Inter-American Development Bank
Banco Interamericano de Desarrollo
Latin American Research Network
Red de Centros de Investigación
Research Network Working paper #R-485

The Elasticity of Substitution in Demand for Non-Tradable Goods in Latin America: The Case of Argentina

by

Martín González Rozada*
Pablo Andrés Neumeyer*
Alejandra Clemente**
Diego Luciano Sasson*
Nicholas Trachter*

*Universidad Torcuato Di Tella
**Instituto Nacional de Estadísticas y Censos (INDEC)

August 2004

Cataloging-in-Publication data provided by the
Inter-American Development Bank
Felipe Herrera Library

The elasticity of substitution in demand for non-tradable goods in Latin America : the case of Argentina / by Martín González Rozada … [et al.]

p. cm. (Research Network Working papers ; R-485)
Includes bibliographical references.

1. Substitute products--Argentina. 2. Commercial products—Argentina. 3. Substitution (Economics). I. González Rozada, Martín. II. Inter-American Development Bank. Research Dept. III. Latin American Research Network. VI. Series.

381 E665--dc21

Inter-American Development Bank
1300 New York Avenue, N.W.
Washington, DC 20577

The Research Department (RES) produces a quarterly newsletter, *IDEA* (*Ideas for Development in the Americas*), as well as working papers and books on diverse economic issues. To obtain a complete list of RES publications and read or download them, please visit our web site at http://www.iadb.org/res

Abstract

The objective of this paper is to estimate the elasticity of substitution in the demand for non-tradable goods relative to tradable goods in Argentina. This parameter plays a crucial role in the analysis of the macroeconomic equilibrium of a small open economy (Mendoza, Galindo and Izquierdo, 2003). Using two data sets, estimates of approximately 0.40 and 0.48, respectively, are found for this elasticity.

1. Methodology and Data

Consider a small open economy with tradable goods, T, and non-tradable goods, N. The consumer's preferences for these two goods are described by the utility function

$$U\left(C_t^T, C_t^N\right) = \left(\omega\left(C_t^T\right)^{-\eta} + (1-\omega)\left(e^{u_t}\right)\left(C_t^N\right)^{-\eta+\theta}\right)^{-\frac{1}{\eta}} \quad for\ \eta \neq \theta$$
$$= \left(\omega\left(C_t^T\right)^{-\eta} + (1-\omega)\left(e^{u_t}\right)\ln\left(C_t^N\right)\right)^{-\frac{1}{\eta}} \quad for\ \eta = \theta,$$

where C_t^T, C_t^N denote the consumption of tradable and non-tradable goods, η>1, ω>0, and u_t are normally distributed preference shocks. If the parameter θ differs from zero, preferences are not homothetic and there will be income effects on the relative demand for tradable and non-tradable goods. A positive θ implies that N goods are superior goods.[1]

Households maximize $E\sum \beta^t U\left(C_t^T\left(s^t\right), C_t^N\left(s^t\right)\right)$ subject to the budget constraint

$$A_0 + \sum_{t=0}^{\infty} p\left(s^t\right)\left(Y_t^d\left(s^t\right) - p_t^N\left(s^t\right)C_t^N\left(s^t\right) - C_t^T\left(s^t\right) - \left(K_{t+1}\left(s^t\right) - (1-\delta)K_t\left(s^t\right)\right)\right) \geq 0,$$

where s^t denotes the history of the economy up to period t, A_0 is the initial financial wealth, $p\left(s^t\right)$ is the price of a unit of good T consumption in state s^t in terms of units of good T at time 0, Y_t^d is the household's disposable income measured in tradable goods, p_t^N is the relative price of non-tradable goods, and $K_{t+1} - (1-\delta)K_t$ denotes the accumulation of capital and K_0 is given. If asset markets are incomplete or there are

[1] For some parameter values, non-homothetic preferences can lead to unbalanced growth paths in which a sector of the economy disappears. The specification of preferences

$$u = \left(\omega\left(C_t^T\right)^{-\eta} + (1-\omega)\left(\bar{c} + c_t^N\right)^{-\eta}\right)^{-\frac{1}{\eta}},$$

allows for short-run non-homothetic behavior when $\bar{c}/c_t^N$ is large, and is consistent with balanced growth in the long run as $\bar{c}/c_t^N \to 0$. However, these preferences imply a demand function that is non-linear in the unknown parameter $\bar{c}$

$$\ln\left(\frac{C_t^N}{C_t^T}\right) = \frac{1}{1+\eta}\ln\frac{1-\omega}{\omega} - \frac{1}{1+\eta}\ln p_t^N - \ln\left(1 + \frac{\bar{c}}{c_t^N}\right) + \varepsilon_t$$

participation constraints, $p(s^t)$ are interpreted as the marginal utility of wealth in state s^t for some agents and the consumer would face additional constraints.

The first-order conditions for this problem imply the equilibrium relation

$$\ln\left(\frac{C_t^N}{C_t^T}\right) = \frac{1}{1+\eta}\ln\frac{1-\omega}{\omega} - \frac{1}{1+\eta}\ln p_t^N + \frac{\theta}{1+\eta}C_t^N + \varepsilon_t, \qquad (1)$$

where ε_t can be interpreted as a composition of the preference shocks u_t and measurement error. The parameter of interest, the elasticity of substitution in the demand for non-tradable goods relative to tradable goods is $v \equiv \frac{1}{1+\eta}$.

The estimation of the elasticity of substitution in the demand for non-tradable goods relative to tradable goods in Argentina was performed with data obtained from official sources. Two data sets were obtained for the period 1993-2001. The first one contains data on the consumption of tradable and non-tradable goods constructed from the national income and product accounts following the flow of goods approach suggested in the terms of reference for this project (Mendoza, Galindo and Izquierdo, 2003). That is, consumption in sector i is calculated from the equation $C_i = Y_i - \sum_j IC_{ij} - (X_i - M_i) - I_i$, where C_i, Y_i, X_i, M_i, I_i denote consumption, gross production, exports, imports and investment in sector i and IC_{ij} denotes the intermediate consumption of good i in sector j.[2] The corresponding prices are the implicit prices in the national income accounts. The second data set employed in this study uses data on the consumption of non-durable goods (tradable goods) and services (non-tradable goods) and price indices for these categories of goods computed from the consumer price index data set.

---

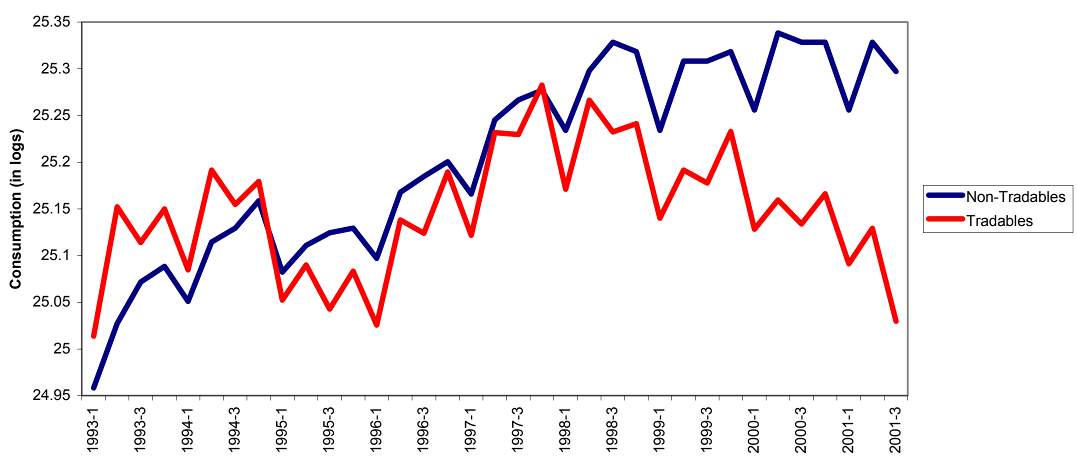
and is harder to estimate. Numerical simulations suggest that for over 100 years the model with the preference parameters estimated is well behaved.

[2] The authors constructed their own series following this methodology and obtained series for consumption of tradable and non-tradable goods that had a high correlation (between 0.60 and 0.98) with the series that were obtained from official sources. The latter were used because the levels of consumption seemed more plausible.

2. Estimation Results

The first step in the estimation procedure is to transform the data by computing the relevant variables in logs. Figure 1 shows the log of real tradable and non-tradable consumption from the first quarter of 1993 to the third quarter of 2001. As the figure indicates, the presence of seasonality is clear in both series.

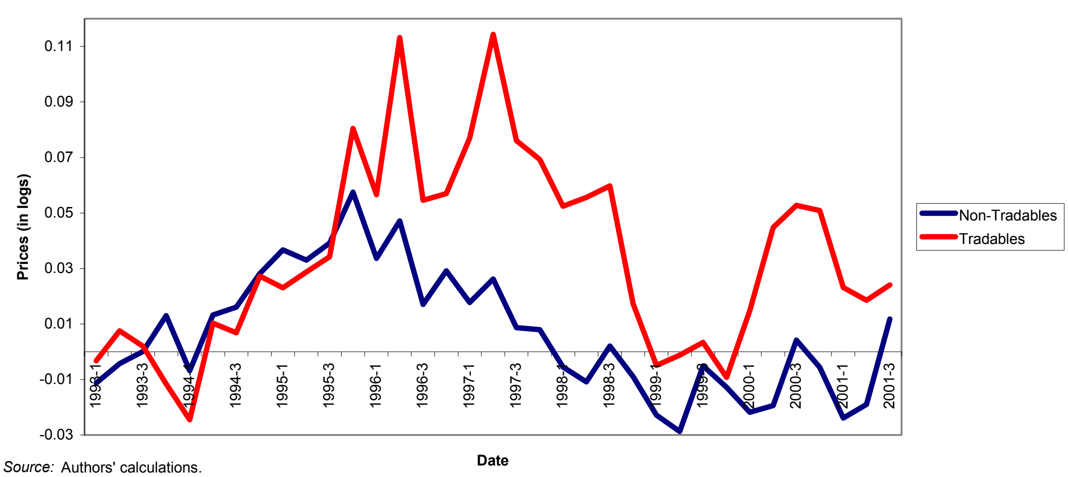
Figure 1.
Consumption of Tradable and Non-Tradable Goods



Source: Authors' calculations.

The next figure plots the implicit prices of non-tradable and tradable goods. Seasonality is less noticeable in this plot, at least for tradable prices.

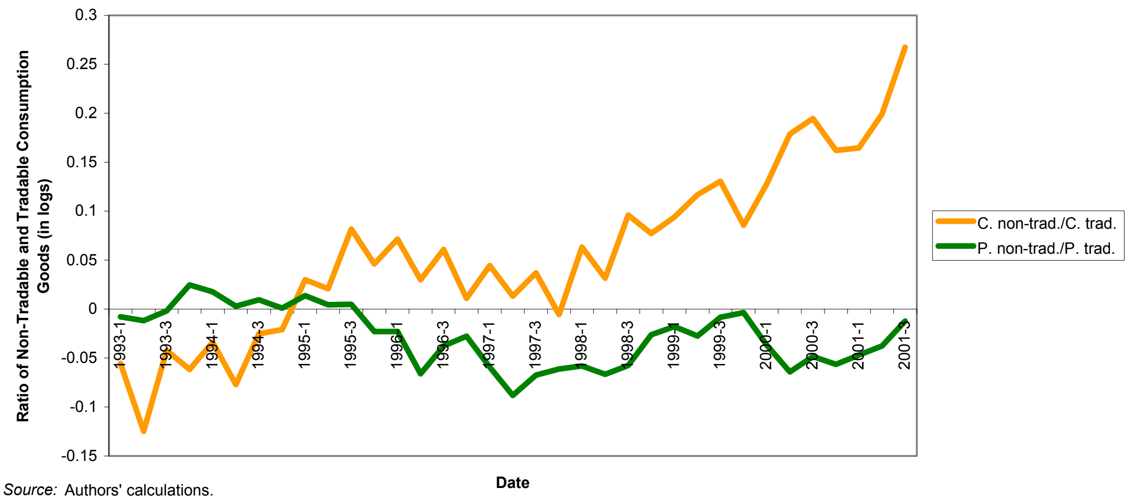
Figure 2.
Non-Tradable and Tradable Prices



Source: Authors' calculations.

Finally, Figure 3 shows the ratio of non-tradable to tradable consumption and prices in logs. One feature of this final graph is the absence of seasonality in both ratios.

Figure 3.
Non-Tradable and Tradable Consumption and Prices



Source: Authors' calculations.

The time trend in the ratio of the ratio of the consumption of non-tradable to non-tradable goods motivates the flexible functional form for preferences that allows for the non-homothetic case.

Since the dataset comprises variables varying with time, the next task is to check the order of integration of each variable individually. In order to do this, the standard augmented Dickey-Fuller test (see Dickey and Fuller, 1979) was applied to each variable. Table 1 summarizes the results.

Table 1. Unit Root Tests

Variable	ADF t-Statistic	p-Value	Lags
$\ln\left(C_t^N / C_t^T\right)$	-0.057	0.9454	4
$\ln\left(p_t^N\right)$	-1.926	0.3167	0
$\ln\left(C_t^N\right)$	-1.195	0.6631	4
$\ln\left(C_t^T\right)$	-2.252	0.1932	4

Notes: The number of lags in the test was selected using the Schwartz Information Criterion. The probability of rejection was computed using MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller tests on the variables show the presence of a unit root in each of the series. Therefore, before going to the estimation step it is necessary to check for cointegration among the variables of the model. Table 2 shows Johansen's cointegration test (see Johansen, 1991) among the ratio between consumption of non-tradable and tradable goods, the ratio between the prices of the non-tradable and tradable goods and the consumption of non-tradable goods in logarithms and expressed in real terms.

Table 2. Johansen Cointegration Test

Null Hypothesis	Eigenvalue	Trace Statistic	5% Critical Value	1% Critical Value
None	0.675	47.185	29.68	35.65
At most one	0.2762	15.716	15.41	20.04
At most two	0.2119	6.666	3.76	6.65
Null Hypothesis	**Eigenvalue**	**Trace Statistic**	**5% Critical Value**	**1% Critical Value**
None	0.675	31.469	20.97	25.52
At most one	0.2762	9.05	14.07	18.63
At most two	0.2119	6.666	3.76	6.65

Note: The number of lags in the test was selected using the Schwartz Information Criterion.

As indicated in the table above, both test statistics (the trace and maximum eigenvalue) indicate the presence of cointegration at the 1 percent level and the maximum eigenvalue statistic also indicates cointegration at the 5 percent level. Therefore, there is evidence of cointegration among the variables as predicted by the theoretical model.

The next step is to estimate the model. In order to do this a vector error correction model is estimated for the three variables. The specification of the error correction model corresponds to the six lags selected in the cointegration test and includes three dummy variables to account for the seasonal cycles. The estimated error correction equation is presented below.[3]

$$\ln\left(\frac{C_t^N}{C_t^T}\right) = \underset{}{14.96} - \underset{(0.20)}{0.4034} \ln p_t^N + \underset{(0.05)}{0.5954} \ln C_t^N \qquad (2)$$

[3] The Appendix presents the estimation of the complete model.

All estimated coefficients are statistically significant at the usual significance levels. Equation (2) indicates that the long-run elasticity of substitution between tradable and non-tradable goods is about -0.40, which is closer to the estimate of 0.44 obtained by Stockman and Tesar (1995) than the estimate of 0.74 obtained by Mendoza (1995). The coefficient on C_t^N is tightly estimated and indicates strong income effects. The point estimates of the preference parameters are about $\eta = \theta = 1.47$.

In order to have an alternative estimation of the elasticity of substitution the procedure described above is repeated, but this time the consumption of non-durable goods is used as a proxy for the consumption of tradable goods, and the consumption of services as a proxy for the consumption of non-tradable goods. The implicit prices of non-durable goods and services are used to construct the ratio between the prices of non-tradable and tradable goods. The Appendix shows unit root tests for the individual variables, the Johansen's cointegration test and the vector error correction estimation. In this case, the cointegration results are somewhat weaker. Only the maximum eigenvalue test indicates cointegration at the 1 percent level. Consistent with this result, using this specification an estimation of the elasticity of substitution of approximately -0.48 is obtained, statistically significant at the 10 percent level.

3. Final Remarks

Using data for the 1980s and 1990s, this paper has estimated the elasticity of substitution between tradable and non-tradable goods for Argentina to be between approximately 0.40 and 0.48.

In spite of the small number of observations and the possible measurement error in the data, the error correction model detected a long-run equilibrium relation between the ratio of consumption of tradable and non-tradable goods, their relative prices and the level of consumption in non-tradable goods. Moreover, the estimated model is consistent with the theory and with Stockman and Tesar's (1995) estimate of the parameter of interest for a sample of developed countries.

However, it is worth mentioning that a small sample of time series variables was used, and this had implications for the estimation. On one hand, the short time series did not permit the use of exogenous variables in the vector error correction specification because of the limited degrees of freedom. On the other hand, the estimated model is not very robust, in the sense that the selected estimation does not present very stable estimated coefficients.

5. References

Dickey, D., and W. Fuller. 1979. "Distribution of the Estimators for Autoregressive Time Series with a Unit Root." *Journal of the American Statistical Association* 74(366): 427-431.

Johansen, S. 1991. "Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models." *Econometrica* 59: 1551-1581.

MacKinnon, J.G. 1996. "Numerical Distribution Functions for Unit Root and Cointegration Tests." *Journal of Applied Econometrics* 11: 601-18.

Mendoza, E.G. 1995. "The Terms of Trade, the Real Exchange Rate and Economic Fluctuations." *International Economic Review* 36(1): 101-37.

Mendoza, E.G., A. Galindo and A. Izquierdo. 2003. "The Elasticity of Substitution in Demand for Non-Tradable Goods in Latin America." Terms of Reference. Washington, DC, United States: Inter-American Development Bank, Research Department. http://www.iadb.org/res/laresnetwork/studies/st80tor.pdf

Stockman, A.C., and L.L. Tesar. 1995. "Tastes and Technology in Two-Country Model of Business Cycle: Explaining International Comovements." *American Economic Review* 85(1): 168-185.

Appendix

Table 1.A. Vector Error Correction Model Estimation Results

Cointegration Eq:	z_{t-1}		
$\ln\left(C_{NT\,t-1} / C_{T\,t-1}\right)$	1		
$\ln\left(P_{NT\,t-1} / P_{T\,t-1}\right)$	0.4034		
	(0.2015)		
	[2.0021]		
$\ln\left(C_{NT\,t-1}\right)$	-0.5954		
	(0.0527)		
	[-11.3061]		
C	14.9634		
Error Correction:	$\Delta\left(\ln\left(C_{NT} / C_{T}\right)\right)$	$\Delta\left(\ln\left(P_{NT} / P_{T}\right)\right)$	$\Delta\left(\ln C_{NT}\right)$
z_{t-1}	-0.469200	-0.481383	-0.285831
	(0.49994)	(0.36038)	(0.19651)
	[-0.93851]	[-1.33577]	[-1.45456]
$\Delta\left(\ln\left(C_{NT} / C_{T}\right)_{t-1}\right)$	0.612304	0.519411	-0.337430
	(0.63025)	(0.45431)	(0.24773)
	[0.97153]	[1.14330]	[-1.36211]
$\Delta\left(\ln\left(C_{NT} / C_{T}\right)_{t-2}\right)$	-0.588071	-0.071664	0.232468
	(0.61440)	(0.44288)	(0.24150)
	[-0.95714]	[-0.16181]	[0.96261]
$\Delta\left(\ln\left(C_{NT} / C_{T}\right)_{t-3}\right)$	-0.598401	0.599062	-0.330187
	(0.68513)	(0.49387)	(0.26930)
	[-0.87341]	[1.21299]	[-1.22610]
$\Delta\left(\ln\left(C_{NT} / C_{T}\right)_{t-4}\right)$	-0.077077	0.401242	0.524183
	(0.77212)	(0.55657)	(0.30349)
	[-0.09983]	[0.72092]	[1.72720]
$\Delta\left(\ln\left(C_{NT} / C_{T}\right)_{t-5}\right)$	0.540688	0.451324	-0.114233
	(0.64847)	(0.46744)	(0.25489)
	[0.83379]	[0.96552]	[-0.44817]

Table 1.A., continued

Error Correction:	$\Delta(\ln(C_{NT}/C_T))$	$\Delta(\ln(P_{NT}/P_T))$	$\Delta(\ln C_{NT})$
$\Delta(\ln(C_{NT}/C_T)_{t-6})$			
	0.220120	0.277890	0.455729
	(0.63516)	(0.45785)	(0.24965)
	[0.34656]	[0.6695]	[1.82544]
$\Delta(\ln(P_{NT}/P_T)_{t-1})$			
	-0.832011	0.028274	-0.689081
	(0.62962)	(0.45385)	(0.24748)
	[-1.32146]	[0.06230]	[-2.78443]
$\Delta(\ln(P_{NT}/P_T)_{t-2})$			
	-0.111923	-0.421696	-0.004859
	(0.78471)	(0.56565)	(0.30844)
	[-0.14263]	[-0.74551]	[-0.01575]
$\Delta(\ln(P_{NT}/P_T)_{t-3})$			
	-0.499180	-0.336285	-0.307264
	(0.83229)	(0.59995)	(0.32714)
	[-0.59977]	[-0.56053]	[-0.93925]
$\Delta(\ln(P_{NT}/P_T)_{t-4})$			
	-0.328235	-0.513406	0.246264
	(0.79898)	(0.57593)	(0.31405)
	[-0.41082]	[-0.89143]	[0.78417]
$\Delta(\ln(P_{NT}/P_T)_{t-5})$			
	-0.187846	-0.172702	-0.332842
	(0.72347)	(0.52150)	(0.28437)
	[-0.25965]	[-0.33116]	[-1.17047]
$\Delta(\ln(P_{NT}/P_T)_{t-6})$			
	-0.306048	-0.109493	-0.098211
	(0.65486)	(0.47205)	(0.25740)
	[-0.46735]	[-0.23195]	[-0.38155]
$\Delta(\ln C_{NT\,t-1})$			
	-2.457124	-0.735731	0.016370
	(1.28354)	(0.92522)	(0.50451)
	[-1.91434]	[-0.79519]	[0.03245]
$\Delta(\ln C_{NT\,t-2})$			
	-0.544635	0.463027	-1.014808
	(1.06280)	(0.76610)	(0.41774)
	[-0.51245]	[0.60429]	[-2.42927]
$\Delta(\ln C_{NT\,t-3})$			
	-0.419562	-0.682683	0.619423
	(1.04856)	(0.75584)	(0.41215)
	[-0.40013]	[-0.90321]	[1.50292]

Table 1.A., continued

Error Correction:	$\Delta(\ln(C_{NT}/C_T))$	$\Delta(\ln(P_{NT}/P_T))$	$\Delta(\ln C_{NT})$
$\Delta(\ln C_{NT\,t-4})$			
	-0.258799	0.041919	-0.513012
	(1.16045)	(0.83650)	(0.45613)
	[-0.22302]	[0.05011]	[-1.12472]
$\Delta(\ln C_{NT\,t-5})$			
	-0.624372	0.216330	0.590741
	(1.11351)	(0.80266)	(0.43768)
	[-0.56072]	[0.26952]	[1.34972]
$\Delta(\ln C_{NT\,t-6})$			
	0.842801	-0.106746	-0.407851
	(0.89261)	(0.64342)	(0.35085)
	[0.94420]	[-0.16590]	[-1.16247]
C	-0.045699	-0.103508	0.200619
	(0.15699)	(0.11316)	(0.06171)
	[-0.29110]	[-0.91469]	[3.25125]
DUMMY 1st Quarter	0.135672	0.141469	-0.389241
	(0.30588)	(0.22049)	(0.12023)
	[0.44354]	[0.64161]	[-3.23746]
DUMMY 2nd Quarter	-0.130081	0.023923	0.08674
	(0.12335)	(0.08891)	(0.04848)
	[-1.05460]	[0.26906]	[0.17891]
DUMMY 3rd Quarter	0.29444	0.180465	-0.396348
	(0.36101)	(0.26023)	(0.14190)
	[0.81561]	[0.69348]	[-2.79318]
R-squared	0.867471	0.747891	0.987182
Sum sq. Resids.	0.005254	0.02730	0.000812
Log likelihood	80.40316	89.56866	106.5494

Notes: Standard error in ( ) and t-statistics in [ ].

Tables 2.A, 3.A and 4.A show unit root tests, cointegration test and estimation results for the alternative representation of non-tradable and tradable goods. That is, as mentioned above in the main text, consumption of non-tradable goods is approximated by the consumption of services, while consumption of tradable goods is approximated by the consumption of non-durable goods. The ratio of prices of services to non-durable goods thus approximates the ratio of non-tradable and tradable prices.

Table 2.A. Unit Root Tests

Variable	ADF t-Statistic	p-Value	Lags
$\ln\left(C_t^N / C_t^T\right)$	-0.265	0.9202	0
$\ln\left(p_t^N\right)$	-1.121	0.6964	0
$\ln\left(C_t^N\right)$	-1.599	0.4706	5
$\ln\left(C_t^T\right)$	-0.089	0.9417	6

Notes: The number of lags in the test was selected using the Schwartz Information Criterion. The probability of rejection was computed using MacKinnon (1996) one sided p-values.

Table 3.A. Johansen's Cointegration Test

Null Hypothesis	Eigenvalue	Trace Statistic	5% Critical Value	1% Critical Value
None	0.5915	44.372	24.31	29.75
At most one	0.3265	18.406	12.53	16.31
At most two	0.2129	6.943	3.84	6.51
Null Hypothesis	**Eigenvalue**	**Trace Statistic**	**5% Critical Value**	**1% Critical Value**
None	0.5915	25.966	17.89	22.99
At most one	0.3265	11.464	11.44	15.69
At most two	0.2129	6.943	3.84	6.51

Notes: The number of lags in the test was selected using the Schwartz Information Criterion.

Table 4.A. Vector Error Correction Model Estimation Results

Cointegration Eq:	z_{t-1}		
$\ln\left(C_{NT\,t-1} / C_{T\,t-1}\right)$	1		
$\ln\left(P_{NT\,t-1} / P_{T\,t-1}\right)$	0.4987		
	(0.3656		
	[1.3639]		
$\ln\left(C_{NT\,t-1}\right)$	-0.07235		
	(0.0054)		
	[-13.4077]		
Error Correction:	$\Delta\left(\ln\left(C_{NT} / C_T\right)\right)$	$\Delta\left(\ln\left(P_{NT} / P_T\right)\right)$	$\Delta\left(\ln C_{NT}\right)$
z_{t-1}	-0.131676	-0.122110	-0.250651
	(0.14334)	(0.09749)	(0.07448)
	[-0.91863]	[-1.25257]	[-3.36554]
$\Delta\left(\ln\left(C_{NT} / C_T\right)_{t-1}\right)$	-0.083987	0.282037	-0.217394
	(0.36609)	(0.24898)	(0.19021)
	[-0.22942]	[1.13276]	[-1.14291]
$\Delta\left(\ln\left(C_{NT} / C_T\right)_{t-2}\right)$	-0.475877	-0.084897	0.473100
	(0.37538)	(0.25530)	(0.19504)
	[-1.26773]	[-0.33254]	[2.42569]
$\Delta\left(\ln\left(C_{NT} / C_T\right)_{t-3}\right)$	0.060091	-0.034825	-0.488374
	(0.34514)	(0.23474)	(0.17933)
	[0.17410]	[-0.14836]	[-2.72336]
$\Delta\left(\ln\left(C_{NT} / C_T\right)_{t-4}\right)$	-0.035277	-0.303725	-0.133463
	(0.38780)	(0.26375)	(0.20149)
	[-0.09097]	[-0.15156]	[-0.66237]
$\Delta\left(\ln\left(C_{NT} / C_T\right)_{t-5}\right)$	0.374066	-0.137591	-0.194811
	(0.34862)	(0.23710)	(0.18114)
	[1.07299]	[-0.58030]	[-1.07550]
$\Delta\left(\ln\left(C_{NT} / C_T\right)_{t-6}\right)$	0.492397	0.047495	-0.349563
	(0.42623)	(0.28989)	(0.22146)
	[1.15522]	[0.16384]	[-1.57843]

Table 4.A., continued

Error Correction:	$\Delta(\ln(C_{NT}/C_T))$	$\Delta(\ln(P_{NT}/P_T))$	$\Delta(\ln C_{NT})$
$\Delta(\ln(P_{NT}/P_T)_{t-1})$			
	0.442236	-0.301454	-0.253014
	(0.51887)	(0.35289)	(0.26959)
	[0.85231]	[-0.85424]	[-0.93851]
$\Delta(\ln(P_{NT}/P_T)_{t-2})$			
	0.800562	-0.054979	-0.022033
	(0.54764)	(0.37246)	(0.28454)
	[1.46183]	[-0.14761]	[-0.07743]
$\Delta(\ln(P_{NT}/P_T)_{t-3})$			
	0.615366	0.269530	0.638819
	(0.49343)	(0.33559)	(0.25637)
	[1.24712]	[0.80315]	[2.49175]
$\Delta(\ln(P_{NT}/P_T)_{t-4})$			
	0.009219	0.689309	0.285863
	(0.52732)	(0.35864)	(0.27398)
	[0.01748]	[1.92201]	[1.04336]
$\Delta(\ln(P_{NT}/P_T)_{t-5})$			
	-0.060739	0.367554	0.589934
	(0.58115)	(0.39525)	(0.30195)
	[-0.10452]	[0.92993]	[1.95375]
$\Delta(\ln(P_{NT}/P_T)_{t-6})$			
	-0.393692	0.304252	0.627845
	(0.59057)	(0.40166)	(0.30685)
	[-0.66663]	[0.75749]	[2.04612]
$\Delta(\ln C_{NT\,t-1})$			
	-0.34449	-0.536003	0.559361
	(0.43270)	(0.29429)	(0.22482)
	[-0.79605]	[-1.82136]	[2.48803]
$\Delta(\ln C_{NT\,t-2})$			
	0.719131	0.122816	-0.602453
	(0.57510)	(0.39114)	(0.29881)
	[1.25044]	[0.31400]	[-2.01617]
$\Delta(\ln C_{NT\,t-3})$			
	-0.320004	-0.268406	0.039074
	(0.65475)	(0.44531)	(0.34019)
	[-0.48875]	[-0.60275]	[0.11486]
$\Delta(\ln C_{NT\,t-4})$			
	0.700226	0.247096	0.009235
	(0.54524)	(0.37083)	(0.28329)
	[1.28425]	[0.66633]	[0.03260]

Table 4.A., continued

Error Correction:	$\Delta(\ln(C_{NT} / C_T))$	$\Delta(\ln(P_{NT} / P_T))$	$\Delta(\ln C_{NT})$
$\Delta(\ln C_{NT\,t-5})$			
	-0.369737	-0.102730	0.133995
	(0.53274)	(0.36233)	(0.27680)
	[-0.69402]	[-0.28353]	[0.48408]
$\Delta(\ln C_{NT\,t-6})$			
	-0.314559	-0.183349	-0.319911
	(0.45118)	(0.30685)	(0.23442)
	[-0.69720]	[-0.59751]	[-1.36469]
R-squared	0.532972	0.548510	0.846678
Sum sq. Resids.	0.003921	0.001814	0.001059
Log likelihood	88.02603	99.20521	107.0135

Notes: Standard error in ( ) and t-statistics in [ ].