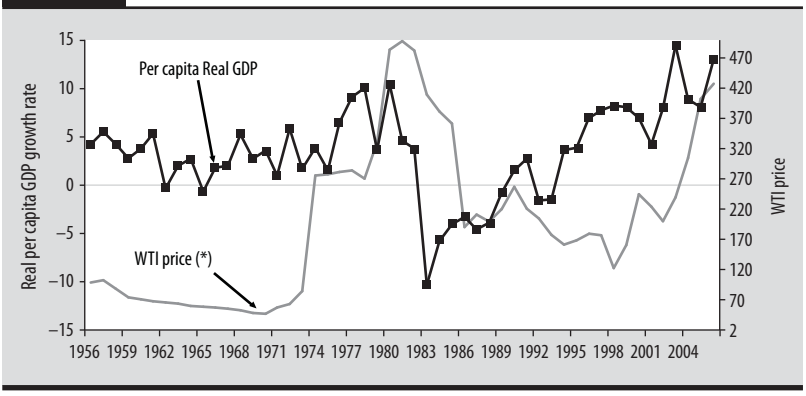
non-energy sector in Trinidad and Tobago are outlined in Figure 8.2. The rest of this work will attempt to identify which of these potential constraints on growth are binding.

Economic Growth and Investment

Trinidad and Tobago's problem does not seem to be its growth rate (8 percent on average over the past decade), but its capacity to achieve sustained, balanced growth and avoid the effects of energy price shocks (see Figure 8.3). Specialization in the energy sector is not only a reflection of factor abundance, but also a reflection of the country's growth path. If the non-energy, tradable sector grew at the same rate as in other fast-growing economies (like Korea), the petroleum sector would account for no more than 20 percent of GDP today, instead of 50 percent. The fact that copper-rich Chile, for instance, has at present a relatively well-diversified economy is a reflection of its success in achieving balanced growth and the discovery and development of noncopper activities.

It is interesting to compare Trinidad and Tobago's growth with that of eight benchmark countries (Elias, Jaramillo and Rojas-Suárez, 2006): the four developed economies of Iceland, Ireland, Norway,

FIGURE 8.3 Growth Rate and Oil Price



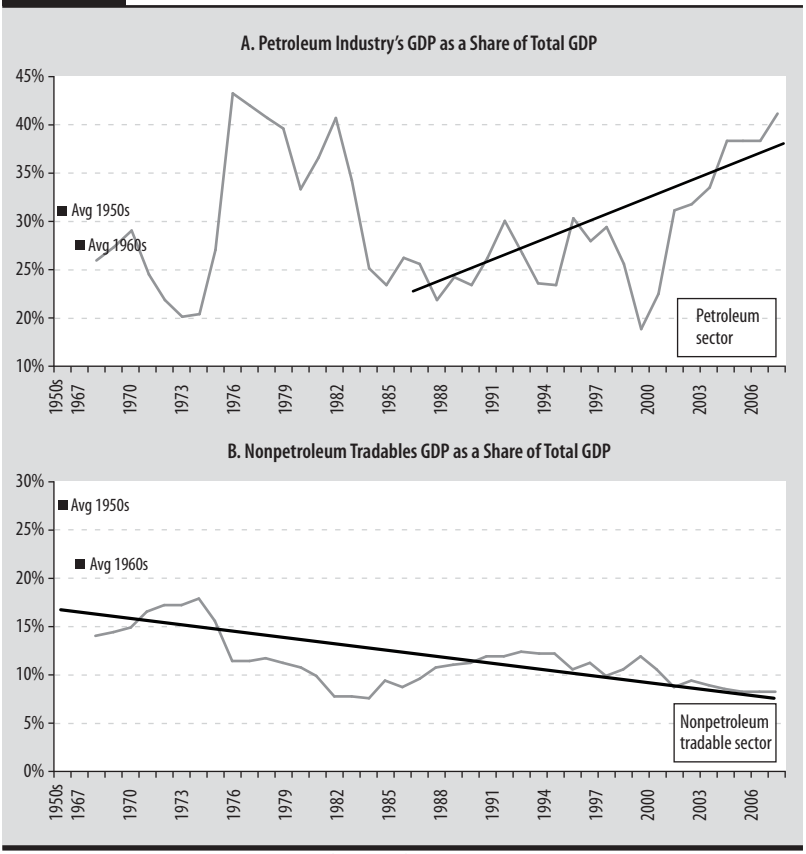
Source: University of Pennsylvania (Penn World Table Statistics) for 1950–1965; Central Statistical Office for 1965–2006.
Note: Primary axis shows the growth rate of the real GDP per capita (at 1955 prices) and secondary axis the evolution of the price of * West Texas Intermediate crude oil (WTI) in constant 1955 US$ (index 1995=100).

and Singapore; and the four fast-growing developing economies of Chile, Costa Rica, Malaysia, and Mauritius. Over the 1970–2006 period, all these countries grew faster, except for Norway. The relative performance of Trinidad and Tobago is highly influenced by the current growth acceleration process. From 1970 to 1995, Trinidad and Tobago grew at only 2 percent annually, compared to 5.4 percent or 5.5 percent for the average benchmark economy. Because Trinidad and Tobago is now growing faster than benchmark countries, it is catching up with developed economies such as the United States, but it is still below the maximum relative level reached in the previous oil boom.

Another interesting comparison is between the share of petroleum in total GDP and the corresponding share of nonpetroleum tradable goods and services: whereas the petroleum industry has sustained its share over the last 50 years (around 30 percent), the nonpetroleum tradable sector shows a sustained decline, going from almost 20 percent in the early 1970s to 6.2 percent in 2006 (Figure 8.4). This observed trend is consistent with the predictions of Hausmann and Rigobon (2002). The volatility of energy prices generates risks in the nonpetroleum tradable sector, which impedes its development, but at the same time its shrinking share makes the economy even more vulnerable to energy price shocks.

Patterns of investment are another story. During the last 15 years, the average ratio of gross fixed capital formation (GFCF) to GDP in Trinidad and Tobago was 19.5 percent. For the 1970–2000 period, this ratio was similar to Costa Rica's and above Chile's (these two countries have a higher real GDP per capita average growth for the same period). But part of this relatively good performance is the high investment ratios observed in the previous oil boom. When Trinidad and Tobago is compared with the benchmark countries, its capital formation seems low. Chile, for instance, had an average ratio of investment to GDP of almost 20 percent between 1985 and 2004, compared to 14.9 percent for Trinidad and Tobago.

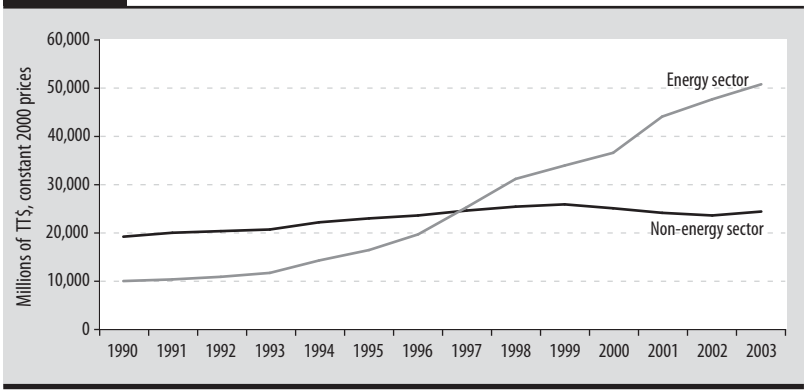
FIGURE 8.4 Share of Petroleum and Nonpetroleum Tradable Sectors of GDP (at factor cost), 1952–2006



Source: Authors' estimations based on Central Statistic Office public information.

Estimates of the capital stock, based on a method developed by Watson (1997), show that between 1991 and 2003 the stock increased by 147 percent. The annualized rate of 7.2 percent exceeds the GDP growth rate of 5.9 percent per year, which indicates that the economy is becoming more capital-intensive. A striking feature of the recent investment process in Trinidad and Tobago is the large heterogeneity by economic sector: the capital stock in the petroleum sector increased by 388 percent (an annual rate of 14.1 percent) while in the nonpetroleum sector it increased by only 22 percent (or 1.54 percent annually).

FIGURE 8.5 Evolution of the Capital Stock in Energy and Non-energy Industries, 1990–2003



Source: Authors' calculations
TT$ = Trinidad and Tobago $

Some non-energy sectors show better (net) investment rates, such as manufacturing, financial services, and agriculture (accumulated rates of 90 percent, 52 percent, and 32 percent, respectively). Some sectors show strong net reductions, such as tourism, other services, and infrastructure services (accumulated rates of –4 percent, –12 percent, and –49 percent, respectively). Even in the manufacturing sector, the overall high rate is due to high rates in two subsectors only: the chemical & nonmetallic minerals, and assembly-type & related industries, the two fastest-growing industries in this period. The other subsectors show low growth. The rate of capital formation in the non-energy sector stagnated, with a positive but small growth in 1994–99 and a slight decrease in 2000–3. Overall growth in both the energy and non-energy sectors reflect the growth in investment in the respective sectors: it is booming in the one and sluggish in the other.

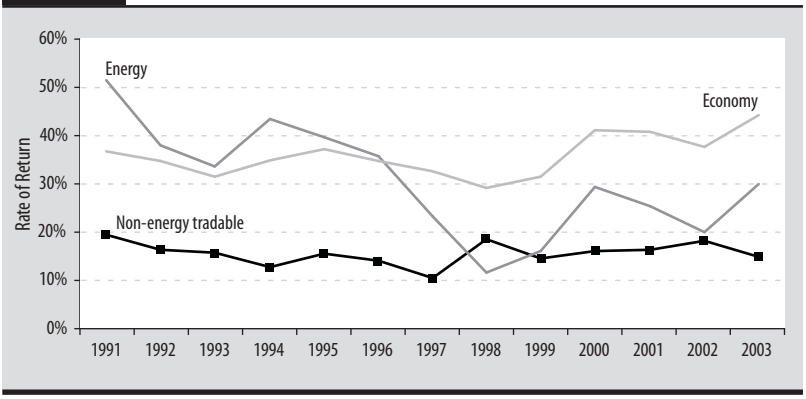
The observed pattern of capital formation shows that the economy, rather than diversifying away from energy industries, is specializing even more in them. With the low net capital formation in the non-energy industries (with a few exceptions), it is not surprising that this sector has been growing more slowly in recent years compared to the mid-1990s.

The pattern of returns to capital in the energy and non-energy tradable sectors seems to be more in line with a Dutch Disease-type of problem than a financial constraints problem. This study computed the rate of return to capital in the petroleum and nonpetroleum tradable sectors. The rate in the petroleum sector is almost double that in the nonpetroleum sector. The accumulation of capital stock is therefore following a reasonable pattern: capital is flowing to the most profitable sectors. The returns in the petroleum sector have been more volatile (with a coefficient of variation of 0.35, as opposed to 0.14 in the nonpetroleum tradable sector), and there is a negative correlation between both returns (correlation coefficient –0.11).

The petroleum sector has been characterized by high capital formation and decreasing returns, while the nonpetroleum tradable sector has shown low capital accumulation and flat or slightly increasing returns. For the entire non-energy sector (tradable and nontradable), the return to capital shows a slightly increasing pattern due to a very high increase in the return for services, particularly in 1998–2003.

The return to capital for the energy and nontradable sectors (for which the estimation is more reliable) seems high when com-

FIGURE 8.6 Rates of Return for Petroleum and Nonpetroleum Tradable Sectors, 1991–2003



Source: Authors' calculations.
Note: The non-energy tradable sector includes agriculture, manufacturing, and tourism.

pared to developed economies. Poterba (1997), for instance, reports an accounting rate of return for business assets in the Group of 7 industrialized countries (G-7) of approximately 15.1 percent for the 1990s, and 14.3 percent for the 1966–96 period. The relative high rate of return found here is in line with the findings for other developing economies. Relative risk in G-7 countries, however, as measured by the Sharpe ratio,[3] is almost half that of Trinidad and Tobago's non-energy tradable sector, which means that the relatively high returns of Trinidad and Tobago are not high enough to compensate for the risks.

The fact that returns show a different pattern in the non-energy tradable and nontradable sectors (where investment is low) seems to be inconsistent with the aggregate financial constraint hypothesis, since a clear increasing trend in returns would be expected for both sectors in the event of capital flight.

Identifying Binding Constraints on Growth Using Micro (Survey) Data

The GDM approach is used to identify the binding constraints on growth using macro and micro evidence. Business is one of the key players in the economic growth process and such constraints affect profitability and growth opportunities. In addition, there could be important differences in the binding constraints by economic sector. The GDM analysis is therefore complemented with micro data collected from a survey of 500 firms, mainly in nonenergy sectors. The sample was designed to capture the opinions of the non-energy sector, but included a small number of energy sector firms (six companies that provide services in the energy sector).

Firms were asked whether they thought any external factors were limiting their growth (see Table 8.1). Some 57 percent indicated that they face constraints on growth that do not depend on firm

[3] This is a measure of the risk-adjusted return (ratio of average return to the standard deviation).

TABLE 8.1 Main Constraint to Growth by Firm Size
(as a percent of firms answering this question)

Firm size	Ranking	Bad regulations	Costly finacing	Lack of human capital	Low profitability	Poor access to foreign market	Poor infrastructure	Macro risks	Poor management	Other
Small	1st	13.9	31.3	18.8	22.9	13.6	13.3	31.0	18.0	3.2
	1st or 2nd	18.0	37.4	33.6	38.3	19.7	21.7	34.2	24.1	3.8
Large	1st	8.5	14.9	17.0	36.2	21.3	10.6	59.6	29.8	4.3
	1st or 2nd	17.0	27.7	29.8	53.2	36.2	21.3	66.0	40.4	4.3

Source: Authors' survey.

management. Interestingly, this result is stronger for energy sector firms and manufacturing. The ratio is higher for exporters than for non-exporters,[4] which is consistent with a Dutch Disease–type of argument: when the energy sector is booming, it imposes more economic stress on other tradable sectors, limiting their growth opportunities. The ratio also increases with firm size. Since firm size is related to the age of the firm, an explanation might be the firm growth curve: as a firm matures, it is more likely to be able to deal with internal limitations, and the risks and problems it now faces are more related to factors outside the firm.

The most limiting constraint on growth and development that firms face in the economic sector in which they operate is "macro risks" (selected by 38 percent of respondents), followed by "costly financing" (30 percent) and "low profitability" (25 percent). Although firms complained about the quality of infrastructure and services, only a few identified this as the most limiting factor. This answer may be interpreted as a revealed preference or priority ranking: infrastructure might be a problem, but it is not the most important constraint to business growth. The most cited constraints, irrespective of ranking, were "low profitability," "costly financing," "lack of human capital," and "macro risks," in that order.

Most firms, regardless of size, selected options from the "lack of opportunities" branch of the growth-diagnostic tree. Inside this branch, "low returns" dominate over "appropriability" in importance. If the analysis is restricted to firms that are individually constrained, the results are similar (with low return losing some weight but remaining the first option). It may be concluded, therefore, from a business perspective, that the problem for the non-energy sector is low returns rather than costly financing or low appropriability.

The smaller the firm, the more weight that survey respondents place on "costly finance." The larger the firm, the more weight is put on "appropriability" and "low profitability." In terms of the in-

[4] That is, firms oriented to the domestic market.

TABLE 8.2 Distribution of Constraint to Growth by Factor Type
(as a percent of firms reporting a problem)

	Costly financing	Lack of opportunities			
Ranking	Costly financing	Appropriability	Poor complementary inputs	Low profitability	Total
1st	17.6	29.1	39.0	14.3	100.0
1st or 2nd	15.7	25.0	41.8	17.6	100.0

Source: Authors' survey.

dividual factors, for large firms, "macro risks" is the most binding constraint, followed by "low profitability" and "poor management." For small firms, the most binding constraint is "costly financing," followed by "macro risks" and "low profitability." Again, since the sample is overrepresented by small firms, for the economy as a whole, the constraints identified may be closer to those identified by the large firms rather than those noted by the smaller firms in the sample.

When the analysis is broken down by economic sector, the manufacturing sector (tradable) placed more weight than the distribution and services sector (nontradable, for the most part) on "appropriability." "Lack of complementary inputs" is particularly important for services (which are more labor-intensive than capital-intensive), whereas "costly financing" is more important in distribution. "Low returns" represents around 50 percent of the most binding constraints for the three sectors and is, therefore, the most binding constraint regardless of economic sector.

When the sample is disaggregated according to exporters and non-exporters, both select factors related to "low returns" as the most binding constraints. Exporters put more weight on "macro risks" and non-exporter firms put more weight on "costly finance."

In summary, from a business perspective, financing constraints are not the most binding constraints for Trinidad and Tobago, but rather the lack of opportunities, regardless of the economic sector and firm type.

Financial Constraints

The saving rate in Trinidad and Tobago is above the average for Latin America and the Caribbean (LAC), and historically exceeds the gross fixed capital formation rate for the region (that is, it is a net saver country). It has the highest foreign direct investment (FDI) to GDP ratio in LAC (an average of 8.4 percent over the 2001–05 period, compared to the LAC average of 3 percent) and a large capital account surplus (for 1999–2006). Its sovereign debt attained investment grade in July 2005 (Standard and Poor's),[5] its financial system is sound, and it has never suffered a financial crisis. Its banking system is relatively sophisticated, dynamic, and well-capitalized; it does not appear vulnerable to the weaknesses in the regional economies and it is evolving as a regional financial center (IMF, 2003).

Using the World Development Indicators (WDI) database for 129 countries, countries were clustered into three groups (low-cost, high-cost, and extreme-imbalance countries). Trinidad and Tobago belongs to the low-cost group, with a lower-than-world average interest rate spread, lower-than-world average real interest rate, and higher-than-world average savings rate. In this group there are 79 countries reporting the most favorable financing conditions, including emerging and developed economies such as Australia, Canada, Chile, France, Germany, Russia, South Africa, Switzerland, and Venezuela, as well as Albania, Argentina, Ethiopia, Honduras, Nigeria, Thailand, and Vietnam. For the group, the average interest rate spread is around 6 percent, the real interest rate is close to 6 percent, and savings-to-GDP ratio is around 25 percent.

Within the low-cost group, Trinidad and Tobago is close to the average, ranking 60th out of 129 countries with regard to interest rate spreads, 47th with regard to the real interest rate, and 41st with respect to savings to GDP ratio. This suggests that Trinidad and Tobago is not financially constrained, at least from the macro perspective.

[5] Only three other countries in the region have this grade: Barbados, Chile, and Mexico.

Trinidad and Tobago has a relatively mature stock market with high market capitalization, but only a few local firms are listed: of the 28,621 businesses operating in Trinidad and Tobago in 2005, only 28, or less than 0.1 percent of the total, are listed. The corresponding ratios for the United Kingdom and Canada are 14.3 percent and 11.8 percent, respectively.

The reluctance of Trinidad and Tobago firms to list is a result of five main factors: the legacy of ownership of firms; the structure of capital markets; the regulatory framework of the respective domestic capital markets and the perceived risks associated with using the local securities markets; the fact that markets are nontransparent and are controlled by a few major market actors (interlocking directors); and the high cost of listing in the local stock exchanges (Sergeant 2006).

Despite the apparently low percentage of publicly listed firms, market capitalization as a ratio of GDP is relatively high (115 percent) and similar to the average for high-income countries (113 percent), but very biased to the finance sector (68 percent of total market capitalization, whereas manufacturing and tourism represent only 9 percent and 0.5 percent, respectively). This relatively high market capitalization is due to cross-listing with other Caribbean countries and the large increase in firm value since 2000 (at that time, market capitalization was just 53 percent of GDP).

A Financial Sector Assessment (FSA) carried out in 2006 by the World Bank and the International Monetary Fund (IMF) concluded that increased savings and limited domestic investment were responsible for the upward pressure on asset prices (and balance sheet values of pension funds, mutual funds, and insurance companies). Increases of around TT$90 billion in market capitalization since 1997 were due mainly to increases in share prices (around 75 percent). Most of the TT$31 billion worth of new equities raised in the market were bonus issues and overseas cross-listings, and only 10 percent involved new capital raised by local firms. These cross-listings have given regional companies access to capital in Trinidad and Tobago and provided an important outlet for domestic

savings. It seems that there are enough resources to finance local firms through the local stock exchange market, but firms are not using the option.

Using cluster analysis, the 162 countries in the WDI database were classified into three groups: low, medium, and high financial depth. Trinidad and Tobago is among the countries with low financial depth, together with the majority of developing countries, though it is among the top performers in that group. According to the 2006 Financial Sector Assessment, expansion of financial access has been limited over the past decade. For instance, credit unions have grown rapidly, but a large part of the increase in assets has taken the form of financial investments rather than lending to members. Furthermore, the provision of financial services to small and medium-sized enterprises (SMEs) through other institutional channels has also not grown significantly because of the high costs and risks associated with SME lending, as well as profitable investment opportunities available to commercial banks outside of this sector.

The survey showed that bank loans represent the first option for financing business activity. On average, 51.8 percent of a firm's last investment was financed with bank loans. The most common case is for banks to finance between 50 percent and 60 percent of the last investment (64 firms) and 62 percent of the firms financed at least 30 percent of new investment with bank loans. These findings suggest that formal credit is available.

The second most common option is retained earnings, which on average financed 35 percent of new investments. New equity and informal lenders financed only a small proportion of total investment. For the other sources of financing (representing 7.1 percent), the most common case was financing through loans from related companies, used more frequently by firms in the energy sector.

Some 81 percent of firms using bank loans were small firms (with fewer than 24 employees), representing 38 percent of the small firms in the sample. The small firms that did not use bank loans relied mainly on retained earnings, which represent 75 percent of the last investment for this subgroup. Medium-sized firms used

bank loans more, and only a small proportion did not use bank loans at all. A relatively large proportion of large firms did not use bank loans, but 64 percent of these firms were using loans from related companies.

Manufacturing firms relied the most on bank loans. Energy companies relied more on retained earnings and loans from related companies. New equity represented a small ratio across the board, and informal lending was relatively important only for services sector firms.

Some 80 percent of all firms were required to provide collateral, amounting to approximately 80 percent of the total investment, for their most recent loans (2005–07). They paid an interest rate of 12.5 percent annually for a 37-month loan and only 10 percent of the firms took loans denominated in a foreign currency. There were no differences according to firm size in the proportion of loans requiring collateral. The larger the firm, the higher was the value of the collateral required (as a percent of the investment). Large firms paid an interest rate that was almost 100 basis points lower than small and medium-sized firms, with a longer duration but with a higher proportion of the loans denominated in a foreign currency.

Based on the World Bank's Investment Climate Survey (ICS), Trinidad and Tobago firms use bank financing more than their counterparts in benchmark (comparator) economies and less retained earnings and new equity. For the average firm in Trinidad and Tobago, bank loans represent 47 percent of financing, compared to 30 percent in Latin America or 36 percent in East Asia. Informal lending is also very high in Trinidad and Tobago (5 percent), almost twice the ratio for East Asia (2.5 percent), which is the region with the highest ratio. On the other hand, retained earnings and new equity together represent 48 percent of total financing equity in Trinidad and Tobago, much lower than in East Asia (62 percent), the region with the highest ratio.

In addition, the average duration of a loan in Trinidad and Tobago (37 months) is above the average for the entire ICS survey

(35 months). More noteworthy, the required collateral for Trinidad and Tobago firms (77 percent of loan value) is well below the ICS survey average (150 percent) and is in the lowest 5 percent of the distribution at the country level.

The macro evidence shows that credit conditions are good in Trinidad and Tobago: the country has enough resources and financing is relatively cheap. In addition, the micro evidence shows that a high proportion of new investment in the non-energy sector is financed through the banking system under reasonable conditions in terms of interest rates and collateral requirements). Therefore, credit availability is not a binding constraint on growth. Nevertheless, financial depth and access to finance are somewhat inadequate. The only explanation for this is that the demand for loans is weak, indicating that the problem outside the energy sector is the lack of opportunities.

Social Returns

In the last 30 years, Trinidad and Tobago has attempted to universalize secondary education. Its gross enrollment ratio increased from 68.8 percent at the end of the 1970s to 83.8 percent in 2004. However, within the Caribbean region, Trinidad and Tobago has educational indicators close to the regional average, although its income level is well above the average. Furthermore, it ranks below the regional average in terms of net and gross enrollment rates for both primary and secondary education; the duration of compulsory schooling (7 years compared to the regional average of almost 10 years); average years of schooling (in this case, just below the regional average), and the ratio of expenditures on education to GDP (4.3 percent while the regional average is 5.9 percent).

The enrollment ratio in higher education is also low. Just 6 percent of the labor force has higher education, compared to 26 percent in developed countries. Recently, Trinidad and Tobago has attempted to increase the number of students at the tertiary level by creating a new university, introducing nontraditional courses, and

eliminating fees at the tertiary level. As a result, the gross enrollment ratio at the tertiary level increased from 6.8 percent in 1990 to 11.9 percent in 2004.

Years of schooling in Trinidad and Tobago are well below the expected amount for a country of its income. Not only is the level of schooling the second lowest among the upper-middle-income (UMI) countries; it is also low compared to LAC and oil-exporting (OIL) countries. In primary education, there has been almost no improvement in the enrollment ratio in the last 20 years (the net enrollment ratio increased from 91.6 percent in 1985 to 92.2 percent in 2004). This ratio is above the average for UMI countries (91.9 percent), but below the average for LAC (95.3 percent), and below the average for the Caribbean region (94 percent). In secondary education, the net enrolment ratio of Trinidad and Tobago is similar to the average of the three comparator regions, but is below the level expected for its income category. Most significant is the very low enrollment ratio in tertiary education: it is the lowest among OIL countries, the second lowest among countries with a similar income level, and well below the Latin American average. Finally, public expenditures on education are above the LAC average, and close to the average for UMI countries, but below the average for OIL countries.

Does the relatively low average years of schooling mean that Trinidad and Tobago has a scarcity of human capital? This study expanded the results of Hausmann and Rodrik (2005) to include Trinidad and Tobago and found that returns to finishing primary education are among the lowest in Latin America, and very close to that of a developed economy such as the United States. The returns to finishing secondary education are also low; only the Dominican Republic in the Caribbean has a lower return. The returns to finishing higher education depend on how non-university tertiary education is classified. If it is classified as higher education, the returns to higher education are very low and among the lowest in Latin America. If non-university tertiary education is included with secondary education, or as an entity in its own right, then the return to higher education is slightly above the Latin American average and

well above the returns for developed countries such as the United States. What is significant for Trinidad and Tobago is the difference in returns between university and secondary education. The additional premium for completing university education is among the highest in Latin America no matter how non-university tertiary education is treated.

Returns to education at all levels are higher in the more industrialized island of Trinidad than in Tobago. The difference is even more striking for those finishing university education. Since the difference is tantamount to a premium for workers and not for where the individual was born, the difference in wages is likely to be related to the difference in GDP composition (or economic activities). Most of the manufacturing and energy companies are located in Trinidad, whereas in Tobago 56.8 percent of workers are employed in the tourism sector and most of the others are employed in the public service.

Between 1998 and 2004, the returns increased for all levels of education. This happened in a period when years of schooling increased because of higher enrollment in secondary and higher education. Even when the proportion of workers with tertiary education increased by 16 percent between 1998 and 2004, the demand for educated labor was strong enough to bring about higher returns in a period of high accumulation of human capital.

The relatively greater returns to higher education seem to contradict the high migration of educated people (brain drain). Defoort (2006), for instance, found that Trinidad and Tobago has one of the highest emigration rates for skilled workers in the world, well above the Central American average. To some extent, the brain drain has been a common problem for the Caribbean. What is interesting is that this evidence of brain drain contrasts with the high proportion of foreigners working in Trinidad and Tobago, particularly among the most educated individuals. In 1998, 13.2 percent of the workers with university degrees were foreigners,[6] but as the university level

[6] Continuous Sample Survey of Population (1998).

has been increasing its intake of students in Trinidad and Tobago this ratio has been falling quickly: by 2004 only 8.1 percent of university-educated workers were foreigners.

Part of the explanation for the high returns and high migration of skilled workers might be due to a problem of mismatching. For instance, local universities may not be educating professionals according to local market demand. To test this hypothesis, standard Mincer equations were independently estimated for the energy and non-energy sector. Returns are similar between both sectors for primary and secondary education, and only slightly higher in the energy sector for university education, which provides very weak evidence of market segmentation.

Another explanation could be the large difference in real wages a highly educated individual could obtain in other countries compared to Trinidad and Tobago. The premium for finishing university in Trinidad and Tobago might be high, but the real wage an employee obtains in Trinidad and Tobago may be lower than the wage a worker can obtain abroad, which may be an incentive to emigrate. If migration possibilities were similar at all levels of education, the premium in Trinidad and Tobago should be (by arbitrage) similar to the premium in the developed countries to which they migrate. Therefore, to observe a high premium for a university degree and migration of highly qualified workers simultaneously, it must be the case that migration is more difficult for lower educated workers (a hypothesis that cannot be tested with the available data). A particular advantage for Trinidad and Tobago migrants is their proficiency in English, which may make them particularly attractive to English-speaking developed economies such as the United States and the United Kingdom. Another advantage is that the country is part of the Commonwealth, which may also facilitate the migration of educated people.

What about quality issues in education? Trinidad and Tobago participates in two international performance evaluation exercises related to the secondary regional examinations of the Caribbean Examination Council (CXC) in English and mathematics. The results

of these tests show that Trinidad and Tobago is above the regional average, but countries with a lower GDP per capita and lower spending per pupil in secondary schools, such as Belize and Dominica, outperform Trinidad and Tobago on both tests.

The quality of education is one of the most important issues among the Caribbean countries and high spending has not been commensurate with educational outcomes (World Bank, 2005). One way in which the quality of education in Trinidad and Tobago can be indirectly compared with countries outside of the Caribbean region is to examine the returns to schooling for immigrants to the United States (or another large economy) who have finished their studies in their countries of origin. This is precisely what Bratsberg and Terrell (2002) did. Since Hanushek and Kim (1999) found a strong correlation between the implicit quality index obtained from Mincer equations for immigrants in the United States who have studied in their countries of origin, while controlling for measures of school quality (through standardized tests), the difference in returns to education can be interpreted as differences in education quality. According to this definition of quality, Trinidad and Tobago ranked 56th out of 67 countries in 1980 and 51st in 1990, so its quality seems to have improved between both Censuses. Its implicit quality is above other Caribbean countries, but below the simple average for South America and even the world average. The comparison is not favorable with respect to the upper-middle-income countries included in this study (see Table 8.3).

Given these results, the pattern of returns observed in 1998 may have been influenced by the low quality of education in primary and secondary school, which reduces the premium for these educational levels, but which also affects the transition to post secondary studies, since the results of the CXC exam determine whether or not students can attend university. The scarcity of highly educated workers pushes up the returns for the most educated.

Did expenditure on education contribute to economic growth? Francis and Iyare (2006) found that, for Trinidad and Tobago, causality goes from GDP growth to expenditure on education, and not the other

TABLE 8.3 Returns to Education for Caribbean Migrants in the United States
(average return to one additional year of schooling)

Country	Rate of return (%)	
	1980 Census	1990 Census
Dominican Republic	1.22	2.10
Haiti	1.19	2.02
Jamaica	2.46	3.64
Trinidad and Tobago	2.7	3.75
Regional/world average		
Caribbean	2.1	2.9
Central America	2.2	3.0
South America	3.5	3.9
Europe	4.7	5.9
World	3.9	4.8

Source: Based on Bratsberg and Terrell (2002).

way around. The evidence shows that the investment in education in Trinidad and Tobago has been procyclical and very inefficient: the increase in the average years of schooling from 11.1 in 1990 to 12.3 in 2004 seems to have been at the expense of quality.

How useful are the skills acquired from the schooling system? According to the survey undertaken for this study, skilled workers make up 25 percent of the total labor force. The highest ratio is in the energy sector, followed by the manufacturing sector, and the lowest ratio is in distribution. With regard to skilled workers, management staff, and professionals, the services sector is the most human capital-intensive. The size of the firm does not matter, although smaller firms, which tend to be in the services sector, employ a larger proportion of management staff and professionals, while exporting firms tend to have a higher proportion of skilled workers but a lower ratio of professionals and management staff.

The survey also shows that it is more difficult to recruit skilled technicians for firms in the manufacturing and services sector, smaller firms, and non-exporting firms. Firms in the distribution sector, smaller firms, and non-exporting firms find it more problematic to fill positions requiring production/service workers. This

suggests that less educated workers are harder to find than skilled ones, but this does not necessarily mean that the market for less educated workers is oversubscribed: it could be that finding this type of worker is not an easy task for local firms, a result that is consistent with the fact that workers may not be well prepared for the available jobs. In Trinidad and Tobago, the time taken to fill a position for a production/service worker is well above the average for Latin America (almost double), while the average time to obtain a qualified worker is close to the mean.

The main reason for the limitation faced in hiring new workers seems to be "poor labor attitude," which 70 percent of managers identify as the main problem firms face in hiring new personnel. Another important reason is "high labor costs," which is more important for firms in the energy and manufacturing sectors and for larger firms, exporters as well as non-exporters. Poor primary schooling and tertiary-level training are relatively binding for manufacturing firms and for large enterprises.

Skilled workers may also be hired from abroad. The average share of foreign workers per establishment in Trinidad and Tobago is close to the Latin America figure, but below the average for other regions. However, the percentage of foreign workers differs greatly among sectors: firms in the energy sector have an average of 10 percent of foreign skilled workers, while in distribution the percentage is almost zero. Further, foreign skilled workers are hired most frequently in large, exporting firms.

Hendriks (2002) established that about 96 percent of the difference between the wage levels in Trinidad and Tobago and the United States is due to differences in factor accumulation, both capital and human, in the two countries. In contrast, the corresponding figure for the 67 countries in the Hendriks study was 49 percent; for Barbados, 65 percent; for Costa Rica, 62 percent; and for Chile, 50 percent. When disaggregated further, in the Trinidad and Tobago case, the differences in human capital accumulation account for 54 percent of the difference, capital accumulation for 39.9 percent, and the quality of education 2.4 percent. The difference explained by human capital

accumulation is remarkably high compared to other Latin American and Caribbean countries (13.8 percent on average) and close to the mean (2 percent) for the quality of education.

Trinidad and Tobago's problem is in the accumulation of factors, both capital and human. The problem is not low total factor productivity, even though high productivity is largely in the energy sector, or the quality of education, which explains only a very small portion of the wage differential, as in most countries.

What role by the quality of infrastructure in capital formation? According to the Global Competitiveness Index (GCI), Trinidad and Tobago has a level of infrastructure in line with that of Caribbean countries, but poor relative to countries with a similar income level. Most of the basic infrastructure remains public (including telecommunications), but the efficiency of public administration is considerably better than a typical public company in Latin America.

In the case of *telecommunications*, deregulation began in the wireless market when the new telecommunications authority invited two firms to provide competition for the state-owned monopoly incumbent (Telecommunications Services of Trinidad and Tobago, TSTT). Long distance cable and Internet services have not yet been deregulated (though the government has indicated that it will start deregulating cable TV). Fixed line and Internet services are provided by TSTT. The Trinidad and Tobago External Telecommunications Company Limited (TEXTEL), co-owned by the government and Cable & Wireless Limited, is responsible for international communications.

The penetration of fixed and mobile telephones, although high by Latin American standards, is below the expected level given Trinidad and Tobago's income. A striking feature is the low degree of Internet connectivity. In 2005, only 12.2 percent of the population used the Internet, well below the regional average of 31.5 percent. In addition, the 7.9 personal computers per 100 inhabitants was very low. This low degree of internet connectivity contrasts with the level of penetration of cellular phones and telephone lines which is among the highest in LAC. Since human capital is augmented by the use

of information, this could be considered as indirect evidence of low human capital.

Electricity access in urban areas is almost 100 percent. The transmission and distribution lines are reliable and outages are among the lowest in the Caribbean (7 percent). Electricity generation is private, whereas transmission and distribution are public. There is no power pool or wholesale market, nor is there bilateral contracting in power. Labor productivity is within the average for the Caribbean region: better than a full public system but worse than full private systems in the region.

Access to improved *water and sanitation* facilities is good in urban areas. The percentage of the population with access to improved water is above the LAC average, although below the CARICOM average and that of high-income countries. There is full access to improved sanitation facilities in urban areas. The system is public and does not follow a pricing policy of cost recovery. The country experimented in the mid-1990s by awarding a management contract to Severn Trent (a U.K. water company), but the government decided to remove the company once the contract expired (1999). In rural areas, there are water shortages and inadequate drainage.

In the case of *ports and airports*, the port of Port-of-Spain and both international airports remain public, but they follow a nondeficit pricing policy. In 2000 the opening of the Piarco terminal in Trinidad resolved the situation partially, and the government plans to expand the Crown Point Airport in Tobago. A World Bank study comparing the productivity at the Port-of-Spain port with ports in other countries in the region showed that productivity is very poor as a result of congestion. The port needs significant investments in additional port facilities to serve the growing demand (World Bank, 2005).

As far as *transportation* is concerned, there is an extensive network of paved roads. Trinidad and Tobago, however, has no mass transport system and traffic is a worsening problem throughout Trinidad because the road network is not well suited to the growing volume of vehicles. A multi-year plan for light rail transport has been announced.

The formation of public capital in the last 30 years has been low compared to other countries in the region. For the 1970–2002 period, the gross public fixed capital formation as a percentage of GDP was 4.4 percent, compared to an average for Latin America of 6.3 percent, and for the Caribbean of 9.5 percent. Public capital formation in Trinidad and Tobago has been procyclical, although not as procyclical as in other Latin American and Caribbean countries.

The government has been investing in infrastructure recently. According to Central Statistical Office (CSO) statistics, the net fixed capital formation in the sectors of electricity and water was negative in the 1980s and early 1990s, changed to positive 1996, and increased rapidly until 2000, after which it stabilized.

The costs for infrastructure services are relatively high. In telecommunications, there are cross-subsidies from international calls to local calls, and the cost per minute for an international call is above that of other countries in the region such as Guyana, Jamaica, and St. Kitts & Nevis, and countries with a similar income level. The cost to local consumers is significantly higher than comparable services for U.S. consumers (including for fixed line, wireless, and broadband services). Airport charges in Trinidad and Tobago are among the highest in the region for both international airports, and water tariffs are set below operating costs.

The survey results indicate that 70 percent of business establishments view the existing infrastructure services as "not very appropriate" or "highly inappropriate." The perception of "inappropriate infrastructure" is stronger for smaller firms: 72 percent of the smaller firms find the infrastructure inappropriate, compared to 66 percent of the larger firms. This perception is slighter stronger for non-exporting firms and for non-energy firms.

The most limiting infrastructure seems to be road infrastructure and transportation, followed by electricity, port facilities, telecommunications, and water. The most common problem (during the last year) was power outages or surges from the public grid (reported by 61 percent of the firms), followed by insufficient water supply (42 percent of the firms), and unavailable internet services (38 percent).

Most of the "other" difficulties experienced by firms concern port shut-downs and the Customs and Excise Department. Trinidad and Tobago performs worse than the average for the Latin America except for power outages, where only Ecuador has a better performance. Insufficient water supply seems to be a major problem.

Only 31 percent of the firms surveyed used the World-Wide Web in interacting with clients and/or suppliers, although 66 percent regularly use e-mail. The most common reasons advanced for this were that workers "do not know how to manage e-mails and websites" and "customers do not use these services." Only 31 percent of the firms find there is no limitation.

As for *government services*, 53 percent of the firms rated them as either "somewhat inefficient," "inefficient," or "very inefficient." The proportion is substantially higher for energy sector firms (79 percent) compared to non-energy firms (52 percent). Firms in the distribution sector have a more negative opinion (63 percent) than those in manufacturing or services (49 percent and 45 percent, respectively) and the proportion is higher for exporters (56 percent versus 53 percent). Trinidad and Tobago appears to be lagging behind fast-growing countries such as China and India in terms of efficiency, but it has a level similar to Mauritius, and is well above the average for Latin America.

Sixty percent (60 percent) of the establishments agreed that corruption was a factor hindering them and their business opportunities, with 23 percent of them finding it a major and severe problem. Energy sector firms have a less negative perception about the effect of corruption on their business opportunities.

The 2006 Global Competitiveness Index (GCI) indicates that, among 125 countries, Trinidad and Tobago fell from 66th place in 2005 to 67th. Within the Caribbean region, Trinidad and Tobago ranks third after Barbados (31st) and Jamaica (60th), and is above the median for the Latin American and Caribbean region. Nevertheless, when compared to the entire sample of countries analyzed, its ranking is lower than expected given its level of development. Among the benchmark countries, Malaysia, Chile, and Costa Rica have a

ranking well above the expected level, and Mauritius is quite close to that. Trinidad and Tobago is one of the countries with the poorest performance given its income level. Looking at the components that make up the GCI, Trinidad and Tobago's poorest performance is in institutions and infrastructure and its best in macroeconomic strength. Most disturbingly, Trinidad and Tobago ranks lower than average in health and primary education (both related to human capital) and is generally lower than countries with similar GDP per capita in almost all the components.

Appropriability

Following the World Bank governance indicators used by Kaufmann, Kraay, and Mastruzzi (2005), five indicators of the quality of governance are considered: voice and accountability; political stability and absence of violence; government effectiveness; rule of law; and control of corruption. The indicators show that when compared to the LAC region Trinidad and Tobago ranks relatively high and is above the simple average of all the components except for political stability. However, Trinidad and Tobago underperforms compared to countries with similar GDP per capita in every component except for voice and accountability and regulatory quality. Trinidad and Tobago experienced a steady deterioration between 1996 and 2005, particularly in the components of political stability, control of corruption, and the rule of law.

Since 1992, almost all investment barriers in Trinidad and Tobago have been eliminated and the overall investment climate is favorable. According to the World Bank's Doing Business Survey, Trinidad and Tobago ranks relatively high (59th out of 175 countries) and is above the world average on indicators related to starting a business, employing workers, protecting investors, and trading across borders.

Trinidad and Tobago ranks among the best country in the region in protecting investors and is even above the average for OECD countries. This is particularly notable in the case of liability for self-

dealing, in which it gets almost full points. Shareholders' ability to sue officers and directors for misconduct (ease of shareholder suits index) and the strength of investor protection are also comparative advantages. Only in the case of transparency (transactions disclosure index) does Trinidad and Tobago show a relatively weak position.

Other beneficial aspects of doing business in Trinidad and Tobago are the low cost and few procedures for transactions across borders and labor regulations (flexible regulations and low hiring costs): in general Trinidad and Tobago ranks even better than the OECD countries. Firing costs are the only weak aspect, since they are higher than the regional average and that of OECD countries.

The indicators related to taxes show that this is not an important issue in doing business: the effective tax rate is lower than in the region, as well as the time spent on legal procedures.

In the area of getting credit, Trinidad and Tobago also ranks relatively well in terms of legal rights, but there are problems in other areas. For instance, there is no reliable register of debtors and only a very small fraction of the population has access to credit.

The most negative aspects are registering a property, enforcing contracts, and closing businesses. In enforcing commercial contracts, Trinidad and Tobago is ranked 156th out of 157 countries. The average time to get a payment, from the moment a plaintiff files the lawsuit, is almost four years. This is a very long period, even when compared to Latin America and Caribbean countries. For registering a property, Trinidad and Tobago ranks 154th. The average time necessary to fulfill the process is again the reason for this poor performance. According to the World Bank, closing a business in Trinidad and Tobago by following the bankruptcy law is a difficult task: the associated costs are high enough to reduce the recovery rate of the insolvent firm. In the case of licenses, the necessary time in Trinidad and Tobago is again longer than in other countries with similar levels of GDP per capita.

The evidence suggests that Trinidad and Tobago, in general, does not have problems in terms of the rule of law and micro risks, and that the only potential constraint to investment is the excessive

bureaucracy, which leads to an extreme amount of time and resources to resolve conflicts and register business. The use of average results, however, may mask some industry-specific shortcomings. For instance, in the Caribbean region there is strong competition in the area of tax exemption, which favors the location of new hotels, and Trinidad and Tobago is the country that least concedes exemptions. In addition, the procedure involved in obtaining a permit for a new hotel seems to be the most bureaucratic and costly in the region.

There is some concern in Trinidad and Tobago about the high and increasing levels of crime. According to the *Global Competitiveness Report* of the World Economic Forum, Trinidad and Tobago ranked 87th out of 104 countries in terms of the costs of crime and violence for business with a score of 2.8 compared to the worldwide average of 4.4. It ranked 89th in organized crime with a score of 3.4 against a worldwide average of 4.8.

From the perspective of businesses, crime is an increasing problem in Trinidad and Tobago. Around 75 percent of the firms surveyed believe that crime is affecting business and business opportunities. This share increases to 88 percent for the distribution sector, in which firms may be more exposed to criminal activity. The effects of crime are reflected in the security costs for establishments, which on average represent 3.7 percent of sales, a very high figure by international standards. Protection costs as a percentage of sales are on average negligible (0.06 percent) and even low by international standards, but for large firms this cost is significantly higher (0.46 percent). The proportion of criminal incidents reported to the police is relatively high; perhaps for this reason the proportion of incidents solved is much lower by international standards. Again, the distribution of reporting and incidents solved varies considerably by firm size. Small firms tend to report more to the police than large firms, and they also spend more on protection, but the share of incidents solved is significantly higher for large firms (17 percent compared to 4 percent for small firms).

In a country such as Trinidad and Tobago, the extra resources generated by the boom presents a policy dilemma: whereas it is

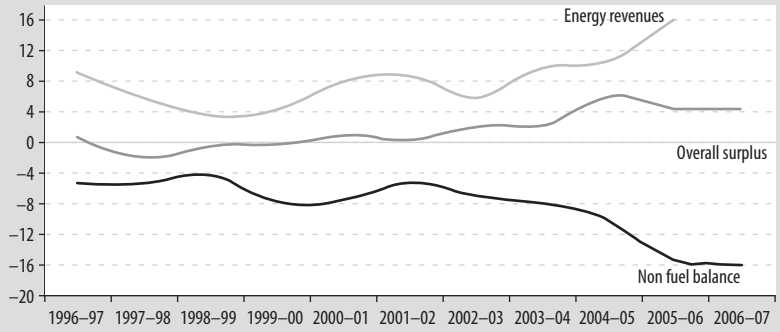
clear that the country must save part of this windfall, the dilemma is how much to save. It is an intergenerational issue: if the government spends more today, the economy grows faster and the current population benefits. However, since this spending is in nontradable goods, the pressure for a real exchange rate appreciation is more powerful and the non-energy tradable sector becomes less competitive, which limits its growth and makes the economy more vulnerable to energy prices shocks. At the same time, the economy is less prepared for the time when resources will be exhausted, both because it will not have a tradable structure to replace the energy sector and because there would be fewer resources to spend on future generations.

The current inflationary pressure is a reflection of this problem and it is eroding the external competitiveness of the tradeable sector. The inflation resulting from the fortunes of the energy sector has been fuelled by the government's massive construction expenditure and its expansionary monetary policy, thus reducing the competitiveness of the economy. According to the latest Corporate Confidence Index (CCI), local business confidence is falling, due to concerns about inflation, a shortage of skilled labor, lower investment returns, and the government's failure to moderate spending.

Recent estimates by the IMF (2007) indicate that the sustainable non-energy deficit in Trinidad and Tobago should be between 4.4 percent and 10.8 percent of GDP (see Figure 8.7). This figure is significantly lower than the projected non-energy deficit of 15–16 percent of GDP for the fiscal year 2005/6 and 2006/7. The increase in the non-oil deficit has been generated both by the increase of public expenditures and a reduction of tax pressure on non-energy activities.

Between fiscal year 1997/98 and fiscal year 2005/06, energy revenues increased from 7.4 percent to 19.4 percent of GDP, while non-energy revenues fell from 19.9 percent to 11.8 percent of GDP, or from 33.8 percent to 20.7 percent of the non-oil GDP. As a result, the government reduced the tax burden on the non-oil private sector. Expenditure, on the other hand, grew from a low of 24.3 percent of

FIGURE 8.7 Central Government Fiscal Balance
(*as percent of GDP*)



Source: Authors' calculations based on IMF's Staff Reports.

GDP (in 2003–05) to 28 percent in fiscal year 2006/07. Due to the outstanding growth in energy revenues, the overall balance remains positive with a surplus of 3.8 percent, but the balance for the non-petroleum sector represents a deficit of around 16 percent of GDP. What these results suggest is that the government is spending part of the windfall on the current generation. But there is a very important difference between the current boom and the 1970s boom. In the 1970s fiscal policy was highly procyclical, and the windfall was inefficiently spent; subsidies eased private investment in declining industries, and abundant capital inflows were spent. Public enterprise losses in 1979 were equivalent to 55 percent of oil revenues (Artana, Bour, and Navajas, 2006).

In the current boom, fiscal policy has been more conservative through the saving of part of the windfall in a stabilization fund, although the IMF (2007) figures suggest the fiscal surplus should be higher than what is being observed. The government has created a Heritage and Stabilization Fund, to be financed from excess income from oil and gas. Whenever these revenues exceed the quarterly projected budget by more than 10 percent, 60 percent of this difference is added to the fund. In the same way, when revenues are below projections, the government may withdraw funds using

the same arrangement. Higher-than-budgeted oil prices have built up the value of the Fund, which totaled US$1.2 billion by the end of the fiscal year 2005/06.

The Fund combines features of both heritage and stabilization. This has been the cause of considerable debate and controversy. For the moment, legislation has not been enacted to establish how the Fund is going to be operationalized. Details about the Fund's design are still under discussion and the objectives are still not clear (is it a mechanism for intergenerational smoothing or for putting planning on a predictable base?).[7] It seems reasonable to save for the future when public debt is at sustainable levels, but not otherwise. Trinidad and Tobago has a ratio of gross debt to GDP of 50 percent (higher than recommended for an emerging economy with narrow capital markets). In this sense, it may be worthwhile to reduce debt, as Russia did during the early 2000s, instead of immediately contributing to the fund.

Several weaknesses persist besides the level of the public debt, including high interest rates and low tax revenues (as a share of GDP). Public expenditures have grown to a relatively high level of almost 50 percent of non-petroleum GDP. The composition has changed since the 1970s, when windfalls were spent in inefficient capital outlays. Now more expenditures are directed toward reducing poverty and improving health and education. Transparency is an issue since there are sizeable off-budget expenditure items, which distort fiscal statistics.

Unless the economy is able to accumulate sufficient resources in the stabilization fund, the relatively high non-energy deficit implies that the government will have to make a drastic fiscal adjustment when the oil reserves are nearly exhausted. However, improper fiscal

[7] Artana, Bour, and Navajas (2006) suggest that an efficient stabilization fund be designed to improve the existing Revenue and Stabilization Fund (RSF). This fund should be built not only to enable conservative management of fiscal resources—saving during the booms and using the resources during the downturns—but also to avoid Dutch Disease.

management will affect the economy today by increasing risks. On the other hand, spending part of the windfall today might exacerbate Dutch Disease-types of problems, affecting the welfare of future generations: both directly, by lowering the Fund, and indirectly, through distortions in the productive structure and an excessive specialization in energy products.

There seems to be a policy conflict as to whether the oil wealth should be invested in human capital and infrastructure or saved for future generations. To achieve the Vision 2020 goal, the country will have to make investments, and the goal is to develop a knowledge-based society. However, as Artana, Bour, and Navaja (2006) argue, the strategy of spending more today carries some risks. First, spending on current or capital outlays contributes to an appreciation of the real exchange rate and might worsen the Dutch Disease problem. Second, it assumes that the social rate of return of government expenditure is higher than any other feasible alternative. Third, investing part of the fund today would not automatically diversify the economy and reduce the risks associated with oil price fluctuations. The evidence for Trinidad and Tobago, on the contrary, shows that recent export developments moved in the same direction as previous exports, developing and exporting oil and gas-related products like petrochemical goods and liquefied natural gas. Diversification into petrochemicals and other products has not reduced the country's exposure to fluctuations in the price of petroleum and natural gas products.

Policymakers in Trinidad and Tobago must understand that fiscal policy has a very important function, and spending or not spending part of the windfall is a policy decision with trade-offs and risks.

What about tourism, which is one of the largest and fastest growing sectors in the world and a major driver of growth for Caribbean countries? Trinidad and Tobago seems to be one of the least developed countries of the region in this area. It ranks 8th in terms of tourist preferences in the English-speaking Caribbean nations. In 2004, Trinidad and Tobago had 439,600 international arrivals,

but only 52 percent were tourists, resulting in tourism revenues of US$249 million. In that same year, the Dominican Republic received 3.5 million international tourists and tourism revenues were US$ 3.4 billion.

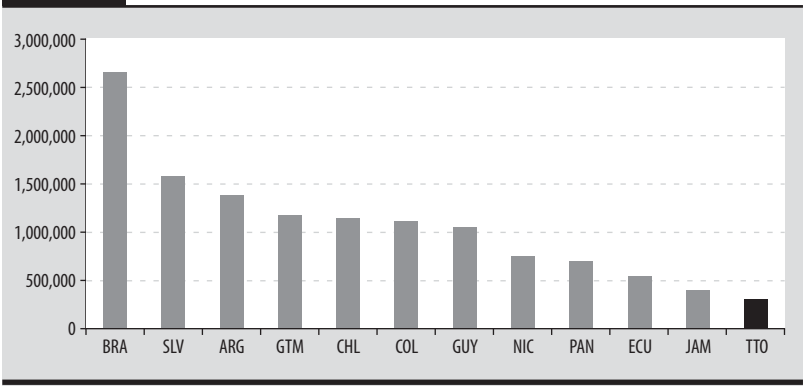
In terms of international tourists per square kilometer, Trinidad and Tobago has the lowest ratio in the English-speaking Caribbean, with 86.2 tourists per square km. The second lowest ratio is 221 (Dominica) and the regional average is 933. What is constraining tourism development in Trinidad and Tobago? Does the country have any comparative advantage in this sphere?

The tourism industry involves many sectors of the economy and requires a fair amount of coordination to develop. This is especially the case with international tourism, since externalities are large and the economies of scales in some related sectors are also high (particularly in transportation). The underdevelopment of tourism seems to be associated with the natural resource curse. The private sector has not been able to resolve the coordination problems to develop the sector fully, and exchange rate volatility increases the risks and volatility of profits. In addition, historically, the government has not paid attention to tourism as a development driver or as a source of revenue, which has not aided private sector development. Tourism has not been seen as a source of growth, but as a low value-added sector that pays low salaries. Tourism has made some strides in Tobago (as opposed to Trinidad), but not at the same rate as in neighboring countries.

To further efforts to diversity the economy, and perhaps as a result of the experience of neighboring countries, the government has taken some initiatives to develop this sector. Steps include establishing a Ministry of Tourism in 1994, developing and implementing tourism-related projects, building awareness of the tourism industry, and facilitating tourism investment and development of the industry.

The Vision 2020 Tourism Development Strategic Plan (Government of Trinidad and Tobago, 2004) identifies tourism as a growth driver and a source of diversification away from energy.

FIGURE 8.8 Open Forest Measure



Source: Hausmann and Klinger (2006).

Open Forest and the "Natural Resource Curse"

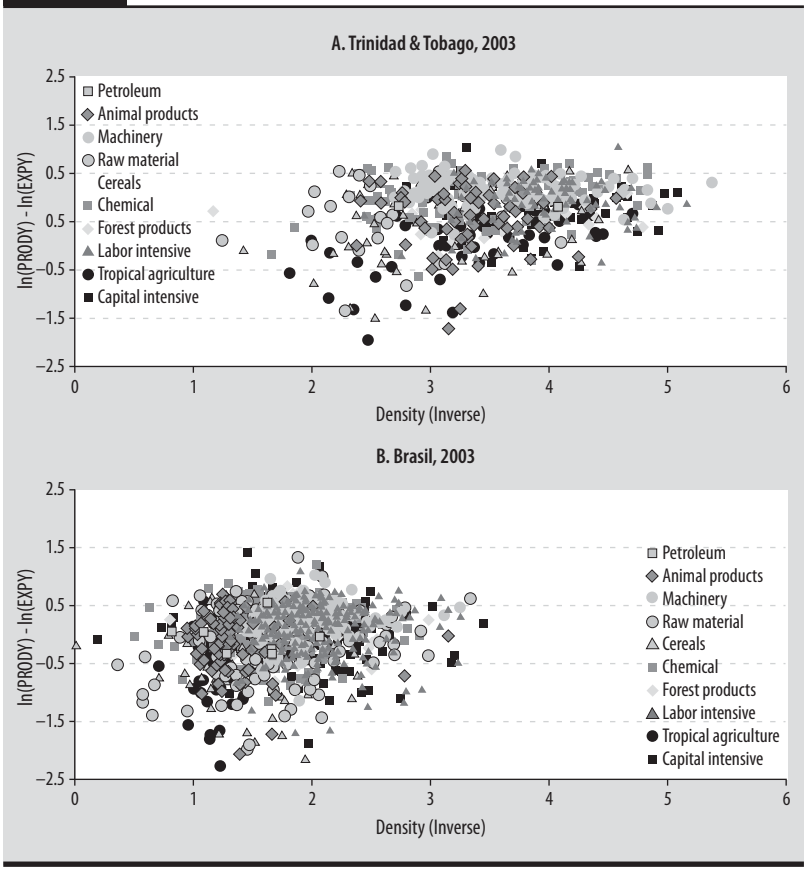
The open forest measure is a measure of how easy it is for a country to diversify its exports (Hausmann and Klinger 2006). As Figure 8.8 shows, Trinidad and Tobago has the poorest open forest in Latin America and the Caribbean, with only 12 percent of the opportunities available to Brazil for producing new goods. This results from its specialization in oil-related products.[8]

Figure 8.9 plots products for Trinidad and Tobago and Brazil, two extreme cases, using Leamer's classification for crossing distances and the difference between productivity of the good and export basket productivity (goods over the zero line are considered upscale goods and those below are considered downscale goods). Not only are Trinidad and Tobago's exports far from almost all kinds of products, but they are located at the same distance from the groups of low productivity (downscale) and high productivity (upscale) goods.

Trinidad and Tobago is far away from the densest part of the forest, and it has a greater distance (the inverse of density) among products, which means that export products are further away from

[8] Hausmann, Hwang and Rodrik (2007) find this characteristic common to most oil-exporting countries.

FIGURE 8.9 Distance and "Upscaling" for Trinidad & Tobago and Brazil



Source: Authors' calculations

one another in comparison to what obtains regionally. It is important to point out that even products in the petroleum sector are further from each other than in other benchmark countries. The closest groups are raw materials and tropical agriculture.

These findings imply that the degree of sophistication of Trinidad and Tobago exports will hardly improve unless economic policies are implemented to overcome the high and growing level of specialization.

Hausmann and Klinger (2006) found that a one standard deviation increase in open forest size results in an increase of one half

percentage in the average productivity growth rate for the basket. This suggests that the current pattern of specialization in Trinidad and Tobago is not only costly in terms of increasing the risk to shocks in oil prices, but also in achieving long-run balanced growth. As in the case of most oil- exporting countries, Trinidad and Tobago produces and exports goods with very specific endowments not easily interchangeable with other kinds of goods. Moreover, considering the sudden appreciations in the real exchange rate—which usually occur in economies such as those with fluctuating oil prices—the development of other nonresource tradable sectors could be a difficult task.

This indicates that Trinidad and Tobago's problem is not only related to a cyclical phenomenon of real exchange rate appreciation during oil price booms, but is more permanent. Historically, exports of oil and related products have represented between 60 and 70 percent (in constant U.S. dollars) of total exports. As a consequence, the degree of export diversification (measured in real terms) has not changed substantially recently, despite the cyclical behavior of the price of West Texas Intermediate (WTI) crude oil (the benchmark for U.S. oil prices).

Capacity, Innovation, and Learning

The survey data show that firms in Trinidad and Tobago produce fewer products per establishment than firms in other regions, but this could just be due to economies of scope and local market sophistication. Related to this, they also have a lower amount of new products introduced per establishment than the benchmark economies.

The percentage of firms using technology licensed by foreign-owned companies is similar to that of Latin American countries but lower than that of East Asia. For the sectors exposed to international competition, the penetration of foreign-owned technology is widespread among firms in the energy sector and, to lesser extent, in the manufacturing sector. This finding is confirmed by the results obtained when the firms are disaggregated into exporting and non-

exporting firms (32 percent to 10 percent). The rate of introduction of new products is higher in services than in manufacturing and energy and there are signs of greater innovation in larger and exporting firms.

However, Trinidad and Tobago underperforms when the quality of processes and products is evaluated. In fact, the percentage of firms receiving ISO certification is half the average for Latin American countries (6.7 percent against 13.3 percent) and it is much lower than in East Asia. Some 23 percent of the firms in Trinidad and Tobago acquired technological innovations from 2004 to 2007, a much lower ratio than in other regions. The percentage of ISO certification and introduction of new technological innovations is higher for companies in the energy sector and the larger and exporting firms.

The reasons reported by firms for the limited acquisition of technological innovations are: the lack of property rights (41 percent of firms), macro instability (36 percent), and inadequate infrastructure (31 percent). In the energy sector, where the introduction of technological innovations is most important, the most limiting reason was "the costly training of workers." In manufacturing, it was "macroeconomic instability," and, for the remaining sectors, it was "the lack of property rights."

When the results are broken down by size, no important differences in the main causes are reported. On the contrary, the most binding constraint on innovation for exporting firms is financial cost, while for the non-exporting companies, it is property rights.

Conclusion

This study has used the growth diagnostics methodology to try to identify the growth constraints in Trinidad and Tobago and establish a ranking of their priority—particularly for the non-energy sector, which is key for the country's diversification efforts. Trinidad and Tobago's growth is very unbalanced, and is led by the energy sector. In the non-energy sector, economic growth is much lower. The petroleum sector accounts for 29 of the 51 percentage points

of the accumulated growth rate between 2002 and 2006, compared to private sector services (19 points) and the rest of the economy (only 3 points). What is even more striking is the low investment in the non-energy sector: since 1991 capital stock has increased by 7 percent per year, but this was due almost entirely to the energy sector. In the non-energy sector, the capital stock has grown by a modest 1.5 percent.

New investment has been directed mainly to the gas industry, after the discovery of new reservoirs. But the new gas products are not really providing a strong source of diversification for the economy since the prices of gas-related products are highly correlated with the oil-related products. In addition, in the last 50 years the non-energy tradable sector has been constantly shrinking as a share of GDP, which makes the economy energy-dependent, increasing the risks of energy price shocks for the entire economy. The energy sector currently represents 45 percent of GDP, but this share almost doubled in the last 15 years, and the pattern of investment for the last 10 years shows that the actual levels would hold and probably increase even more. This is contrary to the Vision 2020 plan, which aims to have Trinidad and Tobago become a developed country by 2020. This plan looks for diversification of the economy away from the petroleum industries. The puzzle to be solved in Trinidad and Tobago is why resources are not flowing to the non-energy sector, particularly the tradable one.

Far from diversifying, the economy is becoming more concentrated in the energy sector, and this is happening even though the government has implemented several reforms in the right direction. Because many constraints on growth have already been eliminated, the case of Trinidad and Tobago is one of fine-tuning, making the identification of constraints more difficult. It may be that most of the conditions for the development of the non-energy tradable sector are already present, but the economy needs more time to show significant changes. Or it could be that the removal of these constraints is not enough to boost growth in an economy that has already specialized in the energy sector. Viewed from this angle, the high exposure to

energy price shocks might force the non-energy tradable sector to be even more competitive than in other countries where that risk does not exist.

The historical correlation between the international oil price and Trinidad and Tobago's real GDP, which is close to 80 percent, is a fact that business managers understand quite well. They know that growth opportunities could be very path-dependent, and current growth is limited by previous conditions. Not having a developed non-energy tradable sector can limit future growth due to the lack of externalities in production, lack of forward and backward linkages, lack of learning-by-doing, and lack of local entrepreneurship. In this sense, the curse might be the past rather than current conditions, and the current success of the energy sector might in itself be a constraint for the development of the non-energy tradable sector. Although the government has already created a Heritage and Stabilization Fund, the problem might be one of credibility. In this economy more than in others, a very prudent fiscal policy, as well as clear and credible rules, are necessary to isolate the non-energy sector from the risks of the energy sector.

Fiscal policy in Trinidad and Tobago has always been very procyclical, exacerbating the Dutch Disease problem. Little progress has been made recently in the area of prudent fiscal management and IMF estimates indicate that the non-energy deficit is not sustainable. There is also evidence that the current growth path of Trinidad and Tobago shows the symptoms of Hausmann and Rigobon's (2002) predictions, particularly a shrinking non-energy sector.

In addition to the macro risk, which business managers consider one of the most important factors limiting their growth opportunities, this study has found that the quality of education is relatively poor; that educational indicators are poorer than expected for Trinidad and Tobago's income level and below those of fast-growing countries; that infrastructure is inadequate and indeed poorer than expected for the income level, particularly in terms of quality; that the country has failed to coordinate and develop sectors outside the energy sector, even in areas with clear potential, such as tourism; that crime

is a growing concern; that the export product space is not very well diversified, and there are not many opportunities to diversify it; and, finally, that there is a lack of innovation and discovery outside the energy sector.

All these factors, affecting mainly the non-energy sector, lie in the lack of opportunities branch of the growth diagnostic tree. Indeed, for almost all the indicators analyzed (education, infrastructure, and social indicators), Trinidad and Tobago underperforms when compared to countries of similar income level, and is more similar to other Caribbean countries rather than fast-growing and diversified economies. In other words, Trinidad and Tobago has many constraints causing reductions in social returns (poor management, low profitability, lack of human capital, poor access to foreign markets, and poor infrastructure). It also has one very important constraint from the appropriability side, macro risks—which shows that the growth constraint for non-energy industries is low risk-adjusted returns, rather than costly finance. This evidence is based on both macro and micro data and is in accordance with managers' opinions.

Prioritizing binding constraints is a very ambitious goal, and it might not even be prudent, as Rodriguez (2006) has argued. First, changing one policy at a time will generally be a very inefficient way of reaching the optimum: it may not only take longer to reach an optimum, thus generating welfare losses during the transition, but may also increase the probability of not converging to the optimum. Second, using this sequential approach poses the risk of getting stuck at a local rather than at a global maximum.

The most critical element in Trinidad and Tobago is, and has been, the fiscal management of natural resource revenues. When the government spends the resources in non-tradable goods and services, it exacerbates volatility and aggravates the underdevelopment of the non-energy sector, forcing this sector to achieve even larger productivity gains to overcome the stress of the lack of competitiveness. The complementary inputs the government provides (such as education and infrastructure) may not be enough to overcome the lack of competitiveness, making the effort meaningless.

The challenge Trinidad and Tobago faces is to overcome a natural tendency to suffer from the natural resource curse and instead develop strong anti-cyclical fiscal policies (first priority), while bearing in mind the long-run growth drivers and overcoming the limitations found in this study (in order to increase the private returns to investment in the non-energy tradable sector). Trinidad and Tobago might need to invest more in several areas (such as core infrastructure and education) to increase productivity in the non-energy sector, but it must do so in a balanced way. The Vision 2020 goal has identified several potential policies, many of which seem to be well-oriented and in line with the findings of this study. Nonetheless, timing might be almost as important as the investment itself in a country facing the risk of energy price shocks.

References

Artana, D., Bour, J.L. and Navajas, F. 2006. "Designing Fiscal Policy to Achieve Development." In: L. Rojas-Suárez and C. Elías, editors. *From Growth to Prosperity: Policy Perspectives for Trinidad and Tobago.* Washington, DC: Inter-American Development Bank.

Bratsberg, B. and Terrell, D. 2002. "School Quality and Returns to Education of U.S. Immigrants." *Economic Inquiry.* 40(2): 177–98.

Defoort C. 2006. "Tendances de long terme en migrations internationales: analyse à partir de 6 pays receveurs." Université Catholique de Louvain. Mimeographed document.

Elías C., Jaramillo, F. and Rojas-Suárez, L. 2006. "Introduction." In: L. Rojas-Suárez and C. Elías, editors. *From Growth to Prosperity: Policy Perspectives for Trinidad and Tobago.* Washington, DC: Inter-American Development Bank.

Fairbanks, M., Rabkin D., Escobari M. and Rodriguez, C. 2006. "Building Competitive Advantages." In: L. Rojas-Suárez and C. Elías, editors. *From Growth to Prosperity: Policy Perspectives for Trinidad and Tobago.* Washington, DC: Inter-American Development Bank.

Francis, B. and Iyare, S. 2006. "Education and Development in the Caribbean: A Cointegration and Causality Approach." *Economics Bulletin*. 15(2): 1–13.

Government of Trinidad and Tobago. 2004. Vision 2020 Tourism Development Strategic Plan. Trinidad and Tobago: Government of Trinidad and Tobago.

Hanushek E.A. and Kim, J-Y. 1999. "School Quality around the World: Evidence from U.S. Immigrant Earnings." Korea's Official Pool of International Economists & Regional Experts No. 2002–15.

Hausmann, R. and Klinger, B. 2006. "Structural Transformation and Patterns of Comparative Advantage in the Product Space." Working paper No. 128. Cambridge, MA: Center for International Development, Harvard University.

Hausmann, R. and Rigobon, R. 2002. "An Alternative Interpretation of the 'Resource Curse': Theory and Policy Implications." Working paper No. 9424. Cambridge, MA: National Bureau of Economic Research.

Hausmann, R. and Rodrik D. 2005. "Self-discovery in a Development Strategy for El Salvador." *Economía*. 6(1): 43–101.

———. 2006. "Doomed to Choose: Industrial Policy as Predicament." Cambridge, MA: John F. Kennedy School of Government, Harvard University (September). Mimeographed document..

Hausmann, R., Hwang, J. and Rodrik, D. 2007. "What You Export Matters." *Journal of Economic Growth*. 12(1): 1–25.

Hausmann, R., Rodrik, D. and Velasco, A. 2005. "Growth Diagnostics." Cambridge, MA: John F. Kennedy School of Government, Harvard University (March).

Hendricks, L. 2002. "How Important Is Human Capital for Development? Evidence from Immigrant Earnings." *The American Economic Review*. 92(1): 198–219.

IMF (International Monetary Fund). 2003. Article IV Consultation-Staff Report. Washington, DC: International Monetary Fund.

———. 2007. Article IV Consultation-Staff Report. Washington, DC: International Monetary Fund.

Kaufmann, D., Kraay, A. and Mastruzzi, M. 2005. "Governance Matters IV: Governance Indicators for 1996–2004." Policy research working paper No. 3237. Washington, DC: World Bank.

Poterba, J. M. 1997. "The Rate of Return to Corporate Capital and Factor Shares: New Estimates Using Revised National Income Accounts and Capital Stock Data." Working paper No. 6263. Cambridge, MA: National Bureau of Economic Research.

Rodriguez, F. 2006. "Comment on Hausmann and Rodrik." *Economía*. 6(1): 90–8.

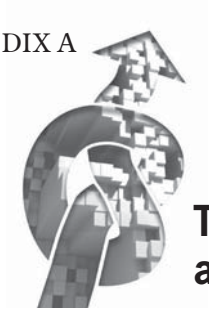
Sergeant, K. 2006. "Issues in Equities Market Development and Integration." Trinidad and Tobago. Mimeographed document.

Watson, P. 1997. "Measuring the Capital Stock of Trinidad and Tobago by Direct Observation." In: E. Edinval, A. Maurin and

J.G. Montauban, editors. *Stratégies de développement comparées dans la Caraïbe.* Paris, France: L'Hermès.

World Bank. 2005. "A Time to Choose: Caribbean Development in the 21st Century". Washington, DC: Caribbean Country Management Unit, Poverty Reduction and Economic Management Unit, Latin America and the Caribbean Region, World Bank.

APPENDIX A



Total Factor Productivity and Growth Accounting

Construction of Capital Stock and TFP Series

The series for capital stock is constructed from data from the Penn World Tables, version 6.2. It follows the methodology presented in Easterly and Levine (2001): a perpetual inventory method to construct the capital stock. In particular, the capital accumulation equation states that:

$$K_{t+1} = K_t(1-d) + I_t\,, \tag{A.1}$$

where K_t is the stock of capital in period t, I is investment, and d is the depreciation rate, which is assumed to equal 0.07. From the capital accumulation equation (A.1) and assuming that the country is in steady state, the initial capital-output ratio is computed as:

$$\frac{K_0}{Y_0} = \frac{i}{g+d}\,, \tag{A.2}$$

where i is the average investment-output ratio for the first ten years of the sample, and g is a weighted average between a world growth (75 percent) of 4.2 percent and the average growth of the country for the first ten years of the sample (25 percent). Multiplying the capital output-ratio from (A.2) by the average output of the first three years of the sample yields the initial capital stock K_0.

The series for labor is computed using the data for real GDP per worker and real GDP (chain) from the Penn World Tables.

To estimate human capital, follow Hall and Jones (1999) and consider h to be relative efficiency of a unit of labor with E years of schooling. Specifically, the function takes the form of:

$$h = e^{\phi(E)}, \tag{A.3}$$

where the function $\phi(.)$ is such that $\phi(0) = 0$ and $\phi'(E)$ is the Mincerian return on education. In particular, this function is approximated by a piece-wise linear function. The following rates of return are assumed for all the countries: 13.4 percent for the first four years of schooling; 10.1 percent for the next four years; and 6.8 percent for education beyond the eighth year (based on Psacharopoulos, 1994). For each country, the average is computed using the data on years of schooling in the population from the Barro-Lee (2000) database.[1]

The TFP series are calculated for each country as a residual from the following Cobb-Douglas production function:

$$Y = AK^{\alpha} \cdot (h \cdot L)^{1-\alpha}, \tag{A.4}$$

where Y represents domestic output, K physical capital, L labor force, h the average quality of the labor force, and A is total factor productivity, or TFP. Following standard practice, the capital income share (α) is set equal to ⅓.

Output per worker is given by:

$$y = \frac{Y}{L} = A\left(\frac{K}{L}\right)^{\alpha} h^{1-\alpha} = Ak^{\alpha}h^{1-\alpha}, \tag{A.5}$$

where A represents the total factor productivity (TFP) and α is ⅓. In logs:

$$\ln y = \ln A + \alpha \ln k + (1-\alpha)\ln h \ .$$

[1] Linear extrapolations are used to complete the five-year data.

A sample of countries used in estimating growth accounting gaps is presented in Table A.1.

TABLE A.1 Sample of Countries Used in Estimating Growth Accounting Gaps

Latin America		Developed		Other	
Argentina	Paraguay	Australia	Korea, Republic of	Algeria	Nepal
Barbados	Peru	Austria	Netherlands	Botswana	Niger
Bolivia	Uruguay	Belgium	New Zealand	Cameroon	Pakistan
Brazil	Venezuela	Canada	Norway	Fiji	Papua New
Guinea					
Chile		Cyprus	Portugal	Ghana	Philippines
Colombia		Denmark	Singapore	India	Senegal
Costa Rica		Finland	Spain	Indonesia	Sierra
Leone					
Dominican Republic		France	Sweden	Iran	South
Africa					
Ecuador		Germany	Switzerland	Jordan	Sri Lanka
El Salvador		Greece	United Kingdom	Kenya	Syria
Guatemala		Hong Kong	United States	Lesotho	Thailand
Honduras		Iceland		Malawi	Togo
Jamaica		Ireland		Malaysia	Turkey
Mexico		Israel		Mali	Uganda
Nicaragua		Italy		Mauritius	Zambia
Panama		Japan		Mozambique	Zimbabwe

Source: Authors.

References

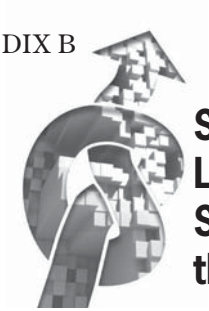
Barro, Robert J. and Jong-Wha Lee 2000. "*International Data on Educational Attainment: Updates and Implications*." Working paper No. 42. Cambridge, MA: Center for International Development, Harvard University (April).

Easterly, W. and Levine, R. 2001. "It's Not Factor Accumulation: Stylized Facts and Growth Models." *World Bank Economic Review*. 15: 177–219.

Hall, J. and Jones, C., 1999. "Why Do Some Countries Produce So Much More Output per Worker than Others?" *Quarterly Journal of Economics*. 114: 83–116.

Psacharopoulos, George, 1994. "Returns to Investment in Education: A Global Update." *World Development* 22(9): 1325–1343.

APPENDIX B



Structural Transformation, Location in the Product Space, and the Value of the Open Forest

Export Sophistication

Recent research by Hausmann, Hwang and Rodrik (2005) finds that the composition of a country's export basket has important implications for economic growth. The authors find that it is not only how much, but also what countries export that matters for growth. Countries that have a more sophisticated export basket enjoy accelerated subsequent growth.

The level of "sophistication" of exports is measured indirectly by examining the levels of income of those countries producing them. It is calculated as follows. First, the authors develop a measure of the revealed sophistication for each product, which they call PRODY, as the revealed comparative advantage (RCA)-weighted GDP per capita of each country that exports the good:

$$PRODY_{i,t} = \sum_c \frac{\left(xval_{i,c,t} \,/\, X_c\right)}{\sum_i \left(xval_{i,c,t} \,/\, X_c\right)} Y_c \,,$$

where $xval_{i,c,t}$ equals exports of good i by country c in year t, X_c equals total exports by country c, and Y_c equals GDP per capita of country c. This is a measure of the GDP per capita of the "typical" country that exports product i. Richer-country goods are more "sophisticated," and are associated with higher wages. It is important to keep in mind

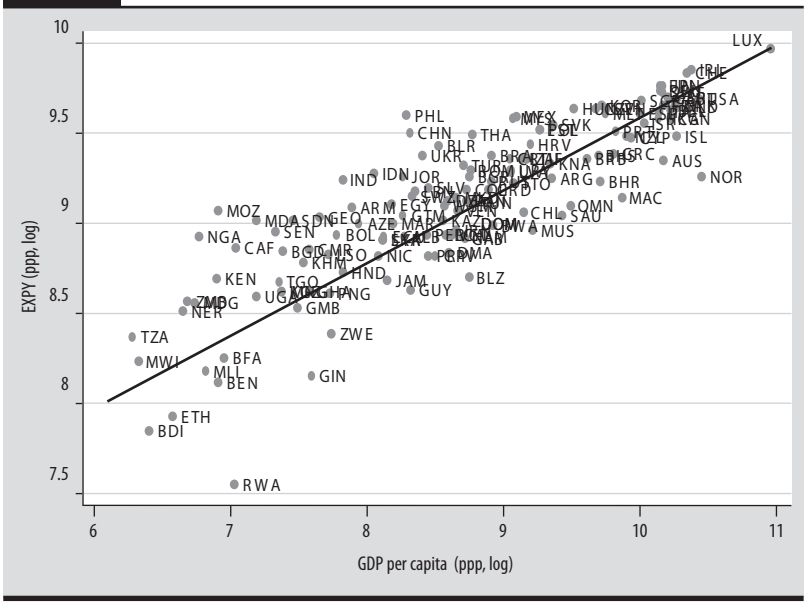
that this is a measure of sophistication that is inferred from the types of countries exporting a good. It is not measuring any technological sophistication directly.

This product-level measure of sophistication is then used to measure the sophistication of a country's export basket as a whole. The authors call this measure EXPY. EXPY is simply the PRODY of each good (i) that the country c exports, weighted by that good's share in the country's export basket (Xc). It represents the income level associated with a country's export package.

$$EXPY_{c,t} = \sum_i \left(\frac{xval_{c,i,t}}{X_{c,t}} \right) PRODY_{i,t} \quad .$$

Not surprisingly, the level of income implied by a country's export basket (EXPY) is correlated with actual income. That is, rich countries produce rich country goods, as illustrated in Figure B1.

FIGURE B1 **EXPY (PPP) vs. GDP per capita (PPP), 2001**



Source: Hausmann and Klinger (2006).
Note: EXPY and GDP per capita are in terms of PPP.

However, there is significant variance in this relationship. Some countries have managed to discover products that are associated with a level of income much higher than their own, such as China, India, Indonesia, the Philippines, Mexico, and Ireland. Moreover, this variance has important consequences: countries converge to the relative income level implied by their export basket. In essence, countries become what they export. This means that if a country has managed to begin exporting a sophisticated export basket relative to its income level, subsequent growth is higher as GDP converges to that level. At the other end of the spectrum, countries specialized in relatively unsophisticated export baskets suffer lagging economic performance. Put another way, the payoff of exporting more of the same depends on current export sophistication.

Export Distance

In standard trade theory, structural transformation is a passive consequence of changing comparative advantage based on factor accumulation. However, there are many reasons why structural transformation may be more complicated than this picture suggests. Several factors may create market failures such as industry-specific learning by doing (Arrow, 1962; Bardhan, 1970) or industry externalities (Jaffe, 1986). There may also be technological spillovers between industries (Jaffe, Trajtemberg and Henderson, 1993). Alternatively, the process of finding out which of the many potential products best expresses a country's changing comparative advantage may create information externalities (Hausmann and Rodrik, 2003; Klinger 2007) as those that identify the goods provide valuable information to other potential entrepreneurs but are not compensated for their efforts.

Hausmann and Klinger (2006) investigate the determinants of the evolution of the level of sophistication of a country's exports, and find that these barriers are less binding when moving to "nearby" products. This is based on the idea that every product involves highly specific inputs such as knowledge, physical assets, intermediate

inputs, labor training requirements, infrastructure needs, property rights, regulatory requirements, or other public goods. Established industries somehow have sorted out the many potential failures involved in assuring the presence of all of these inputs, which are then available to subsequent entrants in the industry. But firms that venture into new products will find it much harder to secure the requisite inputs. For example, they will not find workers with experience in the product in question or suppliers who regularly furnish that industry. Specific infrastructure needs such as cold storage transportation systems may be nonexistent, regulatory services such as product approval and phytosanitary permits may be underprovided, research and development capabilities related to that industry may not be there, and so on.

Hausmann and Klinger (2006) find evidence supporting the view that the assets and capabilities needed to produce one good are imperfect substitutes for those needed to produce another good, but this degree of asset specificity will vary. Correspondingly, the probability that a country will develop the capability to be good at producing one good is related to its installed capability in the production of other similar, or nearby goods for which the currently existing productive capabilities can be easily adapted. The barriers preventing the emergence of new export activities are less binding for nearby products, which only require slight adaptations of existing capacity.

This is found by first developing a measure of distance between products. Distance between each pair of products is measured as the probability that countries in the world export both. If two goods need the same capabilities, this should show up in a higher probability of a country having comparative advantage in both. Formally, the inverse measure of distance between goods i and j in year t, which the authors call proximity, equals

$$\varphi_{i,j,t} = \min\left\{P\left(x_{i,t} \mid x_{j,t}\right), P\left(x_{j,t} \mid x_{i,t}\right)\right\},$$

where for any country c

$$x_{i,c,t} = \begin{cases} 1 & if \quad RCA_{i,c,t} > 1 \\ 0 & otherwise \end{cases},$$

and where the conditional probability is calculated using all countries in year t. This is calculated using disaggregated export data across a large sample of countries from the World Trade Flows data from Feenstra et al. (2005) and UN COMTRADE (United Nations Commodity Trade Statistics Database, *http://comtrade.un.org/*).

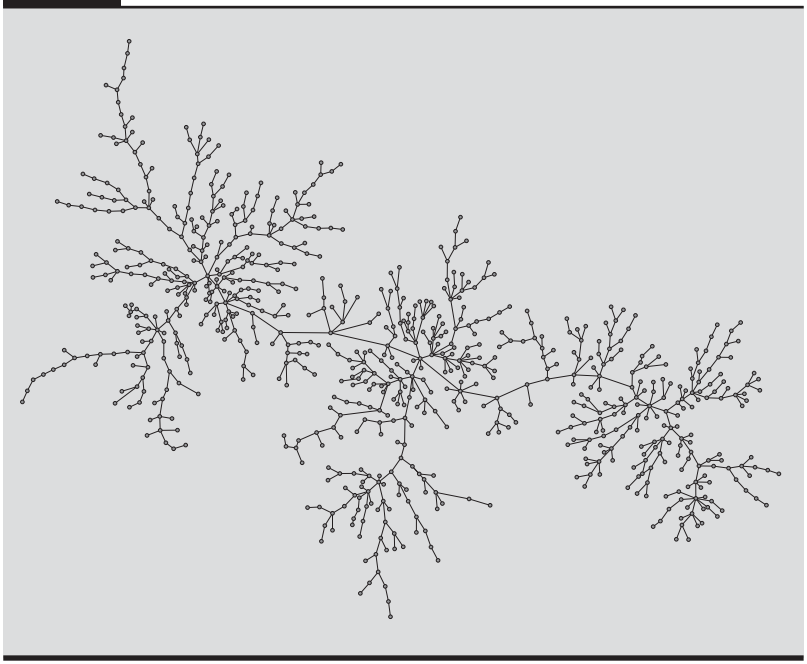
The heterogeneity of the product space can be shown econometrically, yet it is much more revealing to illustrate these pair-wise distances graphically. Using the tools of network analysis, one can construct an image of the product space (Hidalgo et al. 2007).

Considering the linkages as measured in the 1998–2000 period, Hausmann and Klinger (2006) first create the maximum spanning tree by taking the one strongest connection for each product that allows it to be connected to the entire product space. This is shown in Figure B2.

The next step is to overlay this maximum spanning tree with the stronger links, and color-code the linkages between products, depending on their proximity. Figure B3 shows the visual representation of the product space. Each node is a product, its size determined by its share of world trade. In these figures, physical distances between products are meaningless: proximity is shown by color-coding the linkages between pairs of products. A light-blue link indicates a proximity of under 0.4; a beige link; a proximity between 0.4 and 0.55; a dark-blue link; a proximity between 0.55 and 0.65; and a red link, a proximity greater than 0.65. Links below 0.55 are shown only if they make up the maximum spanning tree, and the products are color-coded based on their Leamer (1984) commodity group.

From Figure B3, it can immediately be seen that the product space is highly heterogeneous. There are peripheral products that are only weakly connected to other products. There are some group-

FIGURE B2 Maximum Spanning Tree

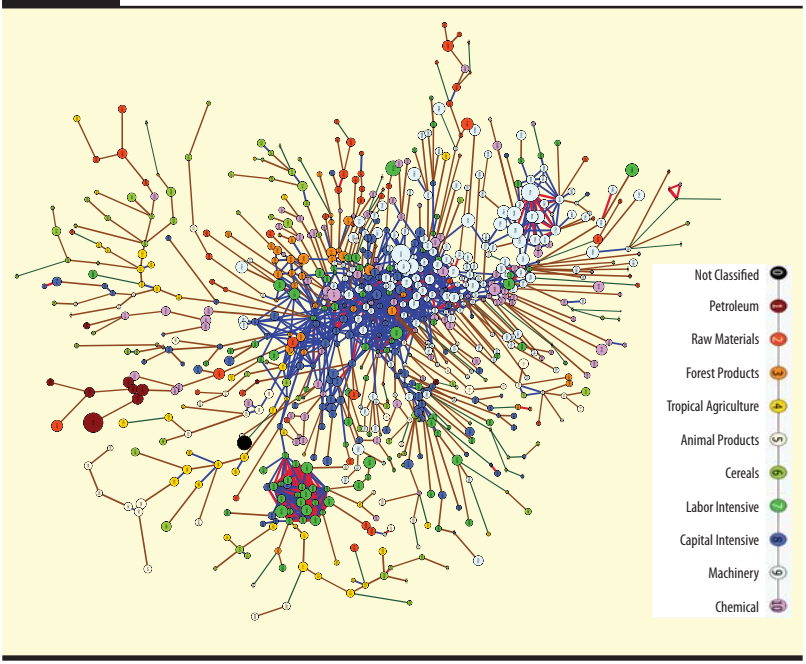


Source: Hidalgo et. al. (2007)

ings among these peripheral goods, such as petroleum products (the large red nodes on the left side of the network), seafood products (below petroleum products), garments (the very dense cluster at the bottom of the network), and raw materials (the upper left to upper periphery). Furthermore, there is a core of closely connected products in the center of the network, mainly of machinery and other capital- intensive goods.

This heterogeneous structure of the product space has important implications for structural transformation. If a country is producing goods in a dense part of the product space, then the process of structural transformation is much easier because the set of acquired capabilities can be easily redeployed to other nearby products. However, if a country is specialized in peripheral products, then this redeployment is more challenging, as there is not a set of products requiring similar capabilities. The process of structural

FIGURE B3 A Visual Representation of the Product Space



Source: Hidalgo et. al. (2007)

transformation can be impeded due to a country's orientation in this space.

Density and Open Forest

To measure what is nearby, pair-wise measures of distance must be used as defined above to calculate the distance of every product from a country's export basket as a whole. This measure is called density. It is the distance of good i from country c's export basket at time t. It is the sum of all paths leading to the product in which the country is present, scaled by the total number of paths leading to that product. As with proximity, density is based on whether or not the country has revealed comparative advantage in the product (RCA≥1). Density varies from 0 to 1, with higher values indicating that the country has achieved comparative advantage in many nearby

products, and therefore should be more likely to export that good in the future.

$$density_{i,c,t} = \left(\frac{\sum_k \varphi_{i,k,t} x_{c,k,t}}{\sum_k \varphi_{i,k,t}} \right).$$

Density is a key variable in the process of growth diagnostics: it can be taken as an indicator of the degree of coordination needed to produce any given product. If the product is very near to the current export basket, density will be high, meaning that most of the capabilities needed in the new sector will already exist in other sectors. If density is low, then the human capital, physical capital, property rights, infrastructure, and every other sector-specific factor of production that the sector needs will not exist, and cannot be easily adapted from what does exist.

To measure whether a lack of coordination is holding back structural transformation, one can use density to determine if there are many nearby opportunities for structural transformation available, or if there are simply no nearby products that could fuel structural transformation in the absence of coordination. In other words, one can use density to measure the opportunity set for the country as a whole. This measure, called "open forest," answers the question of "how green is your valley." In other words, is the current export basket in a part of the product space that is well-connected to other new and valuable opportunities for structural transformation, or is it in a sparse, unconnected part of the product space? It is calculated as follows:

$$open\_forest_{c,t} = \sum_i \sum_j \left[\frac{\varphi_{i,j,t}}{\sum_i \varphi_{i,j,t}} \left(1 - x_{c,j,t}\right) x_{c,i,t} PRODY_{j,t} \right].$$

This indicator can be used to compare the value of the product space of different countries and its evolution.

References

Arrow, K. 1962. "The Economic Implications of Learning by Doing." *Review of Economic Studies*. 29: 155–73.

Bardhan, P. 1970. *Economic Growth, Development, and Foreign Trade*. NY: Wiley-Interscience.

Feenstra, R., Lipsey, R., Deng, H., Ma, A. and Mo, H. 2005. "World Trade Flows: 1962–2000." Working paper No. 11040. Cambridge, MA: National Bureau of Economic Research.

Jaffe, A. 1986. "Technological Opportunity and Spillovers of R&D: Evidence from Firm's Patents, Profits, and Market Value." *American Economic Review*. 76: 984–1001.

Jaffe, A., Trajtenberg, M. and Henderson, R. 1993. "*Geographic Localization of Knowledge Spillovers as Evidenced by Patent Citations*." *The Quarterly Journal of Economics*. 108(3): 577–98.

Hausmann, R. and Klinger, B. 2006. "Structural Transformation and Patterns of Comparative Advantage in the Product Space." Working paper No. 128. Cambridge, MA: Center for International Development, Harvard University.

Hausmann, R. and Rodrik, D. 2003. "Economic Development as Self-discovery." *Journal of Development Economics*. 72: 603–33.

Hausmann, R., Hwang, J. and Rodrik, D. 2005. "What You Export Matters." Working paper No. 123. Cambridge, MA: John F. Kennedy School of Government, Harvard University.

Hidalgo, C., Klinger, B., Barabasi, A. and Hausmann, R. 2007. "The Product Space Conditions the Development of Nations." *Science*. 317: 482–87.

Klinger, B. 2007. "Uncertainty in the Search for New Exports." Graduate Student and Postdoctoral Fellow working paper No. 16. Cambridge, MA: Center for International Development, Harvard University.

Leamer, E.E. 1984. *Sources of Comparative Advantage: Theory and Evidence*. Cambridge, MA: MIT Press.

Inter-American Development Bank
1300 New York Avenue, N.W.
Washington, D.C. 20577