A Gravity Study of the Sectoral Trade Impact of Labour Migration in an Enlarged EU[1]

Helena Marques[2] and Hugh Metcalf[3]

Abstract

In this paper we estimate a sectoral gravity model for trade between three regional blocs of the enlarged EU that we defined as North (wealthiest EU), South (Greece, Portugal and Spain) and East (acceding Central and Eastern European countries). The estimation results show the need to incorporate trade theories based on both endowments and scale economies in the presence of transport costs. We use the estimated coefficients to compute trade potentials between these three groups under the two alternative scenarios of an enlargement with and without free movement of labour. A fully-fledge Single Market allows the North, with good market access and human capital endowments, to consolidate its current hub position by attracting more firms and skilled workers, thus increasing its net exports of skill-intensive goods with high economies of scale to the South. The latter, with poor market access and human capital endowments, retains competitiveness in low scale economies, low skill-intensity sectors. The East, with poor market access but well endowed in human capital, has a marginal gain in trade terms. However, skilled migration would cause a brain drain that, if of sufficiently large proportions, could have very damaging consequences in the long-term.

Keywords: gravity model, trade, migration, human capital, EU enlargement
JEL: F1, L6

[1] We gratefully acknowledge the valuable comments of the participants in an internal seminar at the University of Newcastle and in the EEFS Annual Conference (Bologna). Any remaining errors are our full responsibility.
[2] Department of Economics, Sir Richard Morris Building, Loughborough University, Loughborough, Leicestershire, LE11 3TU, UK. Corresponding author: H.I.Marques@lboro.ac.uk.
[3] Economics Unit, Ridley Building, University of Newcastle upon Tyne Business School, University of Newcastle upon Tyne, Newcastle upon Tyne, NE1 7RU, UK.

1 Introduction

The Eastern enlargement of the EU will be a reality in less than one year's time. Ten countries will become members of one of the largest trade blocs in the world and two more (Bulgaria and Romania) may be admitted by 2007. Thus, except for the Mediterranean islands of Cyprus and Malta, the new members will be Central and Eastern European Countries (CEECs).[4] When the transition process started in these countries more than a decade ago, great flows of East-West migration were anticipated and restrictions were placed on the movement of Eastern workers. On the contrary, East-West trade has been progressively liberalised under the Europe Agreements signed between the EU and each of the CEECs. Under these circumstances, the incoming enlargement seems to have more implications for the liberalisation of labour movements than for the liberalisation of trade. The European Commission (2001) has proposed several alternatives to deal with Eastern migration, ranging from safeguard clauses, flexible systems of transitional arrangements, establishment of fixed quota systems, to general non-application of the Single Market requirement of free movement of labour for a limited period of time.

In previous research (Marques and Metcalf 2003) we built a New Economic Geography (NEG) model with three country groups – EU-North[5] (N), EU-South[6] (S) and EU-East (E) – that differ in the skill endowment as well as both spatial and non-spatial trade costs. The latter are compressed to zero when E integrates with N and S, but the former persist and give rise to a hub effect.[7] In the model, N is a hub and has a higher skill endowment, this is, more skilled workers per capita, than the two peripheries S and E. The model is used to predict the impact of EU's Eastern enlargement on the location of sectors with different skill intensity, this is, different skilled/unskilled labour ratio, under two extreme scenarios. In the first one, the CEECs become members of the EU but free movement of labour is not applied. It was shown that the integrating periphery would attract firms from the centre in the absence of migration, especially from low skill sectors. However, the increased demand for labour will drive up real wages and thus when trade costs are low enough the flow of firms is reversed, the low skill sectors being the first to return to the centre. Labour immobility prevents real wage equalisation, but the difference is low enough for firms to locate in the centre instead. In the second scenario, the CEECs will benefit from free trade as well as free movement of labour. In the model unskilled labour remains immobile and it is skilled labour that migrates from East to West. As a consequence, firms no longer relocate in E. The flow of Eastern skilled workers stops as real wages are equalised. More workers in N and S create demand for goods, driving up prices, and increase supply of labour, driving down nominal wages. This mechanism would be more accentuated in N, as most migrants would relocate there. At the

[4] In the paper we refer to CEECs, or alternatively to EU-East, as being the group formed by Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic, Slovenia, and, on the assumption that they will effectively join the EU, Bulgaria and Romania.
[5] We define EU-North as the group formed by all EU-15 countries except Greece, Portugal and Spain.
[6] We define EU-South as the group formed by Greece, Portugal and Spain.
[7] The hub effect was introduced by Krugman (1993) in a three country model: a country is said to be a hub if the spatial trade costs between itself and each of the two other countries are lower than the spatial trade costs between the latter two.

same time, fewer workers in E drive down prices and drive up nominal wages. The consequence would be total income convergence, if migration were to be perfectly free.

It is the aim of this paper to empirically test the model's predictions regarding the impact of an Eastern enlargement with or without free migration of Eastern workers at both the sectoral and country group level. The comparison of the two scenarios is done through export and import potentials found by means of a two-step methodology. First, we estimate a sectoral gravity model that accounts for different skilled/unskilled labour ratios and different spatial and non-spatial trade costs. Second, we use the estimated coefficients to predict the potential values of trade between N, E and S in sectors with different degrees of economies of scale and skill-intensity under the migration and the no-migration scenarios. As both exporting and importing potentials are considered, we are able to predict the potential net export changes to each of EU's North, South and East regions. This is an important point as Eastern Europe's large trade deficit vis-à-vis the EU has been increasing during the 1990s and the continuation of such trend could create potentially dangerous trade imbalances.

The trade potentials method has been widely applied to EU-CEECs trade with contradictory results. On one hand, Havrylyshyn and Pritchett (1991), Hamilton and Winters (1992), Winters and Wang (1992, 1994), Baldwin (1994), Buch and Piazolo (2000) found that actual EU-CEECs trade was still below potential. On the other hand, Gros and Gonciarz (1996), Schumacher (1997), Festoc (1997), Vittas and Mauro (1997), Maurel and Cheikbossian (1998), Fontagne et al. (1999), Nilsson (2000) found that actual EU-CEECs trade was already above potential, following an "overshooting" reaction to the Europe Agreements. The divergence in empirical results is due mainly to the pre-transition data used, which overestimates the potentials, and to the econometric methodology. Most of the earlier studies used cross-section instead of panel data, thus producing biased results, as shown by Matyas (1998, 1997), Breuss and Egger (1999). Several other studies improved the analysis in different directions, either by using only EU and CEEC data to compute the gravity parameters (Fidrmuc 1998, Buch and Piazolo 2000), or by modifying the gravity model in various ways. First, by assuming the form of Bergstrand's generalised gravity equation instead of the Linnemann model (Festoc 1997). Second, by incorporating Krugman's (1991) assumption that proximity increases trade because it decreases transport costs (Maurel and Cheikbossian 1998). Third, by applying the gravity equation to vertically differentiated products (Fontagne et al. 1998). Finally, by incorporating both geographical and economic distances (Vittas and Mauro 1997, Fontagne et al. 1999). Both studies conclude that the main determinant of East-West trade is geographical distance. In addition, Nilsson (2000) is the only study after Baldwin (1994) that computes potential trade with the East for each of the EU-15 countries. All other studies look exclusively at East-North trade.

While using the traditional two-step methodology, we improve on the previous empirical studies of Eastern Europe's trade potential with the EU in several ways. First, we use panel data that accounts for sources of heterogeneity and idiosyncrasy. Second, the length of the transition period and the enforcement of the Europe Agreements provide data that is a better predictor of future trends than the pre-transition, pre-liberalisation data used in most of the earlier studies. Third, we believe our sectoral approach to be innovative since most previous studies of European trade potentials were conducted at an aggregate level. In fact, we validate our theoretical predictions by finding that trade potentials can differ greatly across sectors

with different characteristics. Fourth, we use both Random Effects GLS and Prais-Winsten regression with Panel-Corrected Standard Errors (PCSEs). To the best of our knowledge this is the first time PCSEs are used in the study of trade potentials between the member countries of an enlarged EU. This method incorporates the assumption that the disturbances are heteroskedastic (each country has its own variance) and contemporaneously correlated across countries (each pair of countries has their own covariance). This assumption seems to be especially suited for any study involving transition economies.

Our main findings can be summarised as follows. A robust trade pattern may be observed whether the new member countries will be participating solely in a customs union or in a fully-fledged single market. In an enlarged EU, the North would have a surplus in all sectors except in low scale economies, low skill-intensity, and the South would have a deficit in all sectors except in low scale economies, low skill-intensity. The North/South symmetry is broken by the presence of the East, with deficits in high scale economies sectors and surpluses in low scale economies sectors. In the case of the CEECs, it seems that the human capital endowment does not prevail over market access. On the contrary, trade between EU-North and EU-South seems to be equally related to endowments and market access. The impact of free Eastern migration on trade shows a distinct difference between high scale economies, high skill-intensity sectors (Chemicals, Machinery and Transport Equipment) and all the others. Trade in the former three sectors increases very sizeably when Eastern skilled workers can freely move West. As firms and workers agglomerate in EU-North and, to a lesser extent in EU-South, a rise in trade of high-skill goods can be explained if these regions gain skilled workers from the East. However, the South lacks the North's market access advantage and thus it suffers the largest loss, whereas the North has the highest gain. The East is in an intermediate position, with a weak market access but well endowed in skilled labour. Furthermore, with free migration the Southern and Eastern peripheries trade more with the centre and less with each other. Thus EU-North can further consolidate its current hub position if the new members participate in a single market for labour.

The paper is organised as follows. Section 2 presents the gravity model specifications and examines the estimation results. Section 3 describes the methodology for computing trade potentials and provides the sectoral trade potentials under the migration and no migration scenarios, comparing the two outcomes and highlighting the impact on the sectors and country groups considered of allowing for migration of skilled labour. Section 4 concludes.

2 A Sectoral Gravity Model

2.1 Model Specifications

In this section we present the four alternative gravity equations that are the basis of our empirical study. Our benchmark equation keeps the two main hypotheses behind the gravity model. The first main hypothesis is that the volume of trade is directly related to the market size of the trading partners, here proxied by their population (POP), and inversely related to the physical distance between them (DIST). The second main hypothesis is that the volume of trade is a function of country wealth, as measured by GDP per capita

(GDPPC). This second element represents more faithfully the so-called Linder (1961) hypothesis on the importance of demand structure and preferences in a world of differentiated goods. High-income countries consume high-quality goods and low-income countries consume low-quality goods. Thus the quality content of exports and imports should increase with GDP per capita.

The two main gravity hypotheses are augmented in two ways. First, the source of quality is the human capital endowment that differs across countries. Thus we add the partner countries' skilled/unskilled labour ratio (HKPC), proxied by the fraction of the country's population with tertiary education studies. Countries relatively abundant in human capital are expected to be net exporters of skill-intensive goods and countries relatively poor in human capital are expected to be net importers of such goods. Second, we distinguish between spatial and non-spatial trade barriers. Spatial trade barriers are given by physical distance and a common border dummy (BORDER). The non-spatial trade barriers are dealt with by means of time dummies, one for EURO membership and another controlling for progressive trade liberalisation with the East since 1991 under the enforcement of the Europe Agreements (EA). Accordingly, our benchmark specification of the gravity model to be estimated for exports and imports of sector k products between countries i and j in year t takes the form:

$$(1)\quad \begin{aligned} TRADE_{ijt}^{k} &= POP_{it}\beta_1 + POP_{jt}\beta_2 + GDPPC_{it}\beta_3 + GDPPC_{jt}\beta_4 + HKPC_{it}\beta_5 + HKPC_{jt}\beta_6 + \\ &+ DIST_{ij}\beta_7 + BORDER_{ij}\beta_8 + EA_{ijt}\beta_9 + EURO_{ijt}\beta_{10} + u_{ijt}^{k} \end{aligned}$$

We modify equation (1) by interacting the skilled/unskilled labour ratio with both the partners' GDPs per capita and the physical distance between partners. The first interaction crosses demand with supply factors. It can be read as representing differences in the skill endowment controlling for similar levels of quality consumption, or alternatively as representing differences in quality consumption for similar levels of skill endowment. The interaction of the skilled/unskilled labour ratio with distance proxies for knowledge spillovers that decrease with distance between countries and provides another reason why distance can negatively influence trade. The second specification is as follows:

$$(2)\quad \begin{aligned} TRADE_{ijt}^{k} &= POP_{it}\beta_1 + POP_{jt}\beta_2 + (GDPPC_{it} * HKPC_{it})\beta_3 + (GDPPC_{jt} * HKPC_{jt})\beta_4 + \\ &+ (DIST_{ij} * HKPC_{it})\beta_5 + (DIST_{ij} * HKPC_{jt})\beta_6 + BORDER_{ij}\beta_7 + EA_{ijt}\beta_8 + EURO_{ijt}\beta_9 + u_{ijt}^{k} \end{aligned}$$

An alternative to equations (1) and (2) is to replace the GDP per capita and the skilled/unskilled labour ratio of each country with the absolute value of the difference between them. To these variables we call respectively economic distance (ECDIST) and human capital distance (HKDIST). The impact of economic distance on trade is a test for intra versus inter-industry trade. Following the Linder (1961) hypothesis, in a world of intra-industry trade we expect countries with similar demand structures to trade more. As a consequence, if economic distance decreases trade we are in the presence of the intra-industry type, whereas if it increases trade then the inter-industry type is predominant. The impact of human capital distance on trade is a test for the HOS hypothesis according to which trade increases with differences in endowments. The modified models are as follows:

$$TRADE_{ijt}^{k} = POP_{it}\beta_1 + POP_{jt}\beta_2 + ECDIST_{ijt}\beta_3 + HKDIST_{t}\beta_4 + \\ + DIST_{ij}\beta_5 + BORDER_{ij}\beta_6 + EA_{ijt}\beta_7 + EURO_{ijt}\beta_8 + u_{ijt}^{k} \quad (3)$$

$$TRADE_{ijt}^{k} = POP_{it}\beta_1 + POP_{jt}\beta_2 + (ECDIST_{ijt} * HKDIST_{ijt})\beta_3 + \\ + (DIST_{ij} * HKDIST_{ijt})\beta_5 + BORDER_{ij}\beta_6 + EA_{ijt}\beta_7 + EURO_{ijt}\beta_8 + u_{ijt}^{k} \quad (4)$$

In specifications (1) and (2) we included the income levels and human capital endowments of each of the partner countries, either separately or interacted. Thus it matters *how much* of income and endowment each country has. In specifications (3) and (4) we consider the differences in income levels and human capital endowments, again separately or interacted. Now it matters *how different* countries are, irrespective of being richer or poorer, more or less endowed.

2.2 Estimation Results

We want to empirically test the predictions of the New Economic Geography (NEG) model in Marques and Metcalf (2003) by estimating equations (1)-(4). The model was built around three country groups – EU-North (N), EU-South (S) and EU-East (E) – that differ in the skill endowment as well as both spatial and non-spatial trade costs. In the model, N is a hub and has a higher skill endowment, this is, more skilled workers per capita, than the two peripheries S and E. Sectors also differ in their characteristics, namely economies of scale and skill-intensity. Thus using the two methods described above we run regressions for bilateral trade flows between the three possible pairs – North-East (N-E), North-South (N-S) and South-East (S-E) – for four groups of sectors distinguished by degree of economies of scale as in Pratten (1988) and skill-intensity as in Baldwin et al. (2000). These four groups are as follows: Chemicals, Machinery and Transport Equipment are high scale economies and high skill-intensive, Metals are high scale economies and low skill-intensive, Leather & Footwear, Minerals and Textiles & Clothing are low scale economies and low skill-intensive, and Wood Products are low scale economies and high skill-intensive. A full description of the data sources is provided in Appendix A.

Estimation of equations (1)-(4) is carried out through Random Effects GLS (allowing for first-order autocorrelation) and the Prais-Winsten regression with correlated Panel Corrected Standard Errors (PCSEs), which assumes that the disturbances are heteroskedastic (each country has its own variance) and contemporaneously correlated across countries (each pair of countries has their own covariance). On the whole the results are robust to the change in estimation method, the differences being mostly in the standard errors. In this section we present the coefficients and p-values obtained through each model specification for the PCSE errors and show identical data for the Random Effects GLS in Appendix B.[8] The PCSE regression coefficients and p-values are given in Tables 1 to 13 for the different country groups and sectors considered.[9]

[8] The complete estimation results may be obtained from the authors upon request.
[9] The coefficients and p-values shown are averages across model specifications in the case of variables common to more than one specification. For example, population and border are present in all four models and thus we take the average of the coefficients obtained in each of them.

As shown in Table 1, market size has on average a positive impact on trade. Strictly, we can talk of home market effects when trade increases more than proportionally with the home market size, this is, when the size coefficient is larger than one. The home market effect seems to be especially related to the sectoral degree of economies of scale, as home market effects tend to be higher in sectors with higher economies of scale. With respect to countries, we must distinguish centre-periphery from periphery-periphery trade. Home market effects are generally more important for EU-North than for either the Southern or Eastern peripheries, which would be expected given EU-North's position as centre. Two extremes are observable in periphery-periphery trade. On one hand, the two largest values occur in Eastern exports of products from high scale economies sectors to EU-South. On the other hand, size is mostly not significant for the south trade with the East, this is, Spain does not significantly trade more with the East than Portugal or Greece. This could be due to Spain's lower openness to trade in general that carries over to trade with the East.

Table 1: Home market effects

			High scale economies and high skill-intensity	High scale economies and low skill-intensity	Low scale economies and high skill-intensity	Low scale economies and low skill-intensity
N-E	N	Exports	1.190***	1.153***	1.144***	1.489***
		Imports	1.238***	1.562***	1.149***	1.123***
	E	Exports	1.409***	1.303***	0.931***	1.088***
		Imports	1.003***	1.110***	0.700***	0.890***
N-S	N	Exports	1.266***	1.495***	1.277***	1.276***
		Imports	1.229***	1.032***	0.997***	1.099***
	S	Exports	1.598	1.482***	0.938*	0.281**
		Imports	0.676	1.357***	1.025*	0.111
S-E	S	Exports	2.080	0.670*	1.123	0.663
		Imports	0.815	0.521	1.409*	1.100
	E	Exports	1.579***	1.695***	0.954***	1.009***
		Imports	0.841*	1.143***	0.469	0.962***

Note: *, ** and *** represent significance at respectively 10, 5 and 1%.

Our measure of income (GDP per capita) is positive and significant most of the time (Table 2). Thus richer countries tend to register a higher value of exports and imports. As argued before, income determines both the supply of and the demand for quality. Thus countries with higher income have the means to produce high quality products and also have a higher preference for quality products. As we control for size, which determines the volume of international trade, the income effects will determine mostly the prices of goods, which are a proxy for quality. As a consequence, we conclude that the quality of the goods traded also increases with the income of the trading partners. Interestingly, the most sizeable significant effects occur in EU-South's trade with both North and East. Thus, an increase in the income of countries like Greece, Portugal and Spain would substantially increase the

Table 2: Income effects

			High scale economies and high skill-intensity	High scale economies and low skill-intensity	Low scale economies and high skill-intensity	Low scale economies and low skill-intensity
N-E	N	Exports	2.132***	2.819***	1.753***	1.169
		Imports	1.338	1.681***	2.867***	1.236
	E	Exports	1.728***	1.264***	0.890***	0.687
		Imports	0.885***	0.958***	0.510***	0.532*
N-S	N	Exports	0.638*	1.775***	3.344***	1.334**
		Imports	1.203	0.450*	1.162**	1.728
	S	Exports	8.861***	0.561***	7.733***	4.022*
		Imports	3.912***	-0.219	2.867*	1.186
S-E	S	Exports	7.703	11.483***	7.394	9.298**
		Imports	4.195	4.652	6.416***	6.805
	E	Exports	1.553***	1.251***	1.488***	0.625
		Imports	1.063***	0.206	0.964***	0.711

Note: *, ** and *** represent significance at respectively 10, 5 and 1%.

quality of the products they trade with the rest of the EU. In addition, whereas for the centre size is a more important determinant of trade than income, exactly the opposite is true for the two peripheries, supporting the argument on the relevance of catching-up in boosting trade. Furthermore, by increasing the South's income the rest of the EU would benefit from a pull-through effect in trade.

Income effects are especially noticeable in sectors with high skill-intensity, as would be expected, though two of the highest mean coefficients show in sectors with low skill-intensity, more exactly in Southern exports to the East. The issue here would be one of product upgrading within the same sectors. As expected, income is generally not relevant in low scale economies, low skill-intensity sectors. In addition, income does not matter in determining trade in high scale economies, high skill-intensity in two instances. First, the imports of Northern countries from East and South do not depend on their incomes. This can be explained by thinking that the preference for quality depends on income. Thus, if the quality of imports is relatively low, all Northern countries would be equally driven to demand them, as the bottom quartiles of income are at a similar level and the top quartiles are the main responsible for overall income differences. The second case of insignificance relates to Southern trade with the East. Spain is simultaneously the largest and richest country in the Southern group. Thus the income and the size results are similar: Spain's size and income have not significantly enhanced its trade with the East during the 1990s with respect to Portugal and Greece.

Table 3: Endowment effects

			High scale economies and high skill-intensity	High scale economies and low skill-intensity	Low scale economies and high skill-intensity	Low scale economies and low skill-intensity
N-E	N	Exports	0.458**	0.114	1.170***	0.180
		Imports	0.793**	0.793***	1.191***	1.264
	E	Exports	1.120	0.433	0.814**	-0.117
		Imports	1.621***	1.036***	1.060***	1.145
N-S	N	Exports	0.665	0.367	0.127	-0.028
		Imports	0.754	0.821***	0.654***	0.463
	S	Exports	-2.616***	0.154	-3.024***	-2.527***
		Imports	-0.671**	-0.272	-0.230	-0.623*
S-E	S	Exports	-0.554***	0.684	0.904	0.669
		Imports	-0.473	-1.130	0.682	-0.971
	E	Exports	0.592**	1.762*	0.286	-0.431
		Imports	1.202	-0.228	1.336*	0.850

Note: *, ** and *** represent significance at respectively 10, 5 and 1%.

Human capital endowments would be expected to influence trade as follows: countries relatively abundant in human capital are expected to be net exporters of skill-intensive goods and countries relatively poor in human capital are expected to be net importers of such goods. In Table 3, the magnitude and significance of the endowment effects are more related to the countries involved than to the sectoral skill-intensity, though endowments are particularly important for high skill-intensity sectors. On average, human capital endowments *increase* trade for the North and East but *decrease* trade for the South. This is in line with the empirical observation that the CEECs are better endowed with human capital than EU-South and as a consequence have the potential to gain competitiveness in high skill-intensive sectors (or more skill-intensive products within low skill-intensive sectors). In addition, the most sizeable (negative) coefficients occur in Southern exports to the North. This situation translates a different type of relationship between the centre and each of the peripheries: Eastern human capital endowments increase imports from the North, but Southern human capital endowments actually *decrease* Southern exports to the North. This happens in sectors that represent over 2/3 of the exports of Greece, Portugal and Spain and it is evidence pointing to a South-North trade based on the

absence of human capital in the South, with the South supplying the North with products at the bottom of the quality ladder, which apparently is in the North's interest, as these are also low-priced goods, thus serving the interests of both consumers and producers in the North. An increase in human capital in the East may increase imports from the North also through both supply and demand links: if the East has more human capital, both firms and consumers will be more demanding, and it will import higher quality, more highly priced inputs and final products from the North.

While endowments *per se* perform poorly, their interaction with income levels has a significantly positive effect on trade (Table 4). For similar endowments wealth makes a difference, or put differently, for similar levels of income endowments are important. Thus income and endowments are relevant when we talk about countries that are similar in one of the dimensions. This is an important result, as it shows that low-income countries may have difficulty in turning potential comparative advantages into effective comparative advantages. The issue is certainly topical in transition economies undergoing rapid structural change. Moreover, in centre-periphery trade income effects are amplified by endowments, but the endowment weighing actually reduces the income effects in periphery-periphery trade. Thus, when compared to Table 2, weighted income effects tend to be higher for the most well endowed partner (North in North-East trade or East in South-East trade). For North-South trade the endowment weighting actually reduces the income effects, showing that this trade is more determined by income than by endowments and reinforcing the conclusions on the negative effect of human capital endowments on Southern trade. The weighted income effects are least significant in low scale economies, low skill-intensity sectors, in accordance with the low skill content and price of these goods. The effects are consistently significant across sectors for Northern and Southern exports to the East. When different human capital endowments are accounted for, an increase in income increases exports to the East by over twice as much in the case of North and over three times as much in the case of South.

Table 4: Income effects (endowment-weighted)

			High scale economies and high skill-intensity	High scale economies and low skill-intensity	Low scale economies and high skill-intensity	Low scale economies and low skill-intensity
N-E	N	Exports	2.411***	2.502***	2.670***	2.016***
		Imports	1.492***	1.701***	2.386***	1.500*
	E	Exports	1.694***	1.263***	0.925***	0.678
		Imports	0.889***	0.953***	0.501***	0.509
N-S	N	Exports	0.504	1.805***	3.245***	1.316**
		Imports	0.682	0.456*	0.620	1.462
	S	Exports	0.935	1.028***	1.478*	-0.300
		Imports	1.684**	-1.019**	-0.983	0.792
S-E	S	Exports	3.576***	3.321***	4.107***	3.156**
		Imports	1.368	3.976***	1.933***	1.318
	E	Exports	1.722**	1.147***	1.643***	0.885
		Imports	1.249***	0.488	1.094***	0.890**

Note: *, ** and *** represent significance at respectively 10, 5 and 1%.

The interaction of human capital with distance, which proxies for knowledge spillovers, has an average negative effect on trade (Table 5). As would be expected proximity is important for sharing knowledge and the capacity to do it tends to decrease with distance. Interestingly, while the East seems to benefit from knowledge spillovers from the North, there are no significant spillover effects from trade with the South. Again this is in line with the argument that the East is well endowed in human capital and thus would be able to absorb the technological content of traded goods. There seems to be technology embodied in imports from the North, but not in imports from the South. This is because the South is poorly endowed with human capital. However, the spillovers are significant in Southern exports to both North and East, in all sectors except low scale economies, low skill-intensity. This can be better explained as the effect of distance after controlling for endowments: distance decreases Southern exports in both Northern and Eastern markets and can be seen as a major disadvantage for the South.

Table 5: Spillover effects

			High scale economies and high skill-intensity	High scale economies and low skill-intensity	Low scale economies and high skill-intensity	Low scale economies and low skill-intensity
N-E	N	Exports	-1.502	-1.601*	-1.976***	-2.136***
		Imports	-0.631	-2.360	-1.045***	-0.412
	E	Exports	-1.349	-0.049*	-0.018	-0.843*
		Imports	-0.268	0.432	-0.056	0.081
N-S	N	Exports	-1.799	-1.743*	-2.833***	-1.266
		Imports	-0.980	-3.665	1.054	-0.518*
	S	Exports	-1.164*	0.499*	-3.603***	-1.494
		Imports	-0.116	0.786	1.321	-1.324
S-E	S	Exports	-3.195***	-1.519	-2.733***	-1.606
		Imports	-1.638***	-5.153***	-0.859	-1.555
	E	Exports	-0.631**	0.992	-0.626	-0.395
		Imports	0.912	0.667	0.770	0.882

Note: *, ** and *** represent significance at respectively 10, 5 and 1%.

The results also provide a test of Linder's hypothesis according to which countries with similar demand structures trade more when trade is intra-industry and trade less when trade is inter-industry. The answer is provided by the economic distance variable, defined as the absolute difference in the partners' GDPs per capita. Hence this variable measures income differences and these proxy for differences in demand structures.

Table 6: Economic distance effects

		High scale economies and high skill-intensity	High scale economies and low skill-intensity	Low scale economies and high skill-intensity	Low scale economies and low skill-intensity
N-E	Exports	1.711**	1.688***	1.335***	0.756
	Imports	0.643	0.890**	1.751***	0.633
N-S	Exports	0.384***	0.363***	0.585***	0.474***
	Imports	0.488***	0.183***	0.098	0.309
S-E	Exports	-0.831	0.384	-0.261	-0.352
	Imports	-2.021***	-1.249***	-0.804***	-1.120

Note: *, ** and *** represent significance at respectively 10, 5 and 1%.

In Table 6, we can clearly distinguish the impact of economic distance on trade between EU-North and both EU-South and the CEECs, on one hand, and trade between EU-South and the CEECs, on the other hand. The impact on centre-periphery trade is positive and mostly significant, except for low scale economies, low skill-intensity sectors, meaning that differences in income actually *increase* North-South and North-East trade. This is in accordance with a centre-periphery pattern as described in the new economic geography theory. Assuming that wages form the larger part of income, lower incomes represent lower wages and thus lower production costs, which act as an incentive for firms to locate in peripheries. On the contrary, this logic

does not totally apply to trade *between* peripheries, as income differences are *negatively* related to trade, though only significantly for EU-South's imports from the East. Income differences are not significant for Southern exports to the East. However, comparing Table 6 with Table 2, we can see that the income of the exporter is important, except in high scale economies, high skill-intensity sectors. Thus wealthier Southern countries would export more, though not necessarily to wealthier Eastern countries. Again a quality argument may be provided: if exports are low quality, they will be demanded by the lower income quartiles and thus that demand is less affected by increases in overall income.

If we think of the effect of economic distance on trade as a test for inter versus intra-industry trade, then North-East and North-South trade would be mainly inter-industry, whereas South-East trade would follow a more mixed pattern, with intra-industry trade predominating on the import side. Rice et al. (2002) present a recent study of the impact of similarities in production and demand on intra-industry trade. They conclude that proximity increases intra-industry trade because neighbouring countries produce and demand a similar mix of products. However, the concept of "proximity" should be seen more in an economic than physical way. Our results provide a good justification. Though North is physically closer to South and East, South and East are economically closer to each other. As a consequence, intra-industry trade is stronger between the peripheries than in centre-periphery trade.

Not only the human capital endowment of each country group is of interest, but also the endowment differences, proxied by the absolute difference in human capital endowments of the partner countries (Table 7). The significance of differences in endowments can be seen as a test, even if weak, of the HOS model, especially when the information on factor endowments is crossed with information on factor intensity. Our results do not validate the HOS model with respect to human capital endowments and skill-intensities in the European countries analysed as endowment differences are on the whole not significant nor do they show any consistent pattern.

Table 7: Differences in endowments effects

		High scale economies and high skill-intensity	High scale economies and low skill-intensity	Low scale economies and high skill-intensity	Low scale economies and low skill-intensity
N-E	Exports	-0.022	0.067*	-0.034	-0.034
	Imports	-0.092	-0.138***	0.100*	-0.057
N-S	Exports	0.019	0.015	-0.003	-0.004
	Imports	0.070	-0.004	0.112*	0.115
S-E	Exports	0.161	-0.117	0.133	0.287*
	Imports	0.363	0.074	0.177	0.258

Note: *, ** and *** represent significance at respectively 10, 5 and 1%.

The differences in endowments per se do not influence trade, but their interactions either with economic (Table 8) or physical distance (Table 9) do. The weighting introduces two major changes in the economic distance effects. First, the negative sign almost disappears from South-East trade, and the effect becomes significantly positive for high scale economies, low skill-intensity sectors. Second, the effect becomes significant for North-East trade in low scale economies, low skill-intensity sectors. This is an important finding, as it helps explaining the apparent contradiction between the celebrated abundance of human capital in the CEECs and their specialisation in low skill-intensity sectors during the 1990s. This specialisation was induced by their low income level, not by their endowments and thus, as incomes start rising, the importance of endowments will increase.

Table 8: Economic distance effects (differences-in-endowments-weighted)

		High scale economies and high skill-intensity	High scale economies and low skill-intensity	Low scale economies and high skill-intensity	Low scale economies and low skill-intensity
N-E	Exports	1.784***	2.016***	2.006***	1.741***
	Imports	1.212***	1.542***	1.320***	1.229***
N-S	Exports	0.394***	0.428***	0.822***	0.593***
	Imports	0.495***	0.173***	0.093	0.376
S-E	Exports	-0.048**	0.792*	0.419	1.089
	Imports	-0.048	2.151***	0.448	0.144**

Note: *, ** and *** represent significance at respectively 10, 5 and 1%.

As the differences in endowments are not significant, their interaction with distance follows essentially the behaviour of the latter in terms of significance of the effects. The role of endowment differences is mostly to correct the magnitude of the distance effect. This correction is generally downwards (cf. Table 10) as differences in endowments provide a motive for trade in spite of the distance by compensating higher transport costs with lower production costs. When we control for endowments, distance becomes less important as the former provide another motive for trade. Thus if the advantage in endowments is strong enough it may compensate for a disadvantage in market access.

Table 9: Distance effects (differences-in-endowments-weighted)

		High scale economies and high skill-intensity	High scale economies and low skill-intensity	Low scale economies and high skill-intensity	Low scale economies and low skill-intensity
N-E	Exports	-1.794***	-1.973***	-2.091***	-1.815***
	Imports	-1.350***	-1.754***	-1.197***	-1.330***
N-S	Exports	-0.395***	-0.389***	-0.805***	-0.646***
	Imports	-0.405	-0.191***	-0.034	-0.297
S-E	Exports	-0.197**	-1.051**	-0.711*	-0.967
	Imports	0.088	-2.285***	-0.737***	-0.227***

Note: *, ** and *** represent significance at respectively 10, 5 and 1%.

One of the features of our theoretical model was the distinction between spatial and non-spatial trade barriers. In the empirical specification, distance and borders make up spatial barriers whereas the Europe Agreements and EURO dummies constitute non-spatial trade barriers, or their degree of removal through economic integration. The distance variable is on the whole significantly negative: trade tends to decrease with distance as distance increases transport costs. The distance effect tends to be higher in South-East trade as these countries are peripheries located far apart

Table 10: Distance effects

		High scale economies and high skill-intensity	High scale economies and low skill-intensity	Low scale economies and high skill-intensity	Low scale economies and low skill-intensity
N-E	Exports	-1.708***	-2.046***	-2.316***	-2.295***
	Imports	-1.594**	-2.052***	-0.903**	-1.511***
N-S	Exports	-1.145***	-0.133	-0.305	-2.553***
	Imports	-0.458	-0.665***	-1.615***	-1.339
S-E	Exports	-2.429***	-1.591**	-2.368***	-1.147
	Imports	-2.035	-3.507***	-2.163***	-2.003

Note: *, ** and *** represent significance at respectively 10, 5 and 1%.

and with poor transport infrastructures. An increase in distance decreases trade between the two peripheries by up to 3.5 times as much. Even though the distance effects are very negative for the peripheries, Table 9 shows that they are substantially reduced when we control for differences in endowments. If we interpret this as the consequence of poor quality infrastructures with respect to the North, there is still a role for policies of infrastructure improvement that will decrease the market access gap between the EU's centre and its peripheries. In addition, an increase in distance decreases Northern exports of products from low scale economies, low skill-intensity sectors by more than twice as much. Data on sectoral transport costs would be necessary to evaluate the sectoral impact of distance more precisely.

The other component of spatial trade barriers is the existence (or not) of a common border. There is a large literature on border effects, according to which countries that share a common border trade more. In our Random Effects results there are no significant border effects. However, in our PCSE results we can identify some sectoral significance, especially in Southern exports to the North. The difference is related to the clustering effects in the PCSE method, whereby the covariances are country pair specific. An interesting argument is put forward by Davis (2000) according to which product differentiation tends to reduce the magnitude of the border effect, these being strongest within homogeneous goods categories. As we deal only with manufacturing industry, we can expect products to be differentiated and thus border effects to be insignificant. More research would be necessary on this issue.

Table 11: Border effects

		High scale economies and high skill-intensity	High scale economies and low skill-intensity	Low scale economies and high skill-intensity	Low scale economies and low skill-intensity
N-E	Exports	0.040*	0.169	-0.426	-0.041
	Imports	0.810	0.088	1.524***	0.703
N-S	Exports	0.154	0.048	0.417	-0.437
	Imports	0.431	0.315*	0.818***	0.261*
S-E	Exports	1.496	1.525	1.935*	2.300
	Imports	1.157	-0.228	1.769	1.382*
Note: *, ** and *** represent significance at respectively 10, 5 and 1%.					

The removal of non-spatial trade barriers under economic integration is proxied by the Europe Agreements and the adoption of a single currency. The Europe Agreement effect (Table 12) applies only to the North-East and South-East pairs and the EURO effect (Table 13) applies only to the North-South pair. On the whole, the Europe Agreements have increased East-West trade and the effects are generally higher in the South-East than in the North-East pair. In both cases it seems that the Europe Agreements have been especially beneficial for trade in high scale economies sectors. Moreover, they have not affected Eastern exports to the South in high scale economies sectors.

Table 12: EA effects

		High scale economies and high skill-intensity	High scale economies and low skill-intensity	Low scale economies and high skill-intensity	Low scale economies and low skill-intensity
N-E	Exports	0.684***	0.828***	0.621***	0.585***
	Imports	0.572*	0.298	0.426***	0.544***
S-E	Exports	1.255***	1.029***	1.207***	0.699
	Imports	0.280	-0.028	0.694***	0.745**
Note: *, ** and *** represent significance at respectively 10, 5 and 1%.					

Finally, being a Euro zone country does not have an effect on trade among the countries analysed, though again the impact on high-skill sectors tends to be higher.[10] This result is in contrast to that of Rose (2000), who found a very large, significant and robust trade effect of currency unions. However, Persson (2001) argued that Rose's result is due to systematic selection into common currencies of country pairs with peculiar characteristics and suggests an alternative methodology that substantially increases uncertainty around the impact of currency unions on trade. Melitz (2001) adds to the argument by considering the effects of forming a currency union on third countries. The idea is that the Euro brings a benefit not just for the Eurozone countries but for those like the UK, who opted out, as in their trade with the Eurozone countries they now deal with just one currency. In our case the magnitude of the standard errors renders the Euro effect on the whole not significant in trade between EU-North and EU-South. This should not be made a case against the Euro. It simply means that Greece, Portugal and Spain have not significantly exported nor imported more from EU-North countries that have adopted the Euro relatively to those who have not. The externality argument can help in explaining this: if a country like the UK has also benefited from the single currency even though it does not participate, then there would be no discernible advantage for trade of Euro and non-Euro EU members. This happens not because the Euro is not beneficial, but because it benefits all countries, even those not participating.

Table 13: EURO effects

		High scale economies and high skill-intensity	High scale economies and low skill-intensity	Low scale economies and high skill-intensity	Low scale economies and low skill-intensity
N-S	Exports	0.138	0.166	0.078	0.122
	Imports	0.267	-0.037	0.184	0.056
Note: *, ** and *** represent significance at respectively 10, 5 and 1%.					

3 Sectoral Trade Potentials

3.1 Methodology

The most widely used empirical methodology for predicting potential East-West trade flows is based on the gravity model and develops in two steps. First, a bilateral gravity equation is estimated for a reference sample, say OECD countries. Second, this equation is used to simulate trade between sample and non-sample countries, say the EU and CEECs. These out-of-sample predictions thus assume that the OECD or EU-15 coefficients can be applied to the CEECs. We follow the two-step methodology by estimating a gravity model and using the estimated coefficients to predict levels of trade. However, our study differ from this traditional set-up in that we conduct an in-sample prediction as we assume that the 1990s coefficients for trade between the CEECs and both EU-North and EU-South can be used to predict the future levels of trade of each of these country pairs. Thus we compute trade potentials between each pair of country groups using the coefficients estimated for that same pair. Our methodology simultaneously recognises the structural differences in the determinants of trade patterns and assumes that the 1990s are good indicators of the determinants of trade patterns in the next decade.

[10] When we use Random Effects GLS, the EURO effect is significant for Northern exports of high scale economies, high skill-intensity products, though the coefficient is around 0.2.

The trade potentials method has been widely applied to EU-CEECs trade with contradictory results. On one hand, Havrylyshyn and Pritchett (1991), Hamilton and Winters (1992), Winters and Wang (1992, 1994), Baldwin (1994), Buch and Piazolo (2000) found that actual EU-CEECs trade was still below potential. On the other hand, Gros and Gonciarz (1996), Schumacher (1997), Festoc (1997), Vittas and Mauro (1997), Maurel and Cheikbossian (1998), Fontagne et al. (1999), Nilsson (2000) found that actual EU-CEECs trade was already above potential, following an "overshooting" reaction to the Europe Agreements. The divergence in empirical results is due mainly to the data used and the econometric methodology. First, the use of pre-transition data overestimated the trade potential. As an example, Gros and Gonciarz (1996) and Nilsson (2000) updated Baldwin (1994) projections by replacing pre-transition with post-transition GDP data and found that actual trade would come very close to potential trade or even exceed it. The argument is that the East is already relatively open, so that trade expansion will be due mostly to income catching-up. Second, the main shortcoming of the econometric methodology is the general use of cross-section instead of panel data, since in bilateral gravity models only panel estimation produces unbiased results, as shown by Matyas (1998, 1997), Breuss and Egger (1999). These econometric problems, together with the use of pre-transition data, render unreliable many of the widely cited earlier estimates.

Several other studies improved the analysis in different directions, either by using only EU and CEEC data to compute the gravity parameters (Fidrmuc 1998, Buch and Piazolo 2000), or by modifying the gravity model in various ways. First, by assuming the form of Bergstrand's generalised gravity equation instead of the Linnemann model (Festoc 1997). Second, by incorporating Krugman's (1991) assumption that proximity increases trade because it decreases transport costs (Maurel and Cheikbossian 1998). Third, by applying the gravity equation to vertically differentiated products (Fontagne et al. 1998). Finally, by incorporating both geographical and economic distances (Vittas and Mauro 1997, Fontagne et al. 1999). Both studies conclude that the main determinant of East-West trade is geographical distance. In addition, Nilsson (2000) is the only study after Baldwin (1994) that computes potential trade with the East for each of the EU-15 countries. All other studies look exclusively at East-North trade, concluding that the highest gains accrue to Germany. This happens because East-West trade patterns reflected basically geographical proximity, so that the South would in fact not trade much with the East despite having a higher trade potential.

The first step in computing trade potentials between the EU-25 countries, this is, the estimation of equations (1)-(4), was described in Section 2. The second step is to substitute the coefficient values back into the equations and to formulate alternative hypotheses regarding the migration and no migration scenarios. The left-hand side values obtained will then correspond to the sectoral trade potentials for each scenario.

In previous work (Marques and Metcalf 2003) two extreme scenarios were compared. In the first one, the CEECs become members of the EU but free movement of labour is not applied. It was shown that the integrating periphery will attract firms from the centre in the absence of migration, but the increased demand for labour will drive up real wages and thus when trade costs are low enough the flow of firms is reversed. Labour immobility prevents real wage equalisation, but the difference is low enough for firms to locate in the centre instead. In the second scenario, the CEECs will benefit from free trade as well as free movement of labour. In the model unskilled labour remains immobile and it is skilled labour that migrates from East to West. As a consequence, firms no longer relocate in EU-East. The flow of Eastern skilled workers stops as

real wages are equalised. More workers in EU-North and EU-South create demand for goods, driving up prices, and increase supply of labour, driving down nominal wages. This mechanism would be more accentuated in EU-North, as most migrants would relocate there. At the same time, fewer workers in EU-East drive down prices and drive up nominal wages. The consequence would be total income convergence, if migration were to be perfectly free.

In the present paper these scenarios will be made less extreme through a number of simplifying assumptions. One of them is common to the two scenarios: no country will adopt the Euro in the next ten years. The remaining assumptions mark the difference between the migration and no migration scenario. In the no migration scenario we further assume that GDP, population and the human capital endowment will keep following the current trends. Hence migration is not necessarily equal to zero, but the enlargement does not imply a single labour market, this is, the current restrictions will continue to apply, at least during the next ten years. This scenario is plausible if the current EU members in fear of mass migration decide to isolate their labour markets from Eastern migrants. There is, however, some income convergence, to the extent that growth rates in the East are higher than in the West.

Alternatively, if free mobility of labour is legally allowed, we incorporate in the current trends the projections for East-West migration provided by Boeri and Brucker (2000) and Weise et al. (2001), modifying the projected values of population and human capital endowments in the EU-25 accordingly. In particular, population and the human capital endowment would increase in the North and to a lesser extent in the South, simultaneously decreasing in the East. The change in the human capital endowment is the same as the change in population as in our projection we follow our theoretical model by considering only migration of skilled labour. De Melo et al. (2002) provide a rationale for thinking of Eastern migration as one of skilled labour. On one hand, Germany has recently implemented a migration policy relying explicitly on skill criteria and, given the Commission's recommendation, it is likely that other EU countries follow a similar strategy. On the other hand, after the enlargement the guest-worker policies and temporary migration schemes being applied to CEECs workers will have to be abandoned. This is of extreme importance, as although Eastern migrants are highly skilled these policies channel them into occupations with low skill requirements (Boeri and Brucker 2000). Furthermore, the possibility of matching between skill endowment and job requirement will be extended not just to the incoming migrants but also to those who have already migrated to the EU, who will be able to upgrade from low skill to high skill activities. Therefore, if the enlargement involves free migration, Eastern skilled workers will be competing with Western skilled workers and not with the unskilled ones as has been happening in the last ten years of transition. However, though migration would be higher with a single labour market, increasing the speed of income convergence, it would not be such as to lead to full equalisation of real wages, at least in the next decade.

In what follows we present and discuss the prediction results under the migration and no migration scenario, as well as the sectoral impact of allowing for participation of the new member countries in a true Single Market.

3.2 Prediction Results

The predicted values of trade between the North-East, North-South and South-East pairs, in both the migration and no migration scenarios, were computed for each of the regression coefficients obtained through the Random Effects GLS and the Prais-Winsten with PCSEs for the four different specifications of the model. The PCSE structure incorporates the assumption that the disturbances are heteroskedastic (each country has its own variance) and contemporaneously correlated across countries (each pair of countries has its own covariance). This assumption seems to be especially suited for any study involving transition economies. As the predictions obtained are similar for the two methods, in this section we present the predicted values for the PCSE coefficients and show identical data using Random Effects GLS coefficients in Appendix B.

Regarding the four different specifications of the model, we present only the predictions using the coefficients from Model 1 and 3.[11] These results are very similar to those coming out of respectively Models 2 and 4 as these replace incomes (or their difference), endowments (or their difference) and distances with interaction variables. The reason is that the effects of the interaction variables simply represent the sum of effects of its components, thus not substantially altering the predicted values. Model 1 represents the level impact of absolute incomes and endowments whereas Model 3 provides a differences effect of relative incomes and endowments. In the first we measure how rich or well-endowed countries are. In the second we look at how different in incomes and endowments countries are. In general Model 1 generates higher trade potentials than Model 3. Which value would be closer to the truth depends on the relative importance of levels or differences. As econometrically it is not possible to blend Models 1 and 3 into a single one due to collinearity, their relative importance in determining trade would vary across country pairs and a country analysis would be necessary to draw further conclusions. The predicted bilateral trade flows using the coefficients from Models 1 and 3 may however be seen as respectively an upper and a lower bound for North-East (N-E), North-South (N-S) and South-East (S-E) flows. These are shown in Table 14.

Countries have two main characteristics that influence the location of sectors: market access and human capital endowments. First, in the presence of trade costs, sectors with high scale economies would locate preferentially in countries with better market access, and thus these would be net exporters of such goods. As the hub, the EU-North group

Table 14: Predicted bilateral trade flows in 2010 (millions USD)

			N-E		N-S		S-E	
			Model 1	Model 3	Model 1	Model 3	Model 1	Model 3
No migration	High scale economies and high skill-intensity	Exports	176.191	70.61	1375.439	689.523	32.48	3.445
		Imports	33.475	13.086	375.479	162.949	8.804	1.865
	High scale economies and low skill-intensity	Exports	16.289	7.518	99.616	96.363	15.429	0.915
		Imports	10.880	6.546	51.133	42.671	3.841	0.933
	Low scale economies and high skill-intensity	Exports	2.877	1.626	26.715	9.152	1.597	0.105
		Imports	10.438	5.217	7.149	5.774	1.316	0.157
	Low scale economies and low skill-intensity	Exports	23.799	12.019	91.255	84.406	8.799	1.44
		Imports	34.039	22.128	120.49	146.074	7.53	1.334
Migration	High scale economies and high skill-intensity	Exports	175.270	70.53	1395.387	691.011	32.208	3.412
		Imports	33.588	13.074	374.955	163.156	8.517	1.809
	High scale economies and low skill-intensity	Exports	16.123	7.496	100.807	96.596	15.393	0.921
		Imports	11.138	6.554	52.813	42.78	3.731	0.929
	Low scale economies and high skill-intensity	Exports	2.962	1.625	26.665	9.166	1.576	0.104
		Imports	10.764	5.200	7.148	5.775	1.313	0.155
	Low scale economies and low skill-intensity	Exports	24.251	12.003	90.218	84.533	8.773	1.431
		Imports	35.399	22.082	119.978	145.988	7.523	1.324

[11] The complete prediction results may be obtained from the authors upon request.

has the best market access. In fact, the Southern and Eastern peripheries trade more with EU-North than with each other. In particular, the North countries are the main exporters of goods in sectors with high economies of scale. Second, sectors with high skill-intensity would locate in countries with a high skill endowment and these would be net exporters of such goods. Our results are in accordance with the widely accepted view that EU-East would have a higher endowment of skilled labour than the South and thus it would be more competitive than EU-South in skill-intensive goods. They also support the idea that the peripheral countries should specialise in low scale-economies sectors. In fact, Table 14 shows that the only sectors where the peripheries would have a surplus in trade with the North are those with low scale economies and either low skill-intensity (South) or high skill-intensity (East). The distortion suffered by Eastern trade in the 1990s and its long-lasting effects are also apparent from Table 14, as the CEECs would keep a surplus vis-à-vis EU-North in sectors with low scale economies and low skill-intensity.

Overall, EU-East would register a trade deficit with respect to both EU-North and EU-South as the surplus in some sectors would not be high enough to compensate the deficit in others. Interestingly, the surplus sectors differ with the trading partner. With EU-North, surplus would exist in all low scale economies sectors, whether low or high skill. This proves that location can be more important than endowments. With EU-South, the surplus would exist in only Wood Products (low scale economies, high skill-intensity) without migration and also in Metals (high scale economies, low skill-intensity) if there were migration. This result carries a very important message for the CEECs: outward migration of skilled labour shifts their comparative advantage towards low-skill sectors away from high-skill sectors. Another important outcome exists for EU-South: even in an enlarged EU-25, the traditional comparative advantage in low scale economies, low skill-intensity sectors such as Leather&Footwear and Textiles&Clothing can be kept. In these sectors, the South would keep a surplus in trade with both North and East, and it would still be a higher net exporter of these products to the North than the East would.

In order to look more explicitly at the effects on the trade balances of each country group we construct Table 15. This Table is built from Table 14 by row subtraction of imports to exports for each sector, thus obtaining the next exports represented in Table 15. The previous conclusions are reinforced. First, the North has a surplus in all sectors except in low scale economies, low skill-intensity. Second, the South has a deficit in all sectors except in low scale economies, low skill-intensity. Finally, the North/South symmetry is broken by the presence of the East, with deficits in high scale economies sectors and surpluses in low scale economies sectors. Thus even after the CEECs have become members of the EU, it seems that the human capital endowment does not prevail over market access. On the contrary, trade between EU-North and EU-

Table 15: Predicted intra-EU net exports by country blocs in 2010 (millions USD)

		North		South		East	
		Model 1	Model 3	Model 1	Model 3	Model 1	Model 3
No migration	High scale economies and high skill-intensity	1142.675	584.097	-976.284	-524.994	-166.391	-59.103
	High scale economies and low skill-intensity	53.892	54.664	-36.894	-53.71	-16.998	-0.954
	Low scale economies and high skill-intensity	12.005	-0.212	-19.286	-3.43	7.281	3.642
	Low scale economies and low skill-intensity	-39.475	-71.777	30.504	61.774	8.971	10.003
Migration	High scale economies and high skill-intensity	1162.113	585.31	-996.741	-526.252	-165.372	-59.059
	High scale economies and low skill-intensity	52.98	54.758	-36.333	-53.823	-16.647	-0.935
	Low scale economies and high skill-intensity	11.716	-0.184	-19.255	-3.441	7.539	3.626
	Low scale economies and low skill-intensity	-40.907	-71.534	31.009	61.562	9.898	9.971

South seems to be equally related to endowments and market access. Our results come as a support of Davis's (2000) call for the use of hybrid theories in explaining trade patterns. Our specifications bear such hybrid character between the more traditional trade theory based on endowments and the new economic geography based on economies of scale and transport costs.

Our results are not directly comparable with those of any previous study on trade potentials. First, to the best of our knowledge this paper is the first to compare trade potentials within an enlarged EU for the migration and no migration scenarios. We do this using an extended gravity model that incorporates human capital, either by itself or interacted with distance and income. Second, the scope in terms of number of countries and sectors is also wider than that of previous studies. Country studies are, for example, Cadot and Melo (1996), looking at France and Mastropasqua and Rolli (1994), looking at the Visegrad countries (Poland, ex-Czechoslovakia and Hungary). Examples of sectoral studies are Corado (1994), studying the textiles and clothing sector, Rollo and Smith (1993) and Vittas and Mauro (1997) studying the sensitive sectors (metals, chemicals, textiles and clothing, leather and footwear, agriculture and food processing) and Fidrmuc (1998) looking at SITC one-digit groups between EU-6. Though none of these studies is as comprehensive as ours, we are able to generalise their results. We also find that integration, whether a customs union or a single market, may have much higher effects on specific sectors than suggested by aggregate trade flows, and have shown how different the results are across sectors.

3.3 Migration Effects

In this paper we are especially interested in the trade impact of freely allowing skilled workers from EU-East into Western labour markets. Using the values in Tables 14 and 15, we subtract the no migration to the migration potentials of each sector and country group for exports and imports. We further sum the values for all sectors and add the net exports effect that results from subtracting the imports effect to the exports effect. The net migration effects on bilateral flows are given in Table 16 and those on country groups are given in Table 17.

We would expect the brain drain caused by outward migration of skilled labour to decrease the East's net exports and simultaneously increase the West's net exports of high skill-intensive goods. This effect would be larger for EU-North as most Eastern brains would relocate there. However, Table 16 shows a somewhat different picture. In terms of

Table 16: Migration effects on bilateral flows (millions USD)

		N-E		N-S		S-E	
		Model 1	Model 3	Model 1	Model 3	Model 1	Model 3
High scale economies and high skill-intensity	Exports	-0.921	-0.08	19.948	1.487	-0.272	-0.032
	Imports	0.113	-0.012	-0.523	0.207	-0.287	-0.056
	Net exports	-1.034	-0.068	20.471	1.281	0.015	0.023
High scale economies and low skill-intensity	Exports	1.026	0.212	1.643	0.117	0.148	0.004
	Imports	1.937	0.118	1.082	0.23	-0.202	-0.015
	Net exports	-0.912	0.094	0.561	-0.113	0.35	0.019
Low scale economies and high skill-intensity	Exports	0.085	-0.001	-0.05	0.013	-0.02	-0.001
	Imports	0.325	-0.017	-0.001	0.001	-0.003	-0.002
	Net exports	-0.24	0.016	-0.049	0.012	-0.017	0.001
Low scale economies and low skill-intensity	Exports	0.452	-0.015	-1.037	0.127	-0.027	-0.008
	Imports	1.359	-0.046	-0.512	-0.086	-0.512	-0.086
	Net exports	-0.907	0.031	-0.525	0.212	0.485	0.077
All sectors	Exports	0.642	0.115	20.505	1.744	-0.171	-0.037
	Imports	3.735	0.042	0.045	0.352	-1.004	-0.158
	Net exports	-3.093	0.073	20.46	1.392	0.833	0.12

flows, the most sizeable change occurs in the North-South direction, with the North increasing its exports of high scale economies, high skill-intensity sectors to the South in up to 25 million USD. Thus migration of skilled workers from the East into mainly the North reinforces the latter's position as a hub and creates trade with the South. This makes of the high scale economies, high skill-intensity sectors (Chemicals, Machinery and Transport Equipment) those with the most sizeable effects as they capture both the market access and the endowments advantages of the North.

This result carries over to Table 17 and also explains why the North registers the largest gains and the South suffers the greatest losses, as the South lacks either a market access or an endowment advantage. The East is in an intermediate position, with a weak market access but well endowed in skilled labour. As firms and workers agglomerate in EU-North, which includes the larger markets, the majority of production will be consumed locally instead of exported using mostly locally produced inputs instead of relying on imports. Note that we are dealing with relatively small migration forecasts. The following effects of migration on trade would be actually amplified by East-West migration. First, the North increases its net exports with migration, as would be expected, but the South even suffers a *reduction*. Second, the East manages to *increase* its net exports, even if marginally. Thus the largest net gains of allowing the East to participate in a full-fledge Single Market accrue to the North, whereas the South registers a net loss.

Table 17: Migration effects on country groups (millions USD)

		North		South		East	
		Model 1	Model 3	Model 1	Model 3	Model 1	Model 3
High scale economies and high skill-intensity	Exports	19.027	1.407	-0.795	0.175	-0.174	-0.068
	Imports	-0.411	0.194	19.662	1.432	-1.193	-0.112
	Net exports	19.438	1.213	-20.457	-1.257	1.019	0.044
High scale economies and low skill-intensity	Exports	1.026	0.212	1.643	0.117	0.148	0.004
	Imports	1.937	0.118	1.082	0.23	-0.202	-0.015
	Net exports	-0.912	0.094	0.561	-0.113	0.35	0.019
Low scale economies and high skill-intensity	Exports	0.036	0.012	-0.021	0.001	0.322	-0.019
	Imports	0.324	-0.016	-0.053	0.012	0.065	-0.002
	Net exports	-0.289	0.028	0.031	-0.011	0.257	-0.016
Low scale economies and low skill-intensity	Exports	-0.585	0.112	-0.539	-0.094	1.352	-0.056
	Imports	0.847	-0.132	-1.044	0.117	0.425	-0.024
	Net exports	-1.432	0.243	0.505	-0.211	0.927	-0.032
All sectors	Exports	19.504	1.743	0.287	0.198	1.649	-0.138
	Imports	2.698	0.165	19.647	1.79	-0.906	-0.153
	Net exports	16.805	1.578	-19.36	-1.593	2.554	0.015

4 Conclusions

In this paper we have estimated a sectoral gravity model for trade between three regional blocs of the enlarged EU that we defined as North, South and East. We use the estimated coefficients to compute trade potentials between these three groups under two alternative scenarios of an enlargement with free movement of labour and an enlargement that keeps the current restrictions to that movement.

The estimation of sectoral gravity models *per se* reveals important differences across sectors and country groups and offers relevant policy recommendations. In fact, even though Spain is simultaneously the largest and richest country in the Southern group, its size and income have not significantly enhanced its trade with the East during the 1990s when compared to Portugal and Greece. This can be due to Spain's lower openness to trade in general that carries over to trade with the East. However, size would give Spain a privileged position in high economies of scale sectors and income would give it an advantage in high skill-

intensity sectors. In an enlarged EU, these two characteristics have the potential to make Spain a stronger player in the markets for sectors with higher scale economies and higher skill-intensity than would be possible for Portugal and Greece.

We also find that for the centre (North) size is a more important determinant of trade than income, whereas exactly the opposite is true for the Southern and Eastern peripheries, supporting the argument on the relevance of catching-up in boosting trade. We can think of size as determining trade volume and income as determining unit values, which are a proxy for quality. Along these lines, our finding means that an increase in the income of Southern countries would substantially increase the quality of the products they trade with the rest of the EU. Conversely, for the North, the size effect would mostly increase the volume of trade as the North is already producing higher quality goods. Hence the peripheries income catching-up would have an important impact on product quality catching-up. Another area of impact of income catching-up would be on the enlarged EU internal trade patterns. We find that economic distance increases centre-periphery trade, but decreases periphery-periphery trade. Thus more similarity in incomes across members of the EU has an important consequence: it would tend to decrease the pull of the hub by decreasing centre-periphery and increasing periphery-periphery trade. If we think of the economic distance effect as a test for inter versus intra-industry trade, income catching-up also implies more intra-industry and less inter-industry trade within the EU, which reduces the adjustment costs of enlargement.

Along with size and income, human capital endowments are an important determinant of trade. They reveal a different type of relationship between the centre and each of the peripheries: human capital endowments increase Eastern trade but decrease Southern trade. This finding is in line with the empirical observation that the East is better endowed with human capital than the South and as a consequence has the potential to gain competitiveness in high skill-intensity sectors, or more skill-intensive products within low skill-intensity sectors. Generally, North-South trade is more determined by incomes than by endowments and it is likely to remain so. A different picture is detected in North-East trade. The East specialised in low skill-intensity sectors during the 1990s, but we find that such specialisation was induced by their low income level, not by their endowments. Thus, as incomes start rising, it is likely that the importance of endowments will increase.

Finally, the distance effects are very negative for the peripheries. If we interpret this as the consequence of poor quality infrastructures with respect to the North, there is still a role for policies of infrastructure improvement that will decrease the market access gap between the EU's centre and its peripheries. When we control for differences in endowments, distance becomes less important as the former provide another motive for trade. Thus if the advantage in endowments is strong enough it may compensate for a disadvantage in market access. A good example would be the South's trade in low scale/low skill goods.

Whether the new member countries will be participating solely in a customs union or in a full-fledge single market, the effects on specific sectors differ from what might be suggested by aggregate trade flows. In an enlarged EU, the North would have a surplus in all sectors except in low scale economies, low skill-intensity, and the South would have a deficit in all sectors except in low scale economies, low skill-intensity. The North/South symmetry is broken by the presence of the East, with deficits in high scale economies sectors and surpluses in low scale economies sectors. Economies of scale together with transport costs prove to be

an important determinant of trade patterns and, even if non-spatial trade barriers fade away with integration, spatial trade barriers will always have a role to play. In the case of the CEECs, it seems that the human capital endowment does not prevail over market access. On the contrary, trade between EU-North and EU-South seems to be equally related to endowments and market access.

The impact of free Eastern migration on trade shows a distinct difference between high scale economies, high skill-intensity sectors (Chemicals, Machinery and Transport Equipment) and all the others. Trade in those three sectors increases very sizeably when Eastern workers can freely move West. This can lead us into thinking that in fact most of the migrants would be skilled. As firms and workers agglomerate in EU-North and, to a lesser extent in EU-South, a rise in trade of high-skill goods can be explained if these regions gain skilled workers from the East. However, the South lacks the North's market access advantage and thus it suffers the largest loss, whereas the North has the highest gain. The East is in an intermediate position, with a weak market access but well endowed in skilled labour. Furthermore, with free migration the Southern and Eastern peripheries trade more with the centre and less with each other. Thus EU-North can further consolidate its current hub position if the new members participate in a single market for labour. This finding validates the theoretical predictions of Marques and Metcalf (2003) according to which the North benefits from allowing migration by gaining skilled workers and being able to keep and attract firms. With economies of scale, the increase in supply overpowers the increase in demand and the North increases the net exports of the sectors in which is has a double advantage: those with high scale economies and high skill-intensity.

Our results come as a support of recent developments in both trade theory and the EU's Agenda 2000. From the theory point of view, we provide empirical justification for the use of hybrid theories in explaining trade patterns. Our specifications bear such hybrid character between the more traditional trade theory based on endowments and the new economic geography based on economies of scale and transport costs. From the policy standpoint, the EU's Agenda 2000 has been a first step in the right direction by emphasising different roles for the EU's Regional Policy. The latter should in fact be a mix of policies, focussing on both income and education/skills, together with infrastructure development. This last aspect has successfully benefited Southern Europe and the same would be expected in Eastern Europe. The same recommendation can be carried over to developing countries that suffer from poor market access and low human capital endowments. Institutions such as the World Bank should adopt a balanced mix of policies, fostering both income and education/skill levels, together with infrastructure improvement. The excessive focus on one of the policies without the right balance may do more harm than good.

Finally, a note of caution as the migration projections used involve relatively small flows that gave rise to substantial differences among EU regions and sectors. However, the effects of migration on trade would be amplified with the volume of East-West migration. What has been said in the paper translates a conservative scenario. If we would follow an entirely theoretical perspective, arguing that migration would be as much as necessary to close the real wage gap, then the trade effects would be much more sizeable and could have a tremendous impact. All in all, EU-North would gain the more, by attracting more firms and skilled workers, thus increasing the net exports of skill-intensive goods. In EU-South any gains would accrue mostly to Spain as a relatively large country. The East, even if gaining in trade terms, it would suffer a brain drain that, if of sufficiently large proportions, could have very damaging consequences in the long-term.

References

Baldwin, R., Forslid, R., Haaland, J. and Midelfart-Knarvik, K. (2000) EU Integration and Outsiders: A Simulation Study of Industrial Location, *Norwegian School of Economics and Business Administration Discussion Paper***,** 02/2000.

Baldwin, R. E. (1994) *Towards an Integrated Europe,* Centre for Economic Policy Research, London,

Boeri, T. and Brucker, H. (2000) *The Impact of Eastern Enlargement on Employment and Labour Markets in the EU Member States,* European Integration Consortium, Berlin and Milano,

Breuss, F. and Egger, P. (1999) How Reliable Are Estimations of East-West Trade Potentials Based on Cross-Section Gravity Analyses?, *Empirica,* **26,** 81-94.

Buch, C. and Piazolo, D. (2000) Capital and Trade Flows in Europe and the Impact of Enlargement, *Kiel Working Paper***,** 1001.

Cadot, O. and Melo, J. d. (1996) The Europe Agreements and EU-Ldc Relations: The Case of France, In *Transition in Central and Eastern Europe: Implications for EU-Ldc Relations*(Ed, Windt, N. v. d.) Kluwer Academic, Dordrecht, pp. 211-240.

Commission, E. (2001) *The Free Movement of Workers in the Context of Enlargement,* DG-V, Brussels,

Corado, C. (1994) Textiles and Clothing Trade with Central and Eastern Europe: Impact on Members of the Ec, *CEPR Discussion Paper,* **1004**.

Davis, D. (2000) Understanding International Trade Patterns: Advances of the 1990s, *Integration & Trade,* **4,** 61-79.

deMelo, J., Miguet, F. and Muller, T. (2002) The Political Economy of EU Enlargement: Lessons from Switzerland, *CEPR DP 3449*.

Festoc, F. (1997) Le Potentiel De Croissance Du Commerce Des Pays D'europe Centrale Et Orientale Avec La France Et Ses Principaux Partenaires, *Economie et Prevision,* **128,** 161-81.

Fidrmuc, J. (1998) Application of Gravity Models to Commodity Groups and Trade Projections between the EU and the Ceec, *mimeo, Institute for Advanced Studies, Vienna*.

Fontagne, L., Freudenberg, M. and Pajot, M. (1999) Le Potentiel D'echanges Entre L'union Europeene Et Les Peco, *Revue Economique,* **50,** 1139-1168.

Fontagne, L., Freudenberg, M. and Peridy, N. (1998) Commerce International Et Structures De Marche: Une Verification Empirique, *Economie et Prevision,* **135,** 147-67.

Gros, D. and Gonciarz, A. (1996) A Note on the Trade Potential of Central and Eastern Europe, *European Journal of Political Economy,* **12,** 709-721.

Hamilton, C. and Winters, A. (1992) Trade with Eastern Europe, *Economic Policy***,** 77-116.

Havrylyshyn, O. and Pritchett, L. (1991) European Trade Patterns after the Transition, *World Bank Working Paper***,** 748.

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

Krugman, P. (1993) The Hub Effect, or Threeness in Interregional Trade, In *Theory, Policy and Dynamics in International Trade*(Ed, Neary, J. P.) CUP, Cambridge (UK), pp. 29-37.

Linder, S. (1961) *An Essay on Trade and Transformation,* Wiley, New York,

Marques, H. and Metcalf, H. (2003) The Eu's New Economic Geography after the Eastern Enlargement, *forthcoming in the Journal of Economic Integration*.

Mastropasqua, C. and Rolli, V. (1994) Industrial Countries' Protectionism with Respect to Eastern Europe: The Impact of the Association Agreements Concluded with the Ec on the Exports of Poland, Czechoslovakia and Hungary, *World Economy,* **17,** 151-69.

Matyas, L. (1997) Proper Econometric Specification of the Gravity Model, *World Economy,* **20,** 363-68.

Matyas, L. (1998) The Gravity Model: Some Econometric Considerations, *World Economy,* **21,** 397-401.

Maurel, M. and Cheikbossian, G. (1998) The New Geography of Eastern European Trade, *Kyklos,* **51,** 45-71.

Melitz, J. (2001) Geography, Trade and Currency Union, *CEPR DP 2987*.

Nilsson, L. (2000) Trade Integration and the EU Membership Criteria, *European Journal of Political Economy,* **16,** 807-27.

Persson, T. (2001) Currency Unions and Trade: How Large Is the Treatment Effect?, *Economic Policy,* **16,** 433-62.

Pratten, C. (1988) A Survey of Economies of Scale, In *Research on the Cost of Non-Europe*, Vol. 2 (Ed, CEC) CEC, Luxembourg.

Rice, P., Stewart, M. and Venables, A. (2002) The Geography of Intraindustry Trade: Empirics, *CEPR DP 3368*.

Rollo, J. and Smith, A. (1993) The Political Economy of Eastern European Trade with the Ec: Why So Sensitive?, *Economic Policy,* **16,** 139-181.

Rose, A. (2000) One Money, One Market: The Effect of Common Currencies on Trade, *Economic Policy,* **15,** 7-46.

Schumacher, D. (1997) Impact on German Trade of Increased Division of Labour with Eastern Europe, In *Europe's Economy Looks East*(Ed, Black, S. W.) Cambridge University Press, Cambridge (UK), pp. 100-164.

Vittas, H. and Mauro, P. (1997) Potential Trade with Core and Periphery: Industry Differences in Trade Patterns, In *Europe's Economy Looks East*(Ed, Black, S. W.) Cambridge University Press, Cambridge (UK), pp. 67-99.

Weise, C., Bachtler, J., Downes, R., McMaster, I. and Toepel, K. (2001) *The Impact of EU Enlargement on Cohesion,* DIW/EPRC, Berlin and Glasgow,

Winters, A. and Wang, Z. (1992) The Trading Potential of Eastern Europe, *Journal of Economic Integration,* **7,** 113-36.

Winters, A. and Wang, Z. (1994) *Eastern Europe's International Trade,* Manchester University Press, Manchester,

Appendix A

Data Sources

Data is taken for the transition period, this is, 1990-99, for the following aggregates of SITC Rev. 2 sectors: chemicals (5), leather products (61, 85), machinery (71-77), metals (67-69), minerals (66), textiles and clothing (65, 84), transport equipment (78, 79), and wood products (63, 82). Trade data (value of exports and imports) is provided by the OECD International Trade Statistics CD-ROM in thousands USD.

Trade liberalisation with the East is accounted for by means of a dummy variable. For each Eastern country it is defined as taking a value of one after the year of signature of the Europe Agreements. The data for all regional trade associations was taken from the WTO website (www.wto.org).

Data for distances and borders was taken from the CEPII website (www.cepii.fr). Distance data is measured in km between the partner countries' economic centres. These correspond to the capital city except for Germany (Hamburg is the city used). Countries are considered to share a common border when they share a land border or a small body of water border.

Data for population (given in thousands) and for GDP (given in billions USD at 1995 prices and exchange rates) was taken from the web version of IMF's International Financial Statistics at www.imf.org.

The schooling variable is given by the number of people with tertiary education studies. This number was obtained from the Barro-Lee dataset for 1990 and then added of the yearly number of enrolments. The enrolment data was taken from the web versions of OECD Education Statistics and UNESCO Statistics of Educational Attainment and Literacy at www.oecd.org and www.unesco.org.

Appendix B

Random Effects GLS with AR (1) Errors

Table B1: Home market effects						
			High scale economies and high skill-intensity	High scale economies and low skill-intensity	Low scale economies and high skill-intensity	Low scale economies and low skill-intensity
N-E	N	Exports	1.240***	1.217***	1.226***	1.571***
		Imports	1.304***	1.370***	1.227***	1.208***
	E	Exports	1.248***	1.142***	0.755***	0.998***
		Imports	0.921***	1.046***	0.795***	0.844***
N-S	N	Exports	1.236***	1.301***	1.211***	1.281***
		Imports	1.221***	1.013***	1.048***	1.015***
	S	Exports	1.503*	1.371***	0.845**	0.138*
		Imports	0.824	1.020***	0.954*	0.12
S-E	S	Exports	1.991	0.838	1.455	0.734
		Imports	0.859	0.119	1.275	1.149
	E	Exports	1.545***	1.508***	1.075***	0.913***
		Imports	0.921**	1.120***	0.48	0.994***
Note: *, ** and *** represent significance at respectively 10, 5 and 1%.						

Table B2: Income effects						
			High scale economies and high skill-intensity	High scale economies and low skill-intensity	Low scale economies and high skill-intensity	Low scale economies and low skill-intensity
N-E	N	Exports	2.026***	2.310***	0.543	1.114
		Imports	1.709	1.828***	2.410***	1.377**
	E	Exports	1.357*	0.800***	0.544***	0.389
		Imports	0.753***	0.965***	0.553***	0.359
N-S	N	Exports	1.026***	0.958***	1.410***	0.646
		Imports	1.205**	0.339	0.902*	1.382*
	S	Exports	8.971***	0.438	7.111***	3.554**
		Imports	3.107**	0.517	3.213***	1.647
S-E	S	Exports	7.086	9.664***	6.684**	6.939**
		Imports	4.685	7.217**	6.018**	4.883
	E	Exports	1.549*	1.300***	1.382***	0.689
		Imports	1.296***	0.361	0.915***	0.587
Note: *, ** and *** represent significance at respectively 10, 5 and 1%.						

Table B3: Economic distance effects					
		High scale economies and high skill-intensity	High scale economies and low skill-intensity	Low scale economies and high skill-intensity	Low scale economies and low skill-intensity
N-E	Exports	1.997***	1.733***	1.163***	1.197
	Imports	1.799*	1.633***	2.087***	1.132
N-S	Exports	0.454***	0.186*	0.284**	0.233
	Imports	0.658***	0.105	0.144	0.321*
S-E	Exports	-0.71	0.22	-0.367	0.187
	Imports	-1.687**	-0.653	-0.993**	-1.06
Note: *, ** and *** represent significance at respectively 10, 5 and 1%.					

Table B4: Endowment effects						
			High scale economies and high skill-intensity	High scale economies and low skill-intensity	Low scale economies and high skill-intensity	Low scale economies and low skill-intensity
N-E	N	Exports	0.834***	0.619**	1.552***	0.504
		Imports	1.076**	1.219***	1.194***	1.013
	E	Exports	1.150	0.368	0.339	0.222
		Imports	1.580***	1.259***	1.807***	1.243***
N-S	N	Exports	0.631*	0.371	0.130	0.431
		Imports	0.825**	0.444	0.596	0.547
	S	Exports	-2.422***	-0.178	-2.528***	-2.206***
		Imports	-0.508	-0.377*	-0.048	-0.690**
S-E	S	Exports	-0.584*	0.266	1.235	0.725*
		Imports	-0.975	-2.106**	0.584	-0.046
	E	Exports	0.801	1.413	0.992	-0.673
		Imports	1.421	0.575	0.717	1.493
Note: *, ** and *** represent significance at respectively 10, 5 and 1%.						

Table B5: Differences in endowments effects					
		High scale economies and high skill-intensity	High scale economies and low skill-intensity	Low scale economies and high skill-intensity	Low scale economies and low skill-intensity
N-E	Exports	-0.021	0.061	0.049	0.039
	Imports	-0.01	0.053	0.139***	0.079
N-S	Exports	0.014	-0.038	0.001	-0.013
	Imports	-0.036	-0.039	0.016	0.085
S-E	Exports	0.034	0.018	0.063	0.289
	Imports	0.373	0.154	0.256	0.24
Note: *, ** and *** represent significance at respectively 10, 5 and 1%.					

Table B6: Income effects (endowment-weighted)						
			High scale economies and high skill-intensity	High scale economies and low skill-intensity	Low scale economies and high skill-intensity	Low scale economies and low skill-intensity
N-E	N	Exports	2.507***	2.491***	2.457***	2.130***
		Imports	2.014***	2.054***	2.319***	1.713***
	E	Exports	1.370**	0.810***	0.518***	0.396
		Imports	0.767***	0.972***	0.626***	0.392
N-S	N	Exports	0.966***	0.948***	1.347***	0.642
		Imports	1.173*	0.338	0.582	1.249
	S	Exports	1.656*	0.728	1.851**	0.113
		Imports	1.377	0.106	0.877	1.537
S-E	S	Exports	2.995***	3.349***	3.541***	3.369**
		Imports	1.827	4.360***	2.806***	1.191
	E	Exports	1.662*	0.565	1.510***	0.826
		Imports	1.442***	0.546**	1.018***	0.712
Note: *, ** and *** represent significance at respectively 10, 5 and 1%.						

Table B7: Spillover effects						
			High scale economies and high skill-intensity	High scale economies and low skill-intensity	Low scale economies and high skill-intensity	Low scale economies and low skill-intensity
N-E	N	Exports	-1.998***	-2.123***	-1.873***	-2.125***
		Imports	-0.952**	-0.939***	-1.078***	-0.877
	E	Exports	-0.507	-0.708**	-0.098	-0.357*
		Imports	0.560**	0.197	0.115	0.308
N-S	N	Exports	0.189	-0.945	-0.673	-0.183
		Imports	0.854	0.172	0.776	-0.227
	S	Exports	-2.630***	-0.959*	-3.261***	-1.529
		Imports	-1.777*	0.228	-0.469	-2.205*
S-E	S	Exports	-2.903**	-1.917*	-1.880	-2.095
		Imports	-2.034*	-5.613***	-1.751	-0.702
	E	Exports	-0.431	1.259	0.165	-0.640
		Imports	0.823	0.749	0.159	1.545*
Note: *, ** and *** represent significance at respectively 10, 5 and 1%.						

Table B8: Economic distance effects (differences-in-endowments-weighted)					
		High scale economies and high skill-intensity	High scale economies and low skill-intensity	Low scale economies and high skill-intensity	Low scale economies and low skill-intensity
N-E	Exports	1.713***	1.952***	1.901***	1.825***
	Imports	1.801***	1.745***	1.720***	1.388***
N-S	Exports	0.465***	0.191**	0.270**	0.257
	Imports	0.659***	0.114	0.154	0.332**
S-E	Exports	0.562	1.005***	1.003*	0.866
	Imports	0.319	1.127*	0.698	0.242
Note: *, ** and *** represent significance at respectively 10, 5 and 1%.					

Table B9: Distance effects (differences-in-endowments-weighted)					
		High scale economies and high skill-intensity	High scale economies and low skill-intensity	Low scale economies and high skill-intensity	Low scale economies and low skill-intensity
N-E	Exports	-1.718***	-1.897***	-1.880***	-1.805***
	Imports	-1.802***	-1.694***	-1.570***	-1.315***
N-S	Exports	-0.452***	-0.233**	-0.267*	-0.284
	Imports	-0.695***	-0.158	-0.144	-0.253
S-E	Exports	-0.783	-1.203***	-1.242**	-0.703
	Imports	-0.215	-1.239*	-0.712	-0.234
Note: *, ** and *** represent significance at respectively 10, 5 and 1%.					

Table B10: Distance effects					
		High scale economies and high skill-intensity	High scale economies and low skill-intensity	Low scale economies and high skill-intensity	Low scale economies and low skill-intensity
N-E	Exports	-1.520***	-1.919***	-2.331***	-2.129***
	Imports	-1.679***	-1.686***	-1.221***	-1.409***
N-S	Exports	-1.042*	-0.658	-0.008	-2.225***
	Imports	-0.808	-0.67	-1.363*	-0.943
S-E	Exports	-2.059**	-1.824***	-2.176***	-0.951
	Imports	-2.523**	-3.905***	-1.950***	-1.514
Note: *, ** and *** represent significance at respectively 10, 5 and 1%.					

Table B11: Border effects					
		High scale economies and high skill-intensity	High scale economies and low skill-intensity	Low scale economies and high skill-intensity	Low scale economies and low skill-intensity
N-E	Exports	0.353	0.506	0.265	0.207
	Imports	0.704	0.698	0.710	0.866
N-S	Exports	-0.022	0.152	0.463	-0.358
	Imports	0.070	0.338	0.724	0.473
S-E	Exports	1.356	1.404	1.781	2.170
	Imports	0.246	-0.942	1.447	1.557
Note: *, ** and *** represent significance at respectively 10, 5 and 1%.					

Table B12: EA effects					
		High scale economies and high skill-intensity	High scale economies and low skill-intensity	Low scale economies and high skill-intensity	Low scale economies and low skill-intensity
N-E	Exports	0.588***	0.745***	0.584***	0.602***
	Imports	0.570***	0.363***	0.438***	0.510***
S-E	Exports	1.346***	0.903***	1.268***	0.730*
	Imports	0.342	0.298	0.864**	0.679
Note: *, ** and *** represent significance at respectively 10, 5 and 1%.					

Table B13: EURO effects					
		High scale economies and high skill-intensity	High scale economies and low skill-intensity	Low scale economies and high skill-intensity	Low scale economies and low skill-intensity
N-S	Exports	0.17	0.203**	0.28	0.103
	Imports	0.227	0.071	0.195	0.03
Note: *, ** and *** represent significance at respectively 10, 5 and 1%.					

Table B14: Predicted bilateral trade flows in 2010 (millions USD)								
			N-E		N-S		S-E	
			Model 1	Model 3	Model 1	Model 3	Model 1	Model 3
No migration	High scale economies and high skill-intensity	Exports	182.111	93.735	1495.635	797.874	30.656	4.148
		Imports	46.484	24.245	480.524	179.87	9.782	2.463
	High scale economies and low skill-intensity	Exports	17.816	10.272	104.626	98.242	11.086	0.861
		Imports	14.921	11.356	54.659	46.873	4.905	1.337
	Low scale economies and high skill-intensity	Exports	3.986	2.031	31.3	14.739	1.592	0.139
		Imports	10.82	8.335	10.276	6.417	1.783	0.202
	Low scale economies and low skill-intensity	Exports	29.11	16.882	102.689	91.919	9.555	2.031
		Imports	39.244	27.154	140.875	158.531	8.363	1.868
Migration	High scale economies and high skill-intensity	Exports	183.45	93.556	1516.494	799.383	30.334	4.136
		Imports	47.158	24.169	483.144	180.428	9.531	2.389
	High scale economies and low skill-intensity	Exports	17.932	10.245	105.876	98.577	10.957	0.86
		Imports	15.504	11.329	55.56	47.029	4.742	1.323
	Low scale economies and high skill-intensity	Exports	4.138	2.028	31.371	14.774	1.586	0.139
		Imports	11.223	8.302	10.294	6.431	1.764	0.199
	Low scale economies and low skill-intensity	Exports	29.747	16.837	103.36	92.121	9.585	2.011
		Imports	40.633	27.073	141.268	158.504	8.433	1.848

Table B15: Predicted intra-EU trade by country blocs in 2010 (millions USD)							
		North		South		East	
		Model 1	Model 3	Model 1	Model 3	Model 1	Model 3
No migration	High scale economies and high skill-intensity	1150.738	687.495	-994.237	-616.32	-156.5	-71.175
	High scale economies and low skill-intensity	52.861	50.284	-43.785	-51.845	-9.076	1.56
	Low scale economies and high skill-intensity	14.191	2.018	-21.215	-8.385	7.024	6.367
	Low scale economies and low skill-intensity	-48.321	-76.884	39.379	66.774	8.942	10.11
Migration	High scale economies and high skill-intensity	1169.643	688.341	-1012.547	-617.208	-157.096	-71.133
	High scale economies and low skill-intensity	52.744	50.463	-44.101	-52.011	-8.642	1.548
	Low scale economies and high skill-intensity	13.992	2.069	-21.256	-8.403	7.264	6.334
	Low scale economies and low skill-intensity	-48.794	-76.62	39.06	66.546	9.734	10.074

Table B16: Migration effects on bilateral flows (millions USD)							
		Bilateral flows					
		N-E		N-S		S-E	
		Model 1	Model 3	Model 1	Model 3	Model 1	Model 3
High scale economies and high skill-intensity	Exports	1.339	-0.18	20.86	1.509	-0.321	-0.012
	Imports	0.673	-0.076	2.62	0.559	-0.251	-0.074
	Net exports	0.666	-0.104	18.24	0.95	-0.07	0.062
High scale economies and low skill-intensity	Exports	1.367	0.308	0.772	0.154	0.421	-0.041
	Imports	1.485	0.129	1.088	0.321	-0.013	-0.029
	Net exports	-0.118	0.179	-0.316	-0.167	0.434	-0.012
Low scale economies and high skill-intensity	Exports	0.151	-0.002	0.071	0.035	-0.006	0
	Imports	0.403	-0.033	0.018	0.014	-0.018	-0.003
	Net exports	-0.252	0.03	0.053	0.021	0.012	0.003
Low scale economies and low skill-intensity	Exports	0.637	-0.045	0.671	0.202	0.03	-0.02
	Imports	1.389	-0.081	0.393	-0.026	0.393	-0.026
	Net exports	-0.752	0.036	0.278	0.228	-0.363	0.006
All sectors	Exports	3.494	0.081	22.374	1.9	0.124	-0.073
	Imports	3.95	-0.06	4.119	0.867	0.11	-0.132
	Net exports	-0.456	0.141	18.255	1.033	0.013	0.059

Table B17: Migration effects on country groups (millions USD)							
		Country effects					
		North		South		East	
		Model 1	Model 3	Model 1	Model 3	Model 1	Model 3
High scale economies and high skill-intensity	Exports	22.199	1.329	2.299	0.546	0.422	-0.15
	Imports	3.293	0.483	20.608	1.435	1.018	-0.192
	Net exports	18.905	0.846	-18.31	-0.889	-0.596	0.043
High scale economies and low skill-intensity	Exports	1.367	0.308	0.772	0.154	0.421	-0.041
	Imports	1.485	0.129	1.088	0.321	-0.013	-0.029
	Net exports	-0.118	0.179	-0.316	-0.167	0.434	-0.012
Low scale economies and high skill-intensity	Exports	0.223	0.033	0.013	0.014	0.385	-0.036
	Imports	0.422	-0.019	0.053	0.032	0.145	-0.003
	Net exports	-0.199	0.051	-0.041	-0.018	0.24	-0.033
Low scale economies and low skill-intensity	Exports	1.308	0.157	0.422	-0.046	1.458	-0.101
	Imports	1.781	-0.108	0.741	0.182	0.667	-0.065
	Net exports	-0.473	0.265	-0.318	-0.228	0.792	-0.036
All sectors	Exports	25.096	1.827	3.505	0.668	2.687	-0.328
	Imports	6.981	0.486	22.491	1.97	1.817	-0.289
	Net exports	18.115	1.341	-18.985	-1.302	0.87	-0.039