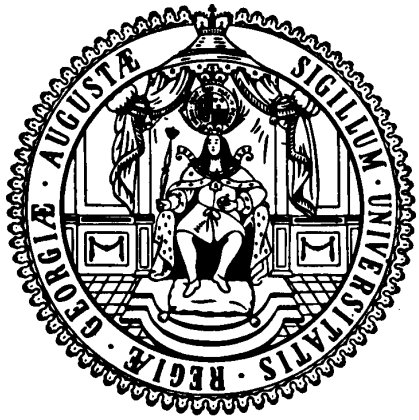
Ibero-Amerika Institut für Wirtschaftsforschung
Instituto Ibero-Americano de Investigaciones Económicas
Ibero-America Institute for Economic Research
(IAI)

Georg-August-Universität Göttingen
(founded in 1737)



Diskussionsbeiträge · Documentos de Trabajo · Discussion Papers

Nr. 166

Determinants of French and Spanish Relative Export Strength

Sebastian Vollmer, Inmaculada Martínez-Zarzoso, Felicitas Nowak-Lehmann D.

Oktober 2007

Platz der Göttinger Sieben 3 · 37073 Goettingen · Germany · Phone: +49-(0)551-398172 · Fax: +49-(0)551-398173
e-mail: uwia@gwdg.de · http://www.iai.wiwi.uni-goettingen.de

Determinants of French and Spanish Relative Export Strength

Sebastian Vollmer [1]

Inmaculada Martínez-Zarzoso [2]

Felicitas Nowak-Lehmann D. [3]

Abstract

In this paper we assess the current relevance of Ricardian theory. Relative prices, labor costs, and productivity are evaluated as determinants of a country's international competitiveness at the industry level. Working with detailed data on unit values and with industry data on productivity, we empirically implement a MacDougall-type model for Spanish and French trade to Brazil, China, Japan, and the U.S.. The period under study is 1980 to 2001 and we distinguish in our analysis between homogenous, reference-priced, and differentiated goods. Our results indicate that Ricardian theory is currently only valid for explaining trade with developing countries while other factors are of importance for developed economies. Overall price competitiveness is of importance, but for differentiated goods, factors distinct from prices seem to determine export success.

Acknowledgements

The authors acknowledge financial support from the Spanish Ministry of Education (SEJ 2007-67548). Sebastian Vollmer acknowledges financial support from the Georg Lichtenberg program "Applied Statistics and Empirical Methods". Inmaculada Martínez-Zarzoso acknowledges financial support from Fundación Caja Castellón-Bancaja and Generalitat Valenciana (P1-1B2005-33, ACOMP07/102).

1 Ibero-America Institute for Economic Research and Center for Statistics, University of Göttingen, Germany. Corresponding author: Georg-August-Universität Göttingen, Platz der Göttinger Sieben 3, 37073 Göttingen, Germany. Phone: +49551398171, Fax: +49551398173, Email: Sebastian.Vollmer@wiwi.uni-goettingen.de.

2 Department of Economics and Ibero-America Institute for Economic Research, University of Göttingen, Germany and Department of Economics and Instituto de Economía Internacional, Universidad Jaume I, Castellón, Spain.

3 Ibero-America Institute for Economic Research and Center for Globalization and Europeanization of the Economy, University of Göttingen, Germany.

Determinants of French and Spanish Relative Export Strength

1. Introduction

As a consequence of the globalization process (progressive deregulation of trade achieved in multilateral trade rounds, regional and bilateral trade agreements, and integrated production systems), trade flows have grown in size 22 times since 1970, much more than the GDP during the same period.

International trade flows have changed as dramatically in content and direction over the past three decades as they have in size. What is the response of national economies to globalization in terms of trade? International trade theories (classical or new) predict that increasing globalization is associated with a higher production concentration of certain economic activities, and therefore increasing specialization, according to comparative advantage and economies of scale criteria. Contrary to the theoretical predictions (Krugman, 1991), recent empirical evidence shows that trade in the extensive margin (a wider set of goods) is the dominant trend for large economies (e.g., Hummels and Klenow, 2005).

Although much attention has been given to the role of productivity differences in influencing international competitiveness, this relationship has scarcely been investigated within the framework of the classical Ricardian model. Since the early studies by MacDougall (1951, 1952), Stern (1962), and Balassa (1963), only a few authors have recently evaluated the empirical validity of the Ricardian model.

Golub and Hsieh (2000) assessed the contemporary relevance of the classical model for US trade over the period 1970-1992. They found some evidence supporting the theory, but much of the sectoral variation in trade remained unexplained. Choudhri and Schembri (2002) used a modern adaptation of the Ricardian model, which incorporates monopolistic competition and derived a MacDougall-type relationship. They tested this relationship for Canada and the U.S.

using panel data for 1966 through 1990 for forty industries. Their results also support the validity of the Ricardian model, although other factors, such as trade liberalization, also play an important role in explaining market shares. This paper extends and updates the existent literature using a different set of countries and years. Since most of the empirical evidence in this field is related to U.S. international trade, we aim to extend the evidence to other countries, and specifically to North-South trade.

In the remainder of the paper, Section 2 briefly presents the Ricardian model and the empirical implementation of the model. Section 3 presents some results before Section 4 concludes.

2. Modeling Relative Export Strength

The Ricardian Model. According to the Ricardian model of free trade, countries tend to export those goods which have the lowest relative costs in autarky. In its simplest form, *comparative advantage* is defined in terms of unit labor requirements in a world of two goods and two countries. Assuming that labor is the only factor of production, the supply of labor is fixed in each country and perfect competition prevails in all markets; Country 1 has a comparative advantage in producing Good i, compared to Country 2 and Good j, if it can produce Good i with less labor relative to Good j, compared to Country 2. Thus,

$$\frac{a_i^1}{a_j^1} < \frac{a_i^2}{a_j^2} \tag{1}$$

It can be shown that world output increases if one or both countries specialize in producing the good in which they have comparative advantage.

The Ricardian model can easily be generalized to multiple goods, i=1,…,N. A ranking can be constructed over the N goods' relative labor requirements in the two countries. The new formulation in terms of Country 1's labor requirements is given by,

$$\frac{a_1^1}{a_1^2} < \frac{a_2^1}{a_2^2} < \ldots < \frac{a_N^1}{a_N^2} \tag{2}$$

According to the theory, Country 1 specializes in goods that lie to the left in this chain, whereas Country 2 specializes in goods that lie to the right. Assuming free trade, a unique break point exists that determines the patterns of specialization in both countries. Although this result does not fully specify the pattern of trade, as in the two-goods case (since a number of goods may not be exported by one or both countries), it nonetheless shows some role for comparative advantage. If Countries 1 and 2 are any two countries in the world, in a world of many countries, it can still be stated that with free trade all of the goods exported by Country 1 and not exported by Country 2 will lie on the left of goods exported by Country 2 in this chain. Therefore, Equation 2 could be used to make partial statements about patterns of trade. In a world of many goods and countries, specialization is associated somehow with low unit labor requirements.

Data sources and empirical implementation. The main problem faced by researchers when they attempt to test the Ricardian theory is that autarky prices are not observable; hence the theory of comparative advantage cannot be directly tested. However, there are other factors that may be observable and that help to explain which goods countries trade; autarky prices then could be explained with country-specific characteristics.

The main data sources are the Groningen Center for productivity and labor costs at the industry level and the UN COMTRADE database for disaggregated exports in value and volume. To test the Ricardian model, we perform a panel analysis of Spanish exports relative to French exports over the period from 1980 to 2001.

Table 1 summarizes some descriptive statistics on labor productivity and labor costs for France relative to Spain at the industry level. Whereas a figure greater than one indicates an advantage in productivity for France relative to Spain, figures greater than one indicate a

Table 1 *Descriptive Statistics on Relative Productivity and Labor Costs*

	Relative value added per hour			**Relative labor costs per hour**			**Relative unit labor costs**		
	Min.	**Average**	**Max.**	**Min.**	**Average**	**Max.**	**Min.**	**Average**	**Max.**
Food, drink & tobacco	1.267	1.434	2.072	1.344	1.591	1.790	0.838	1.122	1.351
Textiles	1.265	1.466	1.665	1.457	1.751	1.922	1.025	1.199	1.383
Clothing	1.091	1.409	1.774	1.659	1.966	2.288	1.147	1.413	1.723
Leather and footwear	1.350	1.770	2.685	1.720	1.984	2.260	0.740	1.162	1.428
Wood & products of wood and cork	1.493	1.671	2.461	1.430	1.715	2.082	0.804	1.033	1.324
Pulp, paper & paper products	0.809	1.129	1.463	1.296	1.574	1.738	0.906	1.422	2.018
Printing & publishing	1.109	1.379	1.981	1.403	1.725	2.333	0.937	1.276	1.554
Chemicals	1.299	1.574	1.968	1.273	1.625	1.797	0.863	1.040	1.335
Rubber & plastics	0.916	1.087	1.328	1.050	1.408	1.644	1.016	1.305	1.656
Non-metallic mineral products	1.075	1.176	1.296	1.391	1.777	1.991	1.123	1.518	1.787
Basic metals	1.050	1.354	1.638	1.202	1.426	1.590	0.734	1.079	1.512
Fabricated metal products	1.759	2.124	2.663	1.415	1.769	2.070	0.718	0.839	0.980
Mechanical engineering	1.285	1.506	1.748	1.313	1.578	1.769	0.903	1.055	1.377
Office machinery	1.931	3.192	9.439	1.516	2.239	3.055	0.292	0.795	1.293
Insulated wire	1.195	1.586	2.066	1.184	1.483	1.820	0.720	0.947	1.270
Other electrical machinery and apparatus nec.	1.408	1.662	1.862	1.321	1.606	1.861	0.834	0.968	1.113
Electronic valves and tubes	1.684	2.348	3.088	1.267	1.671	2.021	0.516	0.741	1.155
Telecommunication equipment	1.130	2.116	3.165	0.931	1.355	1.809	0.464	0.664	0.867
Radio and television receivers	1.455	1.842	2.515	0.824	1.449	2.486	0.427	0.801	1.439
Scientific instruments	1.809	2.198	2.882	1.512	1.859	2.172	0.625	0.864	1.137
Other instruments	1.127	1.474	1.886	0.901	1.323	2.465	0.626	0.893	1.307
Motor vehicles	0.691	1.006	1.457	1.047	1.364	1.655	0.920	1.396	1.970
Building and repairing of ships and boats	0.996	1.795	3.535	0.730	1.882	2.994	0.416	1.122	1.618
Aircraft and spacecraft	1.077	2.423	4.910	1.181	1.895	2.617	0.434	0.923	1.502
Railroad equipment and transport equip. nec.	0.978	1.909	2.783	1.073	1.508	2.331	0.468	0.854	1.747
Furniture, miscellaneous manufacturing; recycling	1.176	1.363	1.474	1.495	1.788	2.080	1.133	1.314	1.473
Total manufacturing	**1.400**	**1.512**	**1.741**	**1.404**	**1.707**	**1.893**	**0.996**	**1.132**	**1.299**

disadvantage for France relative to Spain in labor costs and unit labor costs. For all sectors we observe relative advantages in productivity (value added per hour) and relative disadvantages in labor costs for France. The unit labor costs summarize both indicators in one figure. Here we find a mixed picture, relative advantages for France in most of the more differentiated sectors and relative advantages for Spain in the other sectors. On average, Spain has a slight advantage over France in total manufacturing measured in unit labor costs.

Following MacDougall (1951, 1952), Stern (1962), and Balassa (1963), export ratios are used as a measure of trade. As in Balassa, we use exports to third markets. The independent variables considered are: relative productivity, relative labor costs, and relative unit values. We set up the following specifications to capture the model described above:

$$\ln\left(\frac{X_{ijkt}}{X_{ljkt}}\right) = \alpha_j + \beta_j \ln\left(\frac{UV_{ijkt}}{UV_{ljkt}}\right) + \chi_j \ln\left(\frac{a_{ikt}}{a_{lkt}}\right) + \delta_j \ln\left(\frac{w_{ikt}}{w_{lkt}}\right) + \varepsilon_{jkt} \tag{3}$$

$$\ln\left(\frac{X_{ijkt}}{X_{ljkt}}\right) = \alpha_j + \beta_j \ln\left(\frac{UV_{ijkt}}{UV_{ljkt}}\right) + \lambda_j \ln\left(\frac{ulc_{ikt}}{ulc_{lkt}}\right) + \mu_{jkt}, \tag{4}$$

where X_{ijkt} (X_{ljkt}) denotes exports from Country i (l) to Country j, for Sector k in Period t. UV_{ijkt} and UV_{ljkt} denote French (i) and Spanish (l) export unit values to Destination j, for Sector k in Period t. a_{ikt} and a_{ljkt} denote French (i) and Spanish (l) labor productivity for sector k in period t. w_{ikt} and w_{lkt} denote French (i) and Spanish (l) labor compensation per employee for Sector k in Period t. ulc denotes unit labor costs and is calculated from a and w. As destination markets j, we chose Japan, the U.S., Brazil, and China, two large developed economies, as well as two important emerging markets. One should note that the unit values differ across sectors and destination markets, whereas the productivity and labor-cost data are constant across destination markets and only differ across sectors.

Following Rauch (1999), we classify sectors into three different groups, namely homogeneous (Rauch 1), reference-priced (Rauch 2), and differentiated goods (Rauch 3). In our estimations we include dummies for the different groups into Equations 3 and 4 or restrict

our sample to one of the three groups to acknowledge the differences between these types of goods. We would expect that price competitiveness is less important for differentiated goods than it is for homogeneous or reference-priced goods. Other factors like quality, variety, or uniqueness should be more important for these types of goods.

3. Determinants of French and Spanish Relative Export Strength

In the empirical application, we simplify the terms used in Equations 3 and 4 which have France in the numerator and Spain in the denominator. *lxv* stands for relative (France over Spain) export strength in logs, *luv* is utilized for relative unit values in logs, *lw* is relative labor compensation, and *lva* is relative productivity in logs. *j* characterizes the destination market, k stands for sector, and t stands for time. We obtain the following Equations 5 and 6:

$$lxv_{jkt} = \alpha_j + \beta_j luv_{jkt} + \chi_j lva_{jkt} + \delta_j lw_{jkt} + \varepsilon_{jkt} \quad (5)$$

$$lxv_{jkt} = \alpha_j + \beta_j luv_{jkt} + \lambda_j lulc_{jkt} + \varepsilon_{jkt} . \quad (6)$$

To control for cross-correlation between destination markets *j*, we estimate specifications (5) and (6) respectively as a system, with one equation for each destination market using seemingly unrelated regression (SUR). In prior estimations, we allow for country-specific constants and country-specific coefficients. However, testing for equality of the coefficients using a Wald test indicates that the differences between the coefficients are not significant in all cases. We therefore estimate Equations 5 and 6 with common coefficients and country-specific constants. Autocorrelation is addressed by the inclusion of AR(1) terms. It appears that heteroskedasticity does not affect the estimated coefficients; all SUR results presented are robust compared to GLS approaches[4].

Table 2 reports the results for French, relative to Spanish, exports to four destination markets: the U.S., Brazil, Japan, and China. The period under study is 1980 to 2001. At a first glance

4 Models 5 and 6 were also estimated using weighted least squares. Results are available upon request from the authors.

these results support the Ricardian theory of comparative advantage; the coefficients for unit labor costs, labor costs, and value added are significant and show the expected sign. The coefficient of the unit values is significant with the expected sign as well, but it is rather small. The negative and significant coefficients of the Rauch 1 and Rauch 2 dummies indicate that France has an advantage over Spain in exporting differentiated goods compared to homogenous and reference-priced goods. Compared to earlier studies, the explanatory power of our estimates is rather high, which might be due to the fact that this study, in contrast to previous ones, evaluates the time-series properties of the data.

Table 2 *Determinants of French Export Strength Relative to Spanish Export Strength for Brazil, China, Japan, and the U.S.*

Estimation method: seemingly unrelated regression Included observations: 9743 Total system (unbalanced) observations 21058 Dependent variable: lxv				
	Coefficient	Prob.	Coefficient	Prob.
lulc	-0.229	0.022	-	
lw	-		-0.231	0.117
lva	-		0.228	0.060
luv	-0.039	0.000	-0.039	0.000
AR(1)	0.749	0.000	0.749	0.000
Rauch 1	-1.478	0.000	-1.479	0.000
Rauch 2	-0.429	0.000	-0.429	0.000
Constant Brazil	1.066	0.000	1.068	0.000
Constant China	1.482	0.000	1.484	0.000
Constant Japan	2.304	0.000	2.305	0.000
Constant U.S.	1.792	0.000	1.793	0.000
Brazil Observations: 4352				
Adjusted R-squared	0.513		0.513	
Durbin-Watson	2.166		2.166	
China Observations: 2468				
Adjusted R-squared	0.310		0.309	
Durbin-Watson	2.394		2.394	
Japan Observations: 6060				
Adjusted R-squared	0.641		0.641	
Durbin-Watson	2.068		2.068	
U.S. Observations: 8178				
Adjusted R-squared	0.647		0.647	
Durbin-Watson	2.158		2.158	

Note: All the variables except dummies are in natural logs and in relative terms (France relative to Spain). lulc denotes unit labor cost, lw denotes labor compensation, lva denotes value added per hour, and luv denotes unit values. Autocorrelation was corrected by adding an AR(1) to the model specification

In a next step we estimated the model for reference-priced and differentiated goods separately. The results are shown in the second and third columns of Table 3. Since our productivity data mainly include manufacturing, there is only a relatively small number of observations available for homogeneous goods, excluding most agricultural products.

Table 3 *Determinants of French Export Strength Relative to Spanish Export Strength for Brazil China, Japan, and the U.S. (Rauch 2 and Rauch 3)*

Estimation method: seemingly unrelated regression				
Included observations:	2252		7146	
Total system observations:	4739		15803	
Dependent variable: lxv				
	Rauch 2		Rauch 3	
	Coefficient	Prob.	Coefficient	Prob.
lw	-1.139	0.006	-0.283	0.080
lva	-0.329	0.285	0.412	0.002
luv	-0.283	0.000	0.022	0.043
AR(1)	0.721	0.000	0.734	0.000
Constant Brazil	1.679	0.000	0.956	0.000
Constant China	1.394	0.000	1.521	0.000
Constant Japan	2.453	0.000	2.270	0.000
Constant U.S.	2.147	0.000	1.692	0.000
Brazil Observations:	1076		3198	
Adjusted R-squared	0.540		0.491	
Durbin-Watson	2.043		2.187	
China Observations:	599		1832	
Adjusted R-squared	0.230		0.325	
Durbin-Watson	2.202		2.392	
Japan Observations:	1263		4637	
Adjusted R-squared	0.617		0.629	
Durbin-Watson	2.100		2.025	
U.S. Observations:	1801		6136	
Adjusted R-squared	0.623		0.655	
Durbin-Watson	2.055		2.121	

Note: All the variables except dummies are in natural logs and in relative terms (France relative to Spain). lulc denotes unit labor cost, lw denotes labor compensation, lva denotes value added per hour, and luv denotes unit values. Autocorrelation was corrected by adding an AR(1) to the model specification.

Consequently, we prefer to not draw conclusions from a sub-sample, including only Rauch 1 goods. For reference-priced goods, we find that that labor costs and unit values have a greater impact than they have for *all goods*, whereas productivity turns out to be insignificant. In contrast to differentiated goods, unit values have a positive sign, indicating that other factors

apart from price competitiveness seem to play a role. While labor costs are only weakly significant, both labor costs and productivity carry the expected signs.

Table 4 *Determinants of French Export Strength Relative to Spanish Export Strength for Brazil and China*

Estimation method: seemingly unrelated regression Included observations: 5557 Total System Observations: 6820 Dependent variable: lxv				
	Coefficient	Prob.	Coefficient	Prob.
lulc	-0.688	0.002		
lw	-		-0.803	0.017
lva	-		0.642	0.007
luv	-0.054	0.005	-0.054	0.005
AR(1)	0.650	0.000	0.650	0.000
Rauch 1	-2.476	0.000	-2.485	0.000
Rauch 2	-0.377	0.012	-0.382	0.011
Constant Brazil	1.221	0.000	1.298	0.000
Constant China	1.603	0.000	1.681	0.000
Brazil observations: 4352				
Adjusted R-squared	0.515		0.515	
Durbin-Watson	1.954		1.954	
China observations: 2468				
Adjusted R-squared	0.339		0.339	
Durbin-Watson	2.234		2.234	

Note: All the variables except dummies are in natural logs and in relative terms (France relative to Spain). lulc denotes unit labor cost, lw denotes labor compensation, lva denotes value added per hour, and luv denotes unit values. Autocorrelation was corrected by adding an AR(1) to the model specification.

We expect differences in the validity of Ricardian theory between developed and developing economies. As Hummels and Klenow (2005) have shown, it is the extensive margin, a larger variety of goods exported, which determines export success among developed economies. Therefore it can be expected that the theory of comparative advantage and specialization in production might still be explaining trade with developing countries but not trade between developed economies. To examine these differences we first estimate the model including only Brazil and China as destination markets (Table 4). In this case the results are perfectly consistent with Ricardian theory; all coefficients are significant and show the expected sign. Once more, the Rauch 1 and Rauch 2 dummies are negative and significant.

Table 5 *Determinants of French Export Strength Relative to Spanish Export Strength for Brazil and China (Rauch 2 and Rauch 3)*

Estimation method: seemingly unrelated regression				
Included observations:	1425		4009	
Total system observations:	1675		5030	
Dependent variable: lxv				
	Rauch 2		Rauch 3	
	Coefficient	Prob.	Coefficient	Prob.
lw	-1.973	0.012	-0.767	0.041
lva	0.447	0.391	0.752	0.005
luv	-0.368	0.000	0.041	0.064
AR(1)	0.636	0.000	0.639	0.000
Constant Brazil	1.858	0.000	1.154	0.000
Constant China	1.556	0.000	1.696	0.000
Brazil observations:	1076		3198	
Adjusted R-squared	0.537		0.492	
Durbin-Watson	1.854		1.976	
China observations:	599		1832	
Adjusted R-squared	0.262		0.349	
Durbin-Watson	2.054		2.229	

Note: All the variables except dummies are in natural logs and in relative terms (France relative to Spain). lulc denotes unit labor cost, lw denotes labor compensation, lva denotes value added per hour, and luv denotes unit values. Autocorrelation was corrected by adding an AR(1) to the model specification.

Table 6 *Determinants of French Export Strength Relative to Spanish Export Strength for Japan and the U.S.*

Estimation method: seemingly unrelated regression				
Included observations: 9456				
Total system observations: 14238				
Dependent variable: lxv				
	Coefficient	Prob.	Coefficient	Prob.
lulc	-0.132	0.229		
lw	-		-0.117	0.467
lva	-		0.143	0.291
luv	-0.034	0.002	-0.034	0.002
AR(1)	0.784	0.000	0.784	0.000
Rauch 1	-1.324	0.000	-1.322	0.000
Rauch 2	-0.472	0.000	-0.471	0.000
Constant Japan	2.258	0.000	2.245	0.000
Constant U.S.	1.752	0.000	1.740	0.000
Japan observations: 6060				
Adjusted R-squared	0.643		0.643	
Durbin-Watson	2.153		2.154	
U.S. observations: 8178				
Adjusted R-squared	0.648		0.648	
Durbin-Watson	2.249		2.249	

Note: All the variables except dummies are in natural logs and in relative terms (France relative to Spain). lulc denotes unit labor cost, lw denotes labor compensation, lva denotes value added per hour, and luv denotes unit values. Autocorrelation was corrected by adding an AR(1) to the model specification.

When we compare the results obtained from the reference-priced and differentiated goods sub-samples (Table 5) we find that competitiveness in labor costs and unit values is of major importance for reference-priced goods, while productivity turns out to be insignificant. For differentiated goods, both labor costs and productivity are significant and show the expected signs. In contrast, the unit-value coefficient has a positive and weakly significant sign, indicating that it is not price competitiveness that explains export success for this type of goods.

The results for the two developing countries differ from what we find when we restrict the sample to Japan and the U.S. (Table 6). Neither the coefficients of unit labor costs nor productivity or labor costs are significant. Only price competitiveness seems to play a role, but the estimated coefficient is rather small. Hence, the estimation results for the developed countries in our sample do not support the theory of comparative advantage and specialization in production.

4. Conclusions

The aim of our study was to examine the validity of the Ricardian model for different types of destination markets. Brazil and China are representatives of emerging/developing markets; Japan and the U.S. represent highly industrialized countries. Theory would lead us to expect more inter-industry (Ricardo type) trade between France and Spain and developing countries and to observe more intra-industry trade between France and Spain and industrialized countries. Furthermore, according to the theory, inter-industry trade is driven by price competitiveness factors, whereas intra-industry trade is driven primarily by factors related to taste differences, product variety, and product quality.

In fact, our empirical analysis indicates that Spanish exports to developing countries (Brazil and China), relative to French exports to those countries, can well be explained by the

Ricardian model, i.e., by labor compensation and labor productivity (unit labor costs). In contrast, Spanish exports to developed countries, relative to French exports, are not so much determined by unit labor costs but by product characteristics. This conclusion is supported by the high proportion of intra-industry trade among industrialized countries. Products are imported because consumers of developed countries desire variety and are willing to pay more for a product with certain characteristics.

The empirical evidence shows that the simpler model with common coefficients for destination markets provides more robust results than the model with destination-market-specific coefficients. However, there are some interesting differences in the coefficients when different types of products are investigated. Relative exports of products in the categories homogenous goods (Rauch 1) and reference-priced goods (Rauch 2) depend on price advantages and are therefore governed by price competitiveness factors. In contrast, relative exports of differentiated products (Rauch 3) are positively related to unit values. For this type of good, a higher relative price seems to be an indicator of higher quality or superior product properties, explaining why relative exports rise with increasing prices.

In summary, the results in this paper add some evidence demonstrating that Ricardian theory is valid to explain North-South trade. Although price competitiveness is almost always an issue, other factors aside from price differences are probably more relevant in determining export success for differentiated goods. Consequently, “new” trade theories, related to monopolistic competition and economies of scale, are certainly more appropriate to explain trade among developed countries.

References

Balassa, B. (1963). An empirical demonstration of classical comparative cost theory. *The Review of Economics and Statistics,* 4, 231-238.

Choudhri, E. U., & Schembri, L. L. (2002). Productivity performance and international competitiveness: An old test reconsidered. *Canadian Journal of Economics,* 35 (2), 341-362.

Cunat, A., & Maffezzoli, M. (2007) Can comparative advantage explain the growth of US trade? *The Economic Journal,* 117 (April), 583-602.

Dornbusch, R., Fischer, S., & Samuelson, P. A. (1977). Comparative Advantage, Trade, and Payments in a Ricardian Model with a Continuum of Goods. *American Economic Review,* 67, 823-839.

Drysdale, P. (2001). Evidence of shifts in the determinants of Japanese manufacturing trade, 1970-1995. Australia-Japan Research Centre, Canberra.

Golub, S. S. (1994). Comparative Advantage, Exchange Rates, and Sectoral Trade Balances of Major Industrial Countries. *IMF Staff Papers* , 41 (2), 286-313.

Golub, S. S., & Hsieh, C. T. (2000). Classical Ricardian theory of comparative advantage revisited. *Review of International Economics,* 8 (2), 221-234.

Hufbauer, G. (1991). World Economic Integration: The Long View. *International Economic Insights,* 2 (3), 26-27.

Hummels, D. & Klenow, P. J. (2005). The variety and quality of a nation's exports. *American Economic Review,* 95 (3), 704-723.

Krugman, P. (1991). Increasing Returns and Economic Geography. *Journal of Political Economy,* 99 (3), 483-499.

MacDougall, G. D. A. (1951). British and American exports: A study suggested by the theory of comparative cost. Part I. *The Economic Journal*, 61 (December), 697-724.

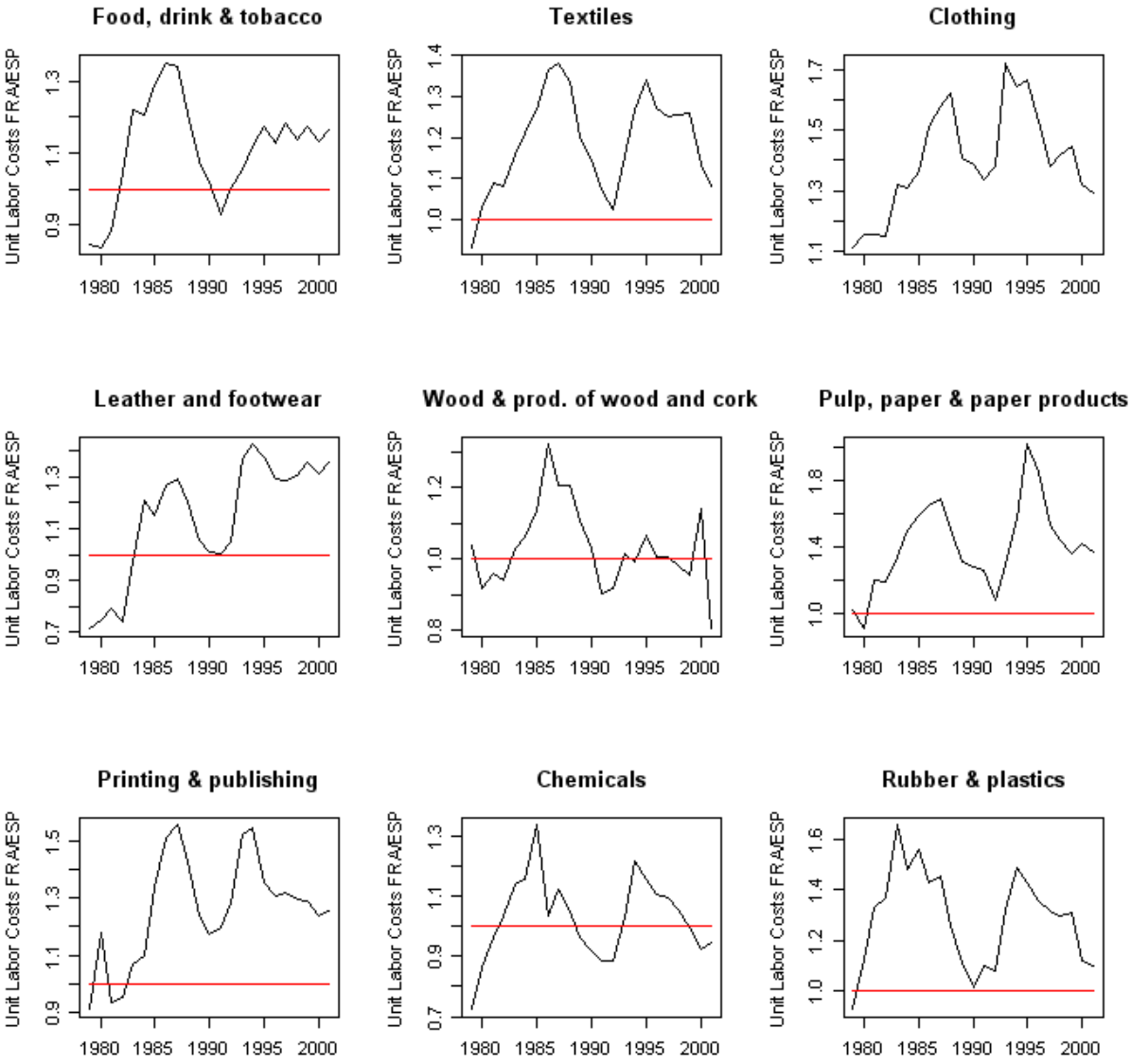
MacDougall, G. D. A. (1952). British and American exports: A study suggested by the theory of comparative cost. Part II. *The Economic Journal*, 62 (September), 487-521.

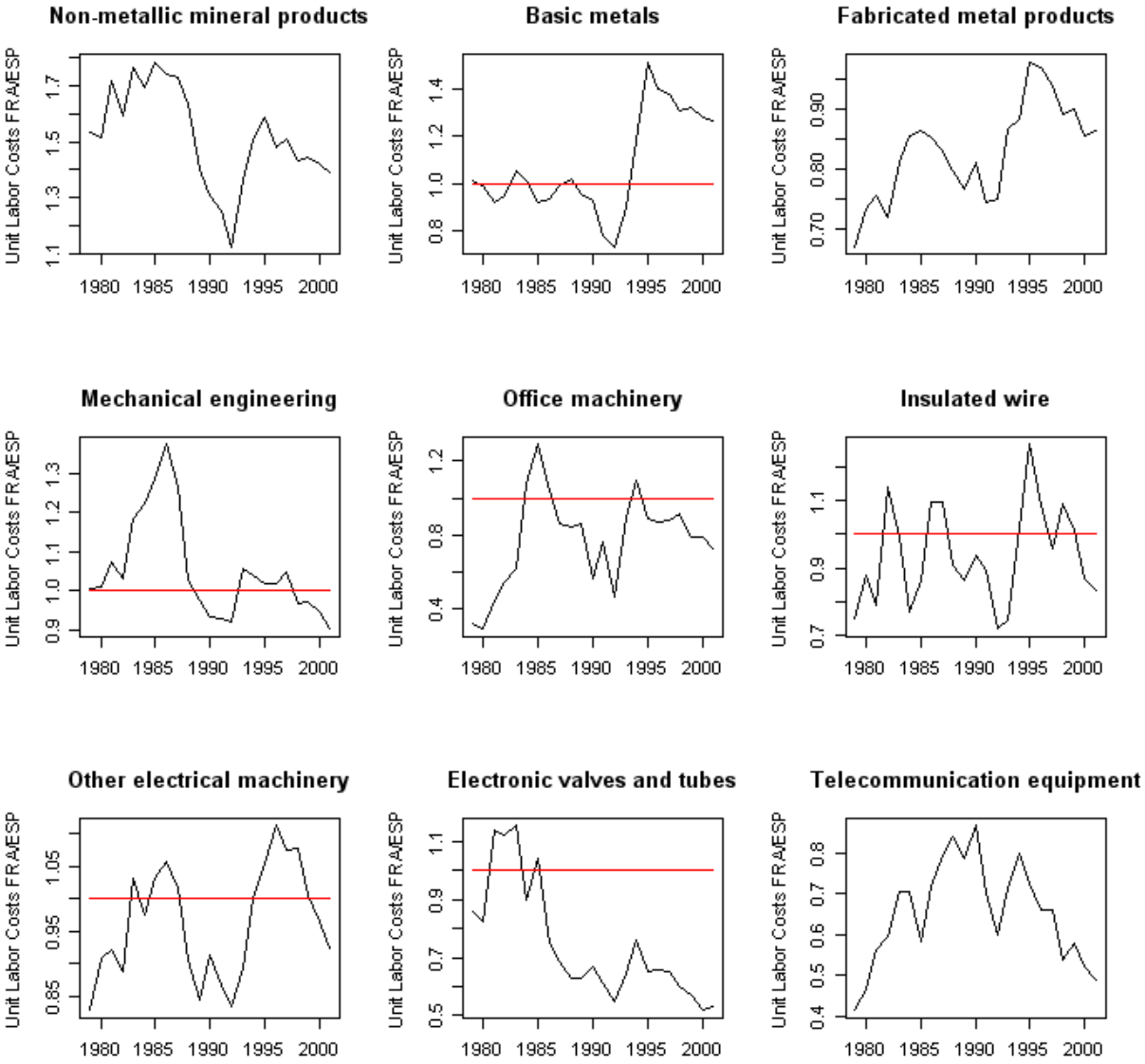
McGilvray, J., & Simpson D. (1973). The commodity structure of Anglo-Irish trade. *The Review of Economics and Statistics,* 55, 451-458.

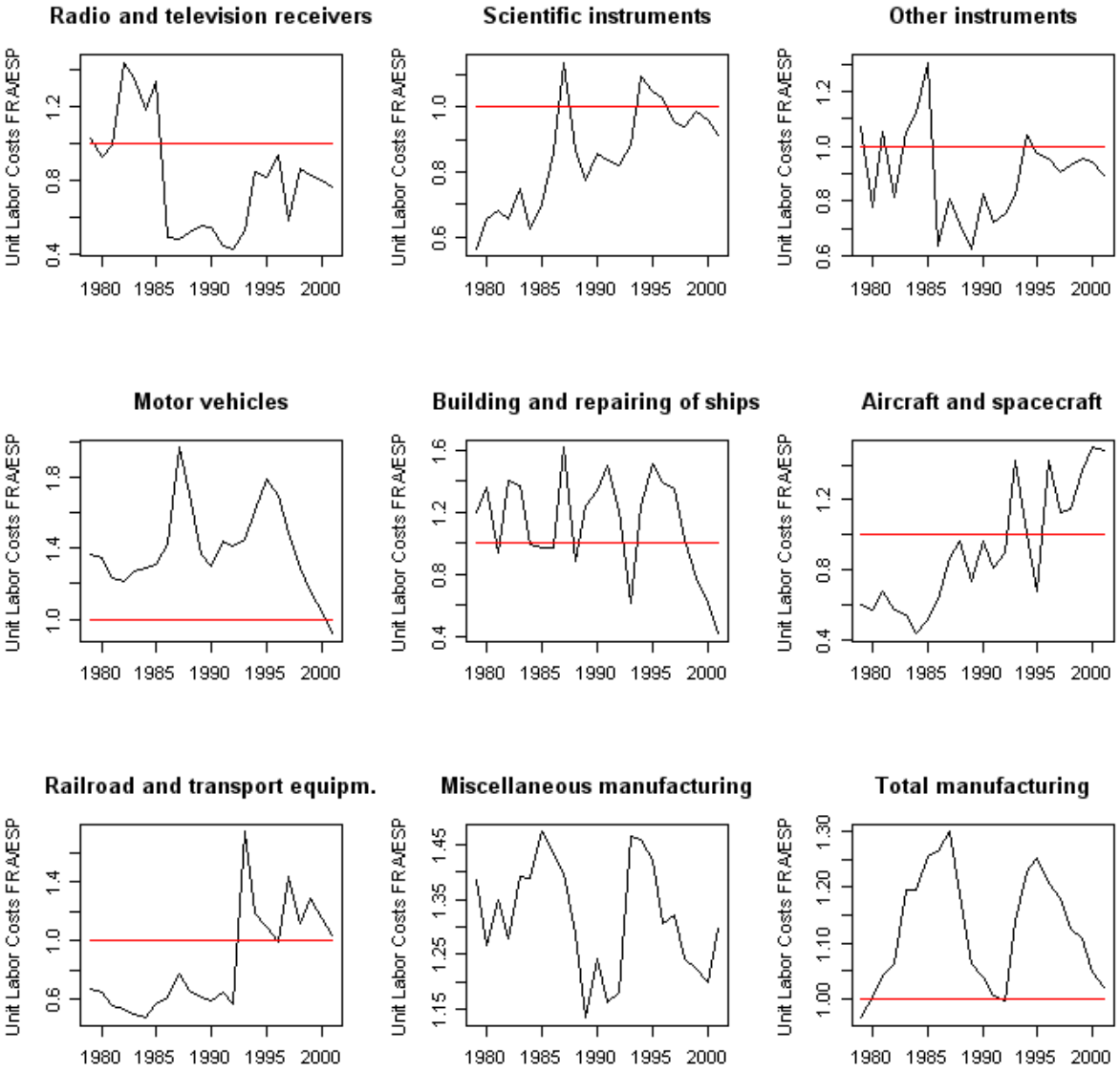
Rauch, J. E. (1999). Networks versus Markets in International Trade, *Journal of International Economics,* 48, 7-35.

Stern, D. (1962). British and American productivity and comparative costs in international trade. *Oxford Economic Papers,* 14, 275-296.

Appendix: French Unit Labor Costs Relative to Spanish Unit Labor Costs




Non-metallic mineral products
Basic metals
Fabricated metal products
Mechanical engineering
Office machinery
Insulated wire
Other electrical machinery
Electronic valves and tubes
Telecommunication equipment
Unit Labor Costs FRA/ESP
1980
1985
1990
1995
2000


Radio and television receivers
Scientific instruments
Other instruments
Motor vehicles
Building and repairing of ships
Aircraft and spacecraft
Railroad and transport equipm.
Miscellaneous manufacturing
Total manufacturing
Unit Labor Costs FRA/ESP
1980
1985
1990
1995
2000