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Department of Economics

Horácio C. Faustino, and Nuno Carlos Leitão

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Immigration and Trade in Portugal: A Static and Dynamic Panel Data Analysis

Horácio C. Faustino
ISEG, Technical University of Lisbon, and SOCIUS- Research Centre in Economic Sociology and the Sociology of Organisations
Nuno Carlos Leitão
ESGS, Polytechnic Institute of Santarém, Portugal

Abstract This article tests the relation between immigration and Portuguese bilateral trade, considering the fifteen European partners (EU15). Using a static and dynamic panel data analysis, the results show that the stock of immigrants has a positive effect on Portuguese exports, imports and bilateral intra-industry trade. These results suggest that immigration affects all types of trade in a positive way. The underlying assumption is that immigration contributes to decrease the costs of transactions, which in turn promotes all trade flows. The static and dynamic results do not confirm the hypothesis of a negative effect of immigration on Portuguese exports. In the static model, a 10% increase in immigration induces a 5.98 % increase in exports and a 5.55% increase in imports. The effect on the Portuguese trade balance is positive. However, the dynamic results for the export and import equations are more reliable, showing a smaller positive effect on exports. A 10% increase in bilateral immigration induces a 0.47% and 2.34% increase in exports and imports, respectively. Our findings also suggest that when immigrants to Portugal originate from a Latin partner-country, the effects on trade are stronger than in the case of immigrants from non-Latin countries. The study is based on an extended gravitational model, in order to incorporate the qualitative factors as control variables.

KEY WORDS: intra-industry trade; immigration; gravity model; panel data; Portugal.

JEL CLASSIFICATION: C33, F11, F12, F22

Addresses:

Horácio C. Faustino (*corresponding author*)

ISEG-Instituto Superior de Economia e Gestão. Rua Miguel Lúpi, 20.

1249-078 Lisboa, Portugal

T: (+351) 213925902 ; Fax; E-mail: faustino@iseg.utl.pt; Home page: http://www.iseg.utl.pt/~faustino

Nuno Carlos Leitão, Escola Superior de Gestão de Santarém, Complexo Andaluz Apartado 295 2001-904 Santarém, Portugal. T:(+351)243303200 e-mail: nuno.leitao@esg.ipsantarem.pt

I. Introduction

With globalisation, many nations have liberalised their trade policies and removed trade barriers. Globalisation means increasing economic integration, free mobility of capital across boundaries, as well as free mobility of labour and migration. Globalisation today offers diaspora communities new opportunities for international business, using their international social networks. Due to these social and ethnic networks, the transaction costs have decreased and immigration has contributed to the increase of both types of international trade: inter-industry trade and intra-industry trade (IIT). According to the traditional trade theory (Ricardian and Heckscher-Ohlin models), the factor movements and trade are substitutes. According to the new trade theory, the link between migration and IIT can be established through the trade transaction costs (see, for example, Helpman and Krugman, 1985). However, the theoretical literature on the effects of immigration on trade is recent. In his seminal paper, Rauch (1999) proposes a network view of trade in differentiated products where immigration can lead to a reduction in trade transaction costs. He uses a gravity model of international trade to test if proximity and common language/colonial ties are more important to differentiated products than for homogeneous products. There are some empirical studies on the relation between immigration and trade (see Girma and Yu, 2002; Blanes, 2005). The gravity equation does not arise from a many-country Heckscher-Ohlin model. The specialisation in differentiated goods generates the force of gravity and this specialisation can be a result of an Armington structure of demand. Feenstra, Markusen and Rose (2001) proved that a wide range of theories are consistent with a gravity-type equation. Following the reciprocal dumping model of trade (Brander, 1981; Brander and Krugman, 1983), they also consider a model with homogeneous products when there is imperfect competition and segmented markets. However, the models of product differentiation and complete specialisation and the models of homogeneous products predicted subtle differences in parameter values. Despite the theoretical problems, the gravity equation describes very well the bilateral trade flows as a function of the incomes and distance between trade partners and works successfully in the empirical studies on developed and developing countries.

In this paper we analyse the impact of immigration on Portuguese trade, making the distinction between inter- and intra-industry trade. The purpose of this paper is to test for the impact of immigration on Portuguese exports (X) and imports (M) and on Portuguese IIT by types (horizontal IIT, and vertical IIT), controlling the effects of other socio-economic factors, like factor endowments, distance and culture. Since we do not seek to estimate the determinants of inter-industry or intra-industry trade, it only requires applied trade theory in order to gain an understanding of the link between factor movements and trade flows and to justify the expected sign of the explanatory variables' coefficients.

General relationships between immigration and international trade require aggregated data and the use of econometric models. This paper uses a static and dynamic panel data analysis and considers the trade between Portugal and each European partner-country (EU-15) for the period 1995-2003.Estimation results confirm the hypothesis that the immigration stock has a positive effect on imports and intra-industry Portuguese trade. The estimates also confirm that immigration has a positive effect on exports. This is a desideratum for further research.

The remainder of the paper is organised as follows. The next section describes the theoretical background to the relationship between immigration and trade. Section 3 presents the gravity model. Section 4 presents the empirical model. Section five reveals the econometric results. The final section concludes.

II. The Relationship between the Immigration and Trade

There is currently a debate as to whether the migration of labour and international trade should be considered a substitute or a complement. The link between immigration and trade can be explained by the Heckscher-Ohlin (HO) model. Under the assumption that specialisation is incomplete, the factor price equalisation theorem, also known as the Heckscher-Ohlin-Samuelson (HOS) theorem, provides strong evidence that trade in final goods essentially substitutes for movements of factors between countries, leading to an increase in the price of the abundant factor and a fall in the price of the scarce factor among the trading partners until relative (and absolute) factor prices are equal. Thus, under the HO assumptions, trade and labour mobility are substitutes. In other words, the trading of goods substitutes for the trading of people. When a country

imports labour-intensive goods, it is equal to "importing" labour from these countries and this "mechanism" leads to the equalisation of wage rates across countries, even if labour is internationally immobile. Immigration and imports of labour-intensive goods are substitutes. In the same way, exporting labour-intensive goods corresponds to "exporting" labour. The question is, what happens if the migration flows are introduced into the HO model? As the HO model treats goods flows and migration flows symmetrically, this does not alter the HO theorem (each country specialises and exports the goods that are intensive in the country's relatively abundant factors) and the HOS theorem (free trade will equalise the factor prices). Furthermore, what happens to the trade flows? Unfortunately, as is mentioned by Borjas (1989) and Blanes (2005), international trade theory and empirical studies have almost ignored the effects of labour migration on trade flows.

According to Rauch (1999), Girma and Yu (2002), and Blanes (2005), immigrants can influence bilateral trade flows in two ways. The first is associated with the notion that the immigrants bring with them a preference for home-country products (preference channel). The second expresses the idea that immigration can reduce transaction costs between the home and host countries, through ethnic networks or information mechanisms (transaction cost reduction channel).

Following these authors, and considering that there is an immigrant preference for home-country products and the additional information brought by immigrants is more relevant to consumer goods than to producer goods, we will expect a positive effect of immigration on imports and a negative effect on exports. However, if we consider that the immigrant stock includes skilled immigrants and immigrant entrepreneurs, this may explain the positive effect on exports.

The HO trade model is an inter-industry trade type model. When we consider IIT, the reality can be rather different and we can find a complementary, rather than a substitute relationship between trade and international factor movements. In this case, trade and immigration can complement each other. We can think about market imperfections, namely, information asymmetries and their effect on consumption preferences and intra-industry trade. In the perfect competition model, the workers have the same preferences and the information on this market is symmetric. In the imperfect competition model, if the immigrants have legal registered status, there is more information on their preferences and the transaction costs decrease. In the medium or long run, when the

immigrants take the citizenship of the host country, the transaction costs also decrease. So, if transaction costs are proxied by the costs of acquiring market information, immigration will have a positive effect on bilateral IIT. The mechanism is the relation between immigration, market information and trade transaction costs. As IIT occurs mainly in differentiated products (Helpman and Krugman, 1985), there is an underlying assumption: the elasticity of substitution between varieties of the same product is higher than the same elasticity between homogeneous products.

Gould (1994), Dunlevy and Hutchinson (1999) and Girma and Yu (2002) found a positive relationship between immigration and bilateral trade between host and home countries. Gould (1994) considered that trade in differentiated products involves stronger immigrant effects. The reason is that the additional information brought by immigrants is more relevant to consumer goods than to producer goods and the increasing imports will satisfy immigrants' specific preferences. Blanes (2005) argues and concludes that the immigrants have a positive effect on trade in differentiated products, measured by the IIT index.

III. The Gravity Model

To test our hypotheses, we use the gravity model, which has been applied to explain varying types of flows, such as bilateral trade flows and migration. The core explanatory variables to explain bilateral trade in the gravity model are measures of the economic size of trading partners (positive or gravitational effects) and the distance between them (a negative effect or counter-force). The gravity equation can be thought of as a kind of short-hand representation of supply (exports of a country to the world market) and demand forces (imports of a country), with stimulating or restraining elements (tariff barriers, distance, culture, other socio-economic factors). Since Anderson (1979), it has been recognised that the predictions of the gravity model can be derived from different models (Ricardian and Heckscher-Ohlin models and new trade theory models, such as Helpman and Krugman 1985 models). Hummels and Levinsohn (1995) tested some of the Helpman and Krugman (1985) hypotheses and concluded that the gravity equation performed very well.

The gravity model is analogous to Newton's Law of Gravity, which states that the

gravity between two objects is directly related to their masses and inversely related to the distance between them. According to the gravity approach, the trade between two countries is directly related to their incomes (or per-capita incomes) and inversely related to the distance between them.

$$F_{ij} = G\frac{Y_i^{\alpha} Y_j^{\beta}}{D_{ij}^{\delta}} \qquad (1)$$

Where F_{ij} denotes the flow from country i to country j. Y_i and Y_j are the economic sizes of the two countries, usually measured as the gross domestic product (GDP), or per-capita GDP. D_{ij} is the distance between countries. G is a gravitational constant.

When we apply logs to the gravity equation (1), we obtain a linear relationship as follows:

$$\text{Ln } F_{ij} = \ln G + \alpha \ln Y_i + \beta \ln Y_j - \delta \ln D_{ij} \qquad (2)$$

If we consider that Fij denotes the value of exports from country i to country j, lnG corresponds to the intercept, while α and β denotes the elasticities of country i's exports with respect to own and foreign income, respectively. and δ are elasticities. The gravity model we will specify and estimate in the next section is an extension of this basic gravity equation in log-linear form augmented for a number of explanatory variables relevant for bilateral trade flows.

Based on Anderson (1979), Bergstrand (1985, 1989,1990), Helpman and Krugman (1985), Baier and Bergstrand (2001), Feenstra et al. (2001) the empirical gravity model may include variables based on alternative theories of trade. These studies provide the formal theoretical foundations for the gravity model. However, the gravity model is not used only in international trade empirical studies. Badinger and Breuss (2008) use a bilateral gravity model including geographical variables (distance, country size, dummy for country border) to test for the effect of trade on productivity. Despite the discussions on the theoretical foundations of the variables that appear in the gravity equations, the results are very robust because the gravity model allows more factors to be taken into

account to explain bilateral trade flows. The gravity log-linear equation has been recognised for its empirical success in explaining different types of bilateral flows.

IV. The Empirical Model and Data Source

The sources of the data on the explanatory variables are the World Bank, World Development Indicators (2005) and Serviços de Fronteiras, Ministério da Administração Interna (Border Services Administration, Portugal). The source used for dependent variables was INE – the Portuguese National Institute of Statistics (Trade Statistics)

IV.1. Dependent Variables

For trade, we will use five alternative measures: the exports (X), the imports (M), the intra-industry trade index (IIT), the vertical IIT index (VIIT) and the horizontal IIT index (HIIT).

The Grubel and Lloyd IIT index

The Grubel and Lloyd (1975) index is employed as a measure for IIT between Portugal, country i, and European partner j. To avoid problems of statistical aggregation, the data is at the 5-digit level of the SITC classification.

$$IIT_i = \frac{\sum_{j=1}^{n} \left(X_{ij} + M_{ij}\right) - \sum_{j=1}^{n} \left|X_{ij} - M_{ij}\right|}{\sum_{j=1}^{n} \left(X_{ij} + M_{ij}\right)} \qquad (3)$$

The HIIT and VIIT indexes

To separate horizontal from vertical intra-industry trade, the Grubel and Lloyd index and the methodology of Abd-el-Rahaman (1991), and Greenaway et al. (1994) are used. Relative unit values of exports and imports are used to disentangle total IIT into total HIIT (RH) vis-à-vis total VIIT (RV). We use a unit value dispersion of 15 per cent.

Moreover, we must consider:

$$HII_i = \frac{RH_i}{\sum_{j=1}^{n} \left(X_{ij} + M_{ij}\right)} \tag{4}$$

$$VIIT_i = \frac{RV_i}{\sum_{j=1}^{n} \left(X_{ij} + M_{ij}\right)} \tag{5}$$

The HIIT and VIIT indexes are also calculated with the desegregation of 5-digit Portuguese Economic Activity Classification from INE - Trade Statistics.

Because IIT is an index varying between zero and one, we apply a logistic transformation to IIT indexes (see Hummels and Levinsohn, 1995).

Because IIT is an index varying between zero and one, we apply a logistic transformation to IIT, HIIT and VIIT (see Hummels and Levinsohn, 1995).
Logistic IIT $= \ln\left[IIT/(1-IIT)\right]$. The same is carried out for HIIT and VIIT.

IV.2. Explanatory Variables

The paper uses the following explanatory variables in logs:

-DGDP is the absolute difference in per capita GDP (PPP, in current international dollars) between Portugal and the European trading partner. Loertscher and Wolter (1980) and Greenaway et al. (1994) provide empirical support for a negative relation between difference in per-capita income and IIT. Falvey and Kierzkowski (1987) suggest a positive sign for VIIT model and Loertscher and Wolter (1980) and Greenaway et al. (1994) provide empirical support for a negative relation between differences in per-capita income and HIIT. The expected effect of this variable on exports and imports is positive;

- EP is a proxy for differences in physical capital endowments. It is the absolute difference in electric power consumption (Kwh per capita) between Portugal and the

European partners. Helpman and Krugman (1985), Helpman (1987) and Hummels and Levinsohn (1995) considered a negative relation between IIT and differences in factor endowments. Based on Helpman and Krugman (1985) and Bergstrand (1983), we expect a positive sign for the VIIT model and a negative sign for the HIIT model. The expected effect of this variable on exports and imports is positive;

- EC is the second proxy for difference in physical capital endowments. It is the absolute difference in energy use (1 kg of oil equivalent per capita) between Portugal and the European partners. A negative effect is expected on IIT and HIIT and a positive effect on VIIT, exports and imports;
- MinGDP is the lower value of GDP per capita (PPP, in current international dollars) between Portugal and European partner. This variable is included to control for relative size effects. According to Helpman (1987) and Hummels and Levinshon (1995), a positive sign is expected;
- MaxGDP is the higher value of GDP per capita (PPP, in current international dollars) between Portugal and the European partners. This variable is also included to control for relative size effects. A negative sign is expected (Helpman, 1987; Hummels and Levinshon, 1995);
- IMI is the stock of immigrants in Portugal by partner-country. A positive effect of immigration is expected on imports, but not on exports. The expected effect on IIT, HIIT and VIT is positive. Blanes (2005) found a positive sign for the IIT model;
- DIST is the geographical distance between the Portugal and partner country. Distance serves to proxy for transport costs. According to the gravitational model, a negative sign is expected for all models;
- BORDER is a dummy variable that equals 1 if the partner-country shares a border with Portugal (i.e., Spain) and 0, otherwise. The expected sign is positive for all models;
- LATIN is a dummy variable that equals 1 if the partner-country is a Latin country (i.e., Spain, Greece, France and Italy) and 0, otherwise. The expected sign is positive for all models.

IV.3. Empirical Specification

To analyse the changes in Portuguese exports, imports and IIT indexes as a function of change in immigration volume from the country-partner and other country-specific

characteristics, we utilise five regression equations with identical predictors. The models test our main hypothesis of a positive effect of immigration stock on imports and IIT indexes and a negative effect on exports. The general econometric model can be specified as follows:

The Static Model

$$F_{ijt} = \beta_0 + \beta_1 X_{ijt} + \delta_t + \varepsilon_{ijt} \quad (6)$$

Where F_{ijt} stands for either Portuguese exports, imports and IIT indexes; X is a set of country-specific explanatory variables. It includes dummy variables and a variable that measures the stock of immigrants from country j residing in Portugal (country i) during year t; δt captures a common deterministic trend; ε_{ijt} is a random disturbance assumed to be normal, independent and identically distributed (IID) with E (ε_{ijt}) =0 and Var (ε_{ijt}) = $\sigma^2 > 0$.

All variables, except dummy variables, enter the equation in natural logarithms. In this way we may estimate the elasticities. The coefficient of the immigration variable captures all channels through which the volume of immigrants affects trade. We do not include the unobserved time-invariant country-specific effects, since this would remove some relevant variables that do not vary along time and that are important to the robustness of the results. We control for time effects by including a time dummy variable (year).

The Dynamic Model

Although the theoretical models of trade do not suggest a dynamic specification, we decided to introduce a dynamic variant of the static model, because in this static model there are problems with serial correlation and endogeneity of some explanatory variables.Whilst "immigration causes trade", the opposite, i.e., "trade causes immigration" is also true. The absence of convincing instruments may cast doubts on

whether the observed correlations between immigration and trade variables reflect a causal relationship. In recent years substantial progress has been made in overcoming these concerns over endogeneity. These econometric problems were resolved by Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bound (1988, 2000), who developed the first-differenced GMM and the GMM system estimators. In this paper, we will use the GMM system estimator.

The econometric model (6) can be rewritten in the following dynamic representation:

$$F_{ijt} = \rho F_{ijt-1} + \beta_1 X_{ijt} - \rho\beta_1 X_{ijt-1} + \delta t + \varepsilon_{ijt} \qquad (7)$$

V. Estimation Results

V.1.The static analysis

To examine the relationship between trade and immigration, controlling for other explanatory factors, we estimated five OLS regressions, with time dummies. We used the same explanatory variables in all equations.

The results in Table 1 are consistent with the hypothesis of a positive correlation between immigration and trade. The explanatory variable, IMI (stock of immigrants in logs) is highly statistically significant (1% level) in the five equations. The results are very robust to different measures of the dependent variable. The trade-immigration elasticities are all positive: 0.598 for the export equation, 0.555 for the import equation, 0.753 for the IIT equation, 1.123 for the HIIT equation and 0.534 for the VIIT equation. The only result that is unexpected is the positive sign of IMI in the export equation and the magnitude of the coefficient. We found a stronger impact of immigration volume upon exports than upon imports. Comparing export-immigration and import-immigration elasticities, we can conclude that the immigration coming from the EU15 has led to increased trade and a positive trade balance. Therefore, we must hypothesise that the Portuguese manufactured goods had already incorporated specific tastes originating in the immigrants' home countries. So, the additional information provided by immigrants was relevant to consumer and producer goods and this led to an increase in exports and imports between immigrants' host and home countries. However, this merits further investigation, using a dynamic analysis to avoid endogeneity problems.

When we consider intra-industry trade (IIT) as a dependent variable, the results are in accordance with expectations. The effect of the stock of immigrants on IIT is positive and remains positive when we consider IIT by types (HIIT and VIIT). These results confirm the hypothesis that the immigrants' information mechanism reduces the trade transaction costs in differentiated products and has a positive effect on all types of intra-industry trade.

Considering that the variable, DIST (distance in logs) can be used as a proxy for trade transaction costs and capture part of these costs, the introduction of this variable in all regressions controls for this effect. The results demonstrate that this variable has the correct sign in all equations and is statistically significant in three of them: exports, imports and VIIT equations.

When we control for per-capita income differences and factor-endowment differences, better results for the immigration variable are obtained. On the other hand, when we did not incorporate these country-specific characteristics, the results were inferior, because the immigration variable captured these effects.

The dummy variable, LATIN has the expected positive sign, providing evidence that the effect of immigration on Portuguese trade is greater for the trade between Portugal and its Latin partner-countries than for the trade with other countries which do not share the same cultural background.

Table 1. The impact of immigration on trade (static models)

Variables	Exports X	Imports M	IIT	HIIT	VIIT	Expected Sign
DGDP	-0.183	-0.025	0.045	-1.163	0.599	X, M, VIIT(+) IIT,HIIT(-)
	(-0.839)	(-0.147)	(0.150)	(-1.37)	(2.25)**	
EC	-0.130	0.243	0.376	0.395	0.360	X, M, VIIT(+) IIT,HIIT(-)
	(-1.08)	(5.62)***	(1.55)	(0.828)	(1.70)*	
EP	0.292	-0.036	-0.354	-0.249	-0.589	X, M, VIIT(+) IIT,HIIT(-)
	(3.83)***	(-0.290)	(-1.75)	(-0.466)	(-3.1)***	
MinGDP	3.398	1.960	4.013	-0.596	4.342	(+)
	(2.89)***	(3.20)***	(2.52)**	(-0.079)	(2.67)***	
MaxGDP	2.865	2.055	3.735	6.045	2.663	(-)
	(3.33)***	(3.34)***	(3.50)***	(2.45)**	(2.81)***	
IMI	0.598	0.555	0.753	1.123	0.534	X(-), M(+) IIT,HIITVIIT,(+)
	(8.36)***	(8.01)***	(5.82)***	(4.27)***	(5.24)***	
DIST	-0.880	-1.188	-1.462	-1.003	-1.453	(-)
	(-1.70)*	(-3.1)***	(-1.57)	(-0.519)	(-2.08)**	
BORDER	-0.077	-0.042	-0.145	-0.263	-0.122	(+)
	(-0.257)	(-0.183)	(-0.262)	(-0.232)	(-0.298)	
LATIN	0.065	0.180	0.097	0.053	0.182	(+)
	(0.559)	(1.66)*	(0.573)	(0.136)	(1.26)	
C	-19.305	-9.412	-31.374	-22.920	-29.054	
	(-2.00)	(-1.60)	(-2.50)	(-0.598)	(-2.43)	
Adj.R^2	0.886	0.898	0.779	0.397	0.723	
Observations	112	112	112	112	112	

OLS estimations including time dummies variables.

T-statistics (heteroskedasticity corrected) are in round brackets. ***/**/*- statistically significant, respectively at the 1%, 5% and 10% levels.

All variables except dummy variables are in logs

V.2. The dynamic analysis

Table 2 presents the dynamic estimations for exports and imports and IIT by types. The immigration variable now appears to have a lesser effect on trade. The trade-immigration elasticities remain positive but the value of these elasticites decreased. The immigration still has a positive effect on exports, although it is much less than was previously the case. A 10% increase in immigration induces only a 0.47% increase in exports, whereas the imports increase by 2.34%. This is more in accordance with the expectations. The first and larger impact is on imports because the immigrants' networks are more likely to increase domestic demand for foreign goods first. However, immigration and trade is still a positive sum game: the export industries and immigrants both win. Considering the intra-industry equations, the results show that the trade-immigration elasticities are all positive: 0.162 to the IIT equation, 0.501 to/for the HIIT equation and 0.374 for the VIIT equation.

As in the static model, we controlled for country size and the difference in factor-endowment effects. The distance variable has the expected negative sign and is significant for export and import equations and VIIT equation, as in the static model. The border dummy variable is statistically significant only for the import equation. The main difference in relation to the static model is the absolute values of the trade-immigrants elasticities. Comparing with the static results, we note that on dealing with endogeneity concerns, the dynamics results present lower trade-immigration elasticities in all five equations. However, they remain positive in the export equation.

Table 2. The effect of immigration on trade (Dynamic models)

Independent Variables	X	M	IIT	HIIT	VIIT
X_{t-1}	0.929 (20.4)***				
M_{t-1}		0.409 (1.34)			
IIT_{t-1}			0.730 (8.73)***		
$HIIT_{t-1}$				0.425 (2.78)***	
$VIIT_{t-1}$					0.251 (1.28)
DGDP	0.096 (1.95)*	-0.005 (-0.0485)	-0.139 (-1.12)	-0.172 (-0.272)	-0.264 (-1.13)
$DGDPi_{t-1}$	-0.253 (-2.70)***	0.261 (2.27)**	0.107 (0.592)	0.025 (0.028)	0.557 (2.38)**
EC	-0.023 (-0.715)	0.093 (2.06)**	0.037 (0.702)	-0.618 (-1.95)*	0.191 (2.21)**
EC_{t-1}	0.027 (1.33)	0.056 (0.959)	-0.051 (-0.979)	0.940 (3.90)***	-0.056 (-0.311)
EP	-1.804 (-4.57)***	1.025 (1.56)	0.241 (0.350)	-2.38 (-0.800)	1.862 (3.34)***
EP_{t-1}	1.862 (4.58)***	-0.964 (-1.41)	-0.155 (-0.221)	2.890 (1.03)	-2.231 (-3.01)***
MinGDP	1.622 (2.94)***	-2.488 (-1.12)	-4.792 (-1.47)	-5.357 (-0.313)	-11.515 (-1.30)
$MinGDP_{t-1}$	-2.128 (-2.66)***	1.373 (0.700)	5.353 (1.63)	4.023 (0.223)	11.957 (1.40)
MaxGDP	2.067 (3.85)***	-2.155 (-1.09)	-4.901 (-1.63)	-0.900 (-0.05)	-10.268 (-1.22)
$MaxGDP_{t-1}$	-1.636 (-2.20)**	2.041 (0.967)	6.133 (1.91)*	0.591 (0.035)	12.654 (1.43)
IMI	0.047 (1.77)*	0.234 (1.78)*	0.162 (2.17)**	0.501 (2.96)***	0.374 (3.47)***
DIST	-0.348 (-2.74)***	-1.294 (-1.72)*	-0.270 (-0.957)	-0.262 (- 0.271)	-1.878 (-2.03)**
BORDER	-0.061 (-1.28)	-0.450 (-2.12)**	-0.0198 (-0.144)	-0.411 (-0.635	-0.692 (-1.08)
LATIN	0.001 (0.035)	0.303 (3.26)***	0.203 (1.93)	0.547(0.830)	0.232 (0.985)
C	2.02 (0.688)	10.651 (1.70)*	-7.427 (-1.12)	2.550 (0.160)	-7.872 (-0.859)
M1	-1.011 [0.312]	-0.002 [0.998]	-0.058 [0.954]	-0.083 [0.933]	0.7228 [0.470]
M2	0.9523 [0.34]	-0.6433 [0.520]	0.1362 [0.892]	0.8984 [0.369]	-1.063 [0.288]
Wjs	7.5e+012 [0.000]	2493 [0.000]	1.1e+004 [0.000]	303.2 [0.000]	4280 [0.000]
Sargan	725e-013 [1.000] Df=165	1.650e-016 [1.000] Df=165	3.540e-015 [1.000] Df=165	-8.702e-015 [1.000] Df=165	-3.925e-015 [1.000] Df=165
N	98	98	98	98	98
Parameters	22	22	22	22	22

The null hypothesis that each coefficient is equal to zero is tested using one-step robust standard error. T-statistics (heteroskedasticity corrected) are in round brackets. ***/**/*- are statistically significant, respectively, at the 1%, 5% and 10% levels. P-values are in square brackets. Year dummies are included in all specifications (this is equivalent to transforming the variables into deviations from time means, i..e., the mean across the fourteen countries for each period).M1 and M2 are tests for first-order and second–order serial correlation in the first-differenced residuals, asymptotically distributed as N(0,1) under the null hypothesis of no serial correlation (based on the efficient two-step GMM estimator). W_{JS} is the Wald statistic of joint significance of independent variables (for first-steps, excluding time dummies and the constant term). Sargan is a test of the over-identifying restrictions, asymptotically distributed as χ^2 under the null of instruments' validity (with two-step estimator).

The instruments in levels used for all equations are: Gmm (DGDP,3,6) Gmm(EP,3,6), Gmm(EC,3,6), Gmm(MinGDP, 3,6),Gmm(MaxGDP,3,6), Gmm(IMI,3,6), Gmm(DIS, 3,6), Gmm(BORDER,3,6), Gmm(LATIN,3,6) and Gmmm(X,3,6), Gmm(M,3,6), Gmm(IIT,3,6),Gmm(HIIT,3,6), Gmm(VIIT,3,6) for the first, secnd, third, fourth and fifth equations, respectively . For levels equations, the instruments used are first differences of all variables lagged t-2.

As the instruments are valid and there are no second-order serial correlations, all the five models are valid.

VI. Conclusion

This paper tests the impact of immigration on Portuguese intra-industry trade. Immigrants express knowledge spillovers that can reduce information costs for economic agents. The empirical results indicate that this reduction in trade transaction costs is an important variable in the determinants of all trade. Our findings suggest that immigration leads to the reduction of trade transaction costs, and increases all types of intra-industry trade, as well as exports and imports. Comparing our static results with those of Blanes (2005), we note that both found a positive relationship between immigration and IIT. However, our results show that this positive effect applied for the two types of IIT (HIIT and VIIT). The dynamic panel data analysis also confirmed this positive relationship.

Although further research should be carried out into this subject, especially the relation between economic theory and international migration, considering the immigrants' different skills (see Borjas, 1999; Peixoto, 2001), this paper makes some new contributions. First, the paper examines the impact of immigration on all trade flows: exports, imports and intra-industry trade, by types. Second, the dynamic panel data analysis providing more reliable results confirms the main static panel data findings, in particular, the positive effect on exports. Third, the results permit us to conclude that immigration could be a vehicle that contributes to the decrease of trade transaction costs and could stimulate Portuguese trade. Fourth, the results suggest that the additional information brought by immigrants is equally relevant to consumer goods and producer

goods. The positive effect on exports and imports confirm this hypothesis. In the static model, we concluded that immigration strengthens exports more than imports. In the dynamic model, the effect of immigration on exports remains positive, but the effect is weaker. Fifth, our empirical results contradict the theoretical hypothesis on the relationship between exports and immigration and this may contribute to the theoretical research. Sixth, some of the control variables, such as relative factor endowments and distance, are found to be statistically significant and the results are more robust with the introduction of these country-specific characteristics variables. Seventh, the paper introduces cultural ties (common culture) and neighborhood as proxies for trade transaction costs. The introduction of these control variables also improved the specification model. The results suggest that when immigrants to Portugal come from a Latin partner-country, the effects on trade are greater than they are in relation to those from other countries. Finally, our findings suggest that Portuguese export industries need not be afraid of a liberal immigration policy: both host and source countries can gain. Free trade and freedom of labour migration are not a zero sum game. What is of most relevance for immigration policy is the immigrants' skills. Hence, in future research, we must include the different levels of immigrants' skills as explanatory variables and analyses its impact on exports, imports and intra-industry trade by types. The consideration of age at entry, time in the home country, education, trans-migrant entrepreneurs and other information from micro data will also improve the empirical model specification and may explain the positive effect on exports. The analysis also may be extended to all European Union countries (EU27) in addition to the inclusion of immigrants arriving from less developed countries.However, despite the empirical results, the economic theory has much to say about the positive relationship between exports and immigration.

Notes

1. In the same way, common language, cultural or historical colonial ties, as well as geographical distance between countries, can be used as proxies for transaction costs.

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