Oil Prices, Geography and Endogenous Regionalism

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Abstract

This paper aims at studying the effect of oil prices on the geography of international trade. We show that oil prices affect differently transportation costs across partners, thereby distorting relative prices. Then oil shocks create trade reallocations at the expense of remote countries. They operate as endogenous factor favoring regionalization of trade flows.
This mechanism is empirically tested for the case of imports into the US market. The empirical results confirm the theoretical intuition even if the amplitude of this effect remains relatively limited: a doubling in oil prices increases the joint market shares of Canada and Mexico in the US market by less than 3%

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1 Introduction

In less than a decade, nominal oil prices have been multiplied by 5, raising from about 20 to more than 100 $US\$$ per barrel. It even reached a pick of 146\$ during july 2008. For many reasons (increasing activity in developing countries such as China and India, political risks and instability in some producing countries like Irak or Nigeria, etc...), some financial analysts and corporations like Goldman Sachs do not rule out the possibility that prices would increase further, predicting levels around 200 USD in the upcoming years.

It is well known that oil shocks create many macroeconomic direct and indirect effects on inflation, employment, GDP, real wages and productivity. These have been well studied and documented since the early 1980s (see Bruno and Sachs (1985)) and revisited very recently by Nordhaus ((2007) and Blanchard and Gali (2007).

The impact of oil prices through the cost of transportation and international trade has been little studied though, perhaps because the expected effect on international commerce would be obvious. Oil prices, providing that they affect proportionally all transportation costs, would act as a global tax, equally affecting local and international trade in goods through a reduction in real revenues. In parallel, an oil price shock can be also seen as a tax on pollution, working for a better global environment.

The objective of this paper is to show that oil prices affect differently transportation costs across partners. By distorting relative prices, oil shocks provoke then trade *reallocations* which have further macroeconomic implications on welfare.

More intuitively, if one believes that an increase in oil prices make more distant partners less competitive, then one would expect oil prices to favor regionalism, thus acting as a resistance force against long distance trade. Oil price increases might then act on welfare as regional trade agreements (RTAs) would do. They would divert trade flows from more efficient (or low cost) partners to less efficient partners, resulting in a welfare loss for the importing country. For close exporters however, oil price shocks would then be welfare creating. There are two main differences, however, between oil shocks and RTAs effects. First, oil shocks would favor regionalism in an endogenous manner through market forces, while RTAs are government type interventions. The second difference is a corollary of the first one: unlike RTAs, oil price increases act as a tax on consumers' revenue without any compensation through government revenues.

Besides, by increasing local and regional trading activities, oil price increases can act as a tax on regional environment. Although greenhouse gases emissions should be lowered globally their concentration might become increasingly local.

More precisely, how can oil prices affect trade costs and thereby the reallocation of trade flows? Trade theory suggests that under the strong assumption that transport costs are proportionally linked to oil prices, a global shock such an increase in oil prices decreases imports from the rest of the world but without changing import distribution across partners. That is because a global oil shock should increase all prices proportionally, thus leaving all relative prices in the manufacturing sector unaffected.

If, however, transport costs do not respond proportionally to oil prices the distribution of trade costs and trade flows among partners can be seriously altered. In this paper, we assume such a framework and then take it to the test. More precisely, we assume a general transport cost function whereby the cost of shipping a good implies variable but also fixed costs. This simple although realistic assumption make the impact of oil shocks depend on the extent to which transport is governed by variable costs relative to fixed ones. We then discuss how oil prices in this more general form can be affecting the geography of trade. It turns out that more distant economies suffer more from an increase in oil prices than closer trading partners. That is because oil prices affect variable costs, which share in total costs increases with longer distance.

In a second step, we embody this new technology function of transport into a gravity equation and discuss how oil prices affect trade flows through changes in transportation charges.

In order to estimate empirically the oil impact on trade geography, we use Robert Feenstra's US bilateral imports and freight charges data at the SITC4 product level (over 1000 products). Alternatively, in order to account for transport modes in our equations, we use the same type of data by mode of transport kindly provided by David Hummels. The two series are available for the period 1974-2001. We first find that the elasticity of relative transport costs to oil prices varies between 0.01 and -0.01 respectively depending on whether the US is trading with long distance partners or close partners. This change in relative costs has implications for trade flows. After estimating an elasticity of substitution of around 1.7, we can deduce that the elasticity of relative market shares to oil prices is around [0.02] for less distant to US economies (Canada and Mexico) and around [-0.07;-0.01] for more distant ones. Keeping all other things equal, this means that multiplying oil prices by a factor of 5 in later years would have contributed to around 7% increase in US *relative* imports from its ALENA's partners.

The paper is organized as follows: section 2 displays the theoretical framework and develops the empirical specification. In section 3, the data used is described and some stylized facts are presented. The results are then presented in section 4. Before concluding, we display some simulations in section 5

2 The Analytical framework

2.1 The oil-price effect on transport costs

In this section, we propose a theoretical formulation of transport costs in which we highlight the importance of fixed costs of transports as a source of the non proportional response to oil prices.

Assume the following general transport cost function:

$$TC_{ij} = c_{ij}.q_{ij} + FC \tag{1}$$

where TC_{ij} represents the total costs of transportation of a merchandize shipped from i to j, c_{ij} being the variable cost from shipping one unit of product, q_{ij} the quantities transported and FC the fixed costs. Note that $c_{ij}.q$ represent variable costs (VC_{ij}).

The variable cost of shipping one unit is proportional to distance. Indeed, if the shipping distance doubles one expects to use twice as more oil and labor hours. Thus, assume $c_{ij} = dist_{ij}.f(p_{oil}, p_c)$ where $dist_{ij}$ represents distance, and f being a general technology function of transport per km, positively related to oil prices p_{oil} and a composite of other factors p_c. This specification is intuitive since for a zero distance, there are no variable costs of transportation and, in particular, oil prices should not matter.

Oil affects transport costs via their variable component. The higher the share of the latter in total costs the higher the impact on transportation. Let s_{ij} equals $\frac{VC_{ij}}{TC_{ij}}$ the share of variable costs, and $\epsilon_{VC/p_{oil}}$ the elasticity of VC_{ij} to oil prices, the product of both terms gives the elasticity of *total* transportation costs to prices:

$$\epsilon_{TC/p_{oil}} = \frac{d(TC)/TC}{d(p_{oil})/p_{oil}} = s_{ij}.\epsilon_{VC/p_{oil}} \tag{2}$$

How can geographical distance affect the sensitivity of transport costs to oil prices ? Notice that under the assumption of an unchanged technology of transport f(.) with distance, the elasticity of variable costs, $\epsilon_{VC/p_{oil}}$, does not depend on distance. However, distance can make transport costs more sensitive to oil prices through s_{ij}. The explanation is simple: an increase in the shipping distance of a given quantity, increases variable costs while leaving fixed costs unaffected. Thus, the share of variable costs must be higher for distant partners than for close ones, which makes former countries transportation costs more sensitive to oil shocks than the latter.

For estimation purposes, let us divide equation 1 by quantities. The unit charge of transport obtained can thus be expressed by:

$$fret_{ij} = c_{ij} + \frac{FC}{q_{ij}} \tag{3}$$

From 3, and expressing fixed unit costs by $UFC = F/q_{ij}$, we can compute the proportional change of unit charge as the weighted sum of relative changes in variable unit cost and fixed unit costs :

$$d(fret_{ij})/fret_{ij} = s_{ij}.d(c_{ij})/c_{ij} + (1 - s_{ij}).d(UFC_{ij})/UFC_{ij} \tag{4}$$

Equation 4 guides our econometric specification. It tells that every increase in variable costs (c_{ij}) due to a shock like oil price increases is passed through unit fret charges. This pass-through is higher when the share of variable to total costs are high. Geographical distance, as mentioned earlier, increases this share. Besides, because of returns to scale born by fixed costs, an increase in quantities shipped reduces the unit fixed costs of transport thereby reducing the unit charge of transport. These returns to scale are the more effective the more partners to trade are close to each other(ie. because of high $1 - s_{ij}$). We are more interested however, in the interaction between oil price changes and distance rather than in the last effect.

Thus, following the theory formulation 4 where we assume c_{ij} to be shifted by oil prices, adding time and product subscripts where suitable, and removing the i-importer subscript because there is only one importer (the US), we estimate the following log linear equation:

$$ln(fret_{jt}) = \beta_1 + \beta_2.ln(dist_j) + \beta_3.ln(p_{oil})_t.ln(dist_j) + \beta_6 ln(q_{kjt}) + othercontrols \qquad (5)$$

As already mentioned, oil prices affect trade costs through distance: at 0 distance, oil are not used and oil prices do not enter the equation anymore. But factors other than oil, also related to distance, are used in the transport technology (like the number of hours worked by onboard personnel). As we do not have access to prices of factors other than oil we introduce distance on its own to capture the variation of these other factors[1]. Beside, quantities shipped (q_{kjt}) capture economies of scale in the transport technology.

Note that we include some control variables: First, we add a contiguity variable (*contig*), a dummy variable indicating if partners share a common border to take into account the fact that across border countries might have more developed transportation networks between them, thus exhibiting reduction in transport costs. Besides, in some specifications the contiguity variable is used alternatively to the distance variable to test our prediction that close countries are hurt less by an increase in oil prices We also add unit values (*uv*) to illustrate that shipping costs are increasing with good's price, due to insurance fees but also due to different technology of transportation. In order to cover better the differences in transport technologies and their impact on costs, we add 3 transport modes dummies (*vessel*, *land* and *air*). We also add a time common evolution (*trend*) to our equation.

For small variation of oil prices, the corresponding elasticity of transport cost is:

$$\frac{dln(fret_{jt})}{dlnp_{oil}} = \widehat{\beta_3}.ln(dist_j)$$

[1] We do not have access to prices of factors other than oil. One could imagine introducing wages in the transport sector for each partner country. This is not however a good idea because a big proportion of international transportation is served by ships and carriers that do not have the same nationality than the country of exports and/or imports.

However, log differences cannot be interpreted as growth rates in periods of large variations of oil prices. an adjustment should be made in this case[2]. The proportional change in unit charges can be expressed then as:

$$\frac{d(fret_{jt})}{(fret_{jt})} = \left(1 + \frac{d(p_{oil})}{p_{oil}}\right)^{\widehat{\beta_3}.ln(dist)} - 1$$

2.2 The relative imports equation

We are interested in studying the impact of oil prices on export market shares, through changes in transport costs. To this end, we adjust a gravity equation model of trade to reveal the impact on market shares.

A standard gravity equation states that bilateral imports depend on trade costs (transport and tariffs), the economic size of the trading partners and some remoteness variables (expressing exporter and importer price indexes, respectively $PI(US)$ and $PI(J)$).

Considering only one country of imports (the USA), including time (t) and product (k) subscripts, we thus have in logs:

$$ln(m_{kjt}) = \alpha_1.ln(\widehat{fret}_{kjt}) + \alpha_2.ln(tariffs_{kjt}) + \alpha_3 ln(GDP_{jt}) + \alpha_4.PI(US)_{kt} + \alpha_5.PI_{kjt} \quad (6)$$

Note that two different variables approximate the trade costs: ad-valorem tariff rates and transport costs. The latter being the predicted values from our first step.

However, as our main purpose is to study the market shares, we estimate a relative (rather than absolute) equation of trade. We thus express each variable in relative terms where the denominator expresses the mean figure over all exporters. We then take the log of these relative

[2] see proof in appendix A

terms to obtain:

$$ln(R.m_{kjt}) = \alpha_1 ln(R.\widehat{fret}_{kjt}) + \alpha_2 ln(R.tariffs_{kjt}) + \alpha_3 ln(R.\widehat{GDP}_{jt}) + \alpha_5.R.PI_{kjt} \qquad (7)$$

where for each y variable , $R.y = \frac{y_{kjt}}{\prod_j y_{kjt}^{1/J}}$. Notice that by doing so the relative US price index $R.PI(US)_{kt} = 1$ and thus should end up in the constant terms. Only the exporter index remains: we approach it by different combinations of fixed and/or dyadic effects in our regressions. Note also that $\widehat{\alpha_1}$ can be interpreted as the elasticity of relative imports to relative transport costs. Indeed, a 1% increase in relative transport costs implies a $\widehat{\alpha_1}$ decrease in relative imports.

The oil-price effect on relative imports will then be:

$$\frac{dln(R.m_{kjt})}{d(p_{oil})_t} = \frac{dln(R.m_{kjt})}{dln(R.fret_{kjt})}.\frac{dln(R.fret_{kjt})}{dln(p_{oil})_t} = \widehat{\alpha_1}\widehat{\beta_3}.ln(R.dist_j)$$

However, in large variation periods we can estimate the effect by:

$$\frac{dR.m_{kjt}}{R.m_{kjt}} = \widehat{\alpha_1}\left[\left(1 + \frac{dp_{oil}}{p_{oil}}\right)^{\widehat{\beta_3}.ln(R.dist_j)} - 1\right]$$

3 Data and Stylized Facts

For our stylized facts as well as the econometric study, we use Robert Feenstra's US bilateral imports - in value and quantity- and freight charges data at the SITC4 product level (over 1000 products).[3] The data is available for almost thirty years (1974-2001).[4] In addition, we use the CEPII's database on distances freely available online.[5] As for macro variables, such as GDP, we use the World Development Indicators published by the worldbank. Finally, in order to

[3] Data is made available on the NBER website: http://www.nber.org/data/. It is described in Feenstra et al. (2001).

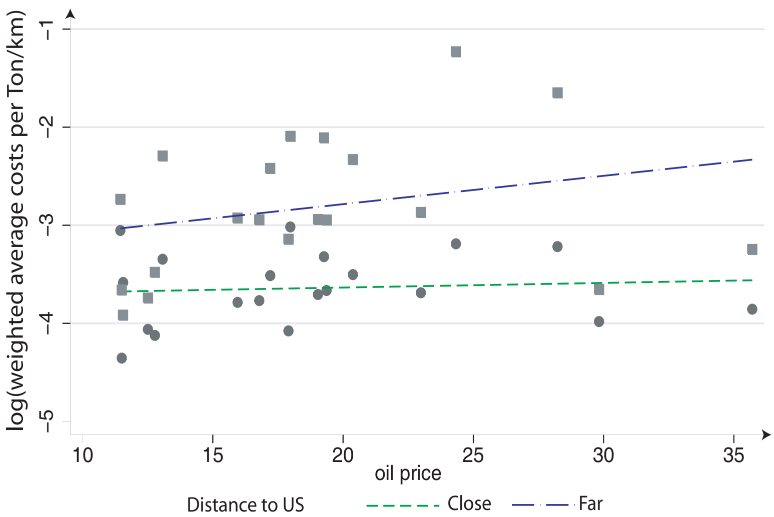
[4] In the stylized facts, we remove all the observations from 1982 to 1988 because of a lack in compatibility with other years. Indeed, data doesn't include land transport for these years which affects market shares.

[5] http://www.cepii.fr/francgraph/bdd/distances.htm

account for transport modes in our econometric study, we use the same type of data by mode of transport kindly provided by David Hummels[6]. It includes air and ocean shipments only. So, we'll add, in our regressions three dummy variables (*land*, *vessel* and *air*) indicating positive flows for each transport mode.

Before the econometric study, we display some stylized facts on our theoretical intuitions: transports costs and market shares should not respond proportionally to oil-prices variations. First, we study the relation between transport costs and oil prices. We split the countries into two groups: far and close from the US. The former (latter) group comprises all countries which are less (more) than 5000 km distant from the US. Then, we calculate average transport costs per Ton/Km. In doing so, we weight transport costs twofold: the share of each product in overall US imports and the market share of each exporting country. We expect a larger effect of oil-prices on the transport costs of remote countries. Figure 1 confirms this intuition since oil prices affect upward the transport costs for all countries, but the slope is flatter for close ones.

Figure 1: Average transport costs & oil prices

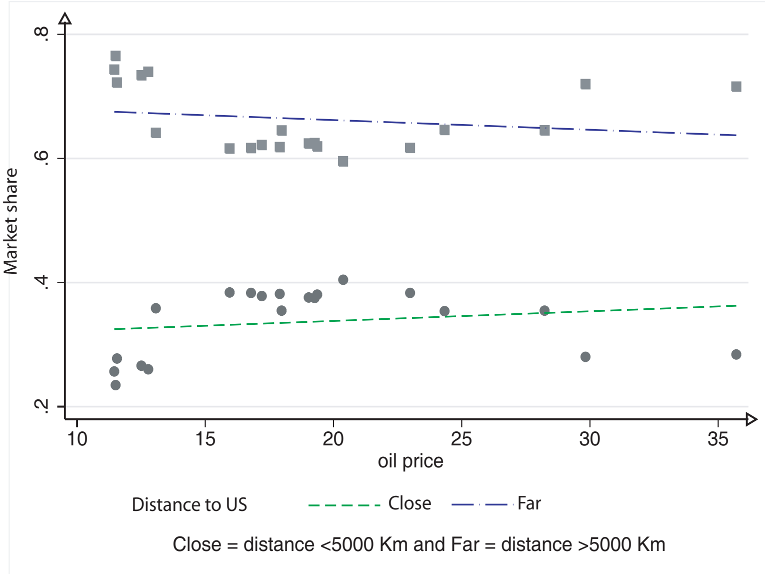


a/ Close = distance <5000 Km and Far = distance >5000 Km
b/ Weighted average transport costs computed over all partners to US

[6]http://www.mgmt.purdue.edu/faculty/hummels

Then, using the same data, we illustrate the market-share variations due to modifications in oil-prices. We divide countries into the same groups than previously. Figure 2 confirms that an increase in oil-prices affects positively the market share of close countries at the expense of far countries.

Figure 2: Market shares & oil prices



4 Econometric Results

We start the econometric study by running different formulations of equation 5. Results are reported in Table 1. Note that in all formulations, we control for heteroscedasticity by adjusting standard errors for intragroup correlation (at the country level).

First, note that transport technology exhibits scale economies since an increase in the shipped quantities decreases significantly the transportation costs. On the other hand, a 1% increase in the unit price of the commodity implies, almost, a 0.5% increase in transportation costs, which is quite important. This result could reflect the insurance fees charged for expensive goods or the transport technology which depends probably on the unit prices. All things being

Table 1: First step: The effect of oil price on transportation costs

	-1	-2	-3	-4	-5	-6
quantity	-0.126^a	-0.126^a	-0.126^a	-0.126^a	-0.126^a	-0.126^a
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
uv	0.482^a	0.482^a	0.482^a	0.483^a	0.483^a	0.483^a
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
dist	0.188^a	0.188^a	0.169^a	0.188^a	0.184^a	0.160^a
	(0.031)	(0.031)	(0.033)	(0.031)	(0.031)	(0.031)
contig	-0.529^b	-0.531^b	-0.531^b	0.392		
	(0.223)	(0.222)	(0.222)	(0.239)		
p_{oil}		0.053			0.069^a	
		(0.036)			(0.022)	
dist.p_{oil}			0.006^c			0.008^a
			(0.004)			(0.002)
contig.p_{oil}				-0.309^b	-0.205^b	-0.203^b
				(0.152)	(0.093)	(0.093)
vessel	-0.119^b	-0.120^b	-0.120^b	-0.118^b	-0.120^b	-0.120^b
	(0.050)	(0.050)	(0.050)	(0.050)	(0.050)	(0.050)
land	-1.048^a	-1.046^a	-1.046^a	-1.055^a	-0.978^a	-0.982^a
	(0.109)	(0.107)	(0.108)	(0.110)	(0.158)	(0.157)
air	0.505^a	0.504^a	0.504^a	0.505^a	0.505^a	0.505^a
	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)
trend	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Constant	-2.365^a	-2.513^a	-2.356^a	-2.368^a	-2.522^a	-2.319^a
	(0.278)	(0.283)	(0.278)	(0.278)	(0.273)	(0.273)
Observations	385916	385916	385916	385916	385916	385916
R^2	0.73	0.73	0.73	0.73	0.73	0.73

All variables, except dummies are in logs
Robust standard errors in parentheses
^{c} significant at 10%; ^{b} significant at 5%; ^{a} significant at 1%

equal, firms will choose the fastest, and then the most costly mode in order to ship expensive merchandizes. The dummy variables *contiguity* exhibits also expected results. Indeed, transport costs for goods exported from Mexico and Canada are lower than those from other countries.
As for *distance*, it has a positive and highly significant sign with an elasticity of 0.18. When we include oil prices without interaction with distance, their coefficient is significant with a positive sign (columns (2) and (5)). This result confirms the importance of oil in explaining shipping costs. But our theoretical predictions tell us that the effects of oil prices pass-through distance. Columns (3) and (6) confirm this intuition. In the last column, the variable contiguity is dropped since it is replaced by an interaction term with oil prices.
From this step, we come to the following conclusions: First, an expected result: oil prices do matter in explaining shipping costs. Second, this effect is more and more important when distance increase. The elasticity of this effect surrounds 0.008. Every 1% increase in oil prices rises transportation costs by 0.008%. Note that, as we said previously, in periods of shocks on the explaining variables, such as the soaring oil prices trends during 2007, this coefficient can no more be interpreted as an elasticity. Indeed, in this case, the growth rate in transport costs due to the increase in oil price equals:

$$\frac{dfret_{kjt}}{fret_{kjt}} = \left(1 + \frac{dp_{oil}}{p_{oil}}\right)^{0.008.ln(dist_j)} - 1$$

Finally, the dummy variables approximating transport modes have also the expected results: *air* shipping is more costly than *vessel* and *land* ones.

As for the second step, results are reported in Tables 2 and 3. The difference between these tables is the fixed effects we include in each. In Table 2, time effects are supposed to capture common time variations for all products and partners. In table 3, we also include products x partners individual effects. These dummies capture the exporter's price index.
First, we note that all the variables exhibit expected signs. transport costs (*dcosts*), tariffs

($dtariffs$) have a negative effect whereas GDP ($dGDP$) impacts positively on the imports.

Table 2: Second step: the effects of trade costs on trade flows (time effects)

	-1	-2	-3	-4	-5	-6
dcosts	-2.082[a]	-2.083[a]	-2.083[a]	-2.081[a]	-2.080[a]	-2.080[a]
	(0.093)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
dtariffs	-3.497[a]	-3.497[a]	-3.498[a]	-3.499[a]	-3.498[a]	-3.498[a]
	(0.650)	(0.099)	(0.099)	(0.099)	(0.099)	(0.099)
dGDP	0.538[a]	0.538[a]	0.538[a]	0.538[a]	0.538[a]	0.538[a]
	(0.030)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Constant	0.017	0.017	0.017	0.017	0.017	0.017
	(0.072)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Observations	378532	378532	378532	378532	378532	378532
R^2	0.28	0.28	0.28	0.28	0.28	0.28

Standard errors in parentheses
[c] significant at 10%; [b] significant at 5%; [a] significant at 1%

The elasticity of transport costs to imports varies from -1.34 to -2, whereas tariffs seem to affect more pronouncedly imports. Finally, economic size of the exporting countries affects positively export flows to the US.

The oil-price effect on relative imports will then be:

$$\frac{dln(R.m_{kjt})}{d(p_{oil})_t} = (0.008).(-2).ln(R.dist_j)$$

In large variation periods we can estimate the effect by:

$$\frac{dR.m_{kjt}}{R.m_{kjt}} = -2\left[\left(1+\frac{dp_{oil}}{p_{oil}}\right)^{0.008(ln(R.dist_j))} - 1\right]$$

In Table 4, we decompose the exports values used in the previous tables (m_{kjt}) into two components: mean values by exporting country ($\bar{m}_{kjt}$) and the number of the shipped goods by each country (N_{kjt}). In order to be able to make this decomposition, this study is done at a more aggregated level (SITC2).

This decomposition is done in order to explore the role of intensive vs extensive margins.

Table 3: Second step: the effects of trade costs on trade flows (time & product-country effects)

	-1	-2	-3	-4	-5	-6
dcosts	-1.342[a]	-1.342[a]	-1.342[a]	-1.341[a]	-1.341[a]	-1.341[a]
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
dtariffs	-3.070[a]	-3.070[a]	-3.071[a]	-3.072[a]	-3.073[a]	-3.073[a]
	(0.082)	(0.082)	(0.082)	(0.082)	(0.082)	(0.082)
dGDP	0.778[a]	0.778[a]	0.778[a]	0.778[a]	0.778[a]	0.778[a]
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Constant	0.245[a]	0.245[a]	0.245[a]	0.245[a]	0.245[a]	0.245[a]
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Observations	378532	378532	378532	378532	378532	378532
Nbr group(sitc2 iso$_j$)	47502	47502	47502	47502	47502	47502
R^2	0.16	0.16	0.16	0.16	0.16	0.16

Standard errors in parentheses
[c] significant at 10%; [b] significant at 5%; [a] significant at 1%

Table 4: Oil price effects on trade flows: Extensive vs Intensive margins

	imports	mean imports	nbre exporters	imports	mean imports	nbre exporters
dcosts	-2.426[a]	-2.037[a]	-0.388[a]	-1.403[a]	-1.204[a]	-0.200[a]
	(0.024)	(0.020)	(0.006)	(0.018)	(0.017)	(0.005)
dtariffs	-4.529[a]	-4.091[a]	-0.437[a]	-3.112[a]	-2.708[a]	-0.404[a]
	(0.205)	(0.177)	(0.056)	(0.143)	(0.133)	(0.039)
dGDP	0.804[a]	0.514[a]	0.289[a]	1.180[a]	0.892[a]	0.288[a]
	(0.005)	(0.004)	(0.001)	(0.019)	(0.017)	(0.005)
Constant	0.063[a]	0.041[a]	0.022[a]	0.247[a]	0.162[a]	0.084[a]
	(0.016)	(0.013)	(0.004)	(0.010)	(0.009)	(0.003)
Observations	69531	69531	69531	69531	69531	69531
R^2	0.41	0.32	0.47	0.21	0.16	0.15
Nbr group(sitc2 iso$_j$)				5523	5523	5523
time effects	YES	YES	YES	YES	YES	YES
product-country effects	NO	NO	NO	YES	YES	YES

This allows as to know whether the oil-price, through transport costs, affects the number of varieties exported by each country or the mean exports for each one. The results are clearly in favor of the first component: an increase in transportation costs affect mostly the value of exports to the US rather than the number of varieties exported.

5 Simulations

In this section, we simulate the oil-price effect on market shares into the US market. We take the case of a doubling in oil-prices. The following formula is applied using the estimation coefficients of the econometric study:

$$\frac{dR.m_{kjt}}{R.m_{kjt}} = -2 \left[2^{0.008(ln(R.dist_j))} - 1 \right]$$

At first glance, it seems that the effects of oil prices on international trade are not as dramatic as it is often heard in the public debate. Indeed, a doubling of this cost implies around 1.5% increase in the Canadian and Mexican market share into the US market. However, if we think about the whole period between 1999 and the first semester of 2008, the sextuple increase would have increased non-negligibly the regionalization of the north american trade. In this scenario, oil price shocks would have contributed to an increase of Canada and Mexico sum of market shares by almost 7.5% relative to average market shares. The very big oil price shift of these recent years seem indeed to have acted as an endogenous factor stimulating the regionalization of trade flows.

Table 5: Evolution of market shares in response to a doubling in oil price

country	MS evolution
Mauritius	-.0071202
Madagascar	-.0065401
Indonesia	-.0064734
Singapore	-.0061735
Seychelles	-.0061026
Malaysia	-.0059782
Australia	-.0059351
Sri Lanka	-.0058771
Mozambique	-.0058509
South Africa	-.0056432
Malawi	-.0054997
Zimbabwe	-.0054424
Cambodia	-.0053342
Thailand	-.0052648
Tanzania	-.0051762
Viet Nam	-.0050875
Zambia	-.0050765
Somalia	-.0050064
Burma	-.0049619
Kenya	-.004892
Laos	-.0048483
Philippines	-.0046225
India	-.0046039
Papua	-.0045773
Burundi	-.0045256
Bangladesh	-.0045224
Rwanda	-.0044598
Uganda	-.0044546
Djibouti	-.0043313
New Zealand	-.0042896
Ethiopia	-.0042531
Hong Kong	-.0041756
Nepal	-.0041537
Oman	-.0040402
New Caledonia	-.0039638
Congo (RDC)	-.0039372
Pakistan	-.003847
UAE	-.0037823
Qatar	-.0036014
Bahrain	-.0034848
Sudan	-.0034159
Congo	-.0034061
Saudi Arabia	-.0033361
Afghanistan	-.003251
Central Africa	-.0031369
Kuwait	-.003091
Tajikistan	-.0028561
China	-.0028193
Gabon	-.0027906
Fiji	-.0027593
Iran	-.0027345
Uzbekistan	-.0026321
Turkmenistan	-.0025984
Kyrgyzstan	-.0025838
Iraq	-.002546
Equa- Guinea	-.0025453
Chad	-.0024951
Cameroon	-.0024874
Korea	-.0023108
Jordan	-.0022049
Israel	-.0021363
North Korea	-.0020771
Egypt	-.0020731
Azerbaijan	-.0020547
Lebanon	-.0020083
Syria	-.0019873
Japan	-.0018907
Armenia	-.0018755
Kazakstan	-.0018594
Mongolia	-.0018548
Nigeria	-.001812
Kiribati	-.0017675
Cyprus	-.0017656
Georgia	-.0016666
Samoa	-.0015966
Benin	-.0015189
Togo	-.0014514
Ghana	-.0013353
Niger	-.0012781
Turkey	-.0012461
Cte d'Ivoire	-.0009627
Greece	-.0007952
Burkina Faso	-.000722
Bulgaria	-.0004826
Ukraine	-.000403
Liberia	-.0003503
Uruguay	-.0003449
Macedonia	-.0003325
Moldova	-.0003144
Malta	-.0003089
Russia	-.0003036
Albania	-.000263
Romania	-.0002566
Mali	-.0001126
Argentina	-4.82e-06
Tunisia	.0000627
Sierra Leone	.0000866
Bosnia	.0001654
Guinea	.0002138
Hungary	.0003626
Belarus	.0003955
Croatia	.0003983
Chile	.0004379
Slovakia	.0005034
Italy	.0005109
Slovenia	.0005958
Guinea-Bissau	.0007212
Algeria	.0007247
Austria	.0007268
Brazil	.0007756
Poland	.0007798
Paraguay	.0008018
Lithuania	.0008109
Czech Republic	.0008865
Latvia	.000954
Gambia	.0009655
Estonia	.0011094
Senegal	.0011426
Mauritania	.0012184
Switzerland	.0012716
Finland	.0013678
Germany	.0014728
Morocco	.0016045
France	.001677
Sweden	.0017012
Spain	.0017062
Denmark	.0017458
Benelux	.0019084
Netherlands	.0019401
Norway	.002288
Portugal	.0023701
Bolivia	.0025154
United Kingdom	.0025713
Ireland	.0031724
Peru	.0042455
Iceland	.005138
Suriname	.0052275
Guyana	.0059015
Ecuador	.0064758
Trinidad tobago	.0071665
Barbados	.0074142
Greenland	.0078371
Colombia	.0078936
Saint Kitts Nevis	.0080077
Venezuela	.008016
Netherland Antilles	.0087438
Panama	.009207
Costa Rica	.0098649
Dominican Republic	.0106546
Nicaragua	.0107325
Haiti	.0110783
El Salvador	.0113557
Jamaica	.0116569
Honduras	.0117303
Guatemala	.0117419
Belize	.0126898
Bermuda	.0127713
Mexico	.0138902
Bahamas	.0142559
Canada	.0157785

6 Conclusion

A Interpretation of Econometric coefficients in shocks on oil prices periods

Define $fret$ as the transport cost and p_{oil} the oil price. Our equation is as follows:

$$ln(fret) = \beta.ln(dist)ln(p_{oil}) + V$$

where V represents all other explaining variables.

In period 0, before the shock of p_{oil}, we have the following relation: $fret_0 = \beta.ln(dist)e^{(p_{oil})_0}.e^V$

In period 1, after the oil price shock, we have the following relation: $fret_1 = \beta.ln(dist)e^{(p_{oil})_1}.e^V$

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The growth rate of $fret$ due to a shock of p_{oil} equals:

$$\frac{dfret}{fret} = \frac{e^{(\beta.ln(p_{oil})_1)} - e^{(\beta.ln(p_{oil})_0)}}{e^{(\beta.ln(p_{oil})_0)}} = \left(\frac{p_1}{p_0}\right)^{\beta.ln(dist)} - 1$$

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