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A GRAVITY MODEL APPROACH TO ESTIMATING PROSPECTIVE TRADE GAINS IN THE EU ACCESSION AND ASSOCIATED COUNTRIES

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ABSTRACT

Examining the trade prospects for the new European Union (EU) member states and the EU associated partner countries is an important issue in the context of European eastward enlargement and greater economic integration with its immediate neighbours. An out-of-sample approach to projecting trade volumes for twenty countries of interest is adopted using a gravity equation for a panel data set of bilateral export flows from twelve EU countries to twenty OECD trading partners over the 1992-2003 period. The potential trade volumes are calculated from a gravity model of new trade theory (NTT) determinants. The selected twenty countries' prospects for further trade integration vis-à-vis the EU can be gauged by expressing the trade volume projections as a ratio of actual trade volumes for each pair of countries. The projected trade ratios for the ten new member states are found to be multiples of actual 2003 levels, indicating that trade expansion looks set to continue. Near unity values, however, are more frequent among the Mediterranean countries, indicating fewer opportunities for further trade integration with the EU.

JEL Classification: F14, F15, C23

Keywords: Panel data, Gravity model, Trade integration

I. INTRODUCTION

The disbanding of the Council for Mutual Economic Assistance (CMEA)[1] – rendered obsolete by democracy, current account convertibility and trade liberalisation – raised the issue of where and to what extent trade among its member countries might be re-directed. The trade-diverting effects of the CMEA system – resulting in the post-war economic isolation of its members from the rest of the world – would, however, jeopardise the credibility of trade measures based on simple extrapolations from historical data. The gravity equation of trade, however, can be estimated for a reference sample of countries and its parameters used to project the expected trade flows between the CMEA members countries and Western Europe. Focusing on the original CMEA member countries[2] and more generally the Central and Eastern European (CEE) countries, several studies have sought to estimate the volume and direction of trade flows using the gravity model (Wang and Winters 1991; Hamilton and Winters 1992; Baldwin 1994). In finding potential to actual trade ratios far in excess of unity, these early studies concluded in favour of a large expansion of future CEE–EU trade.

Trade projections based on a traditional specification of the gravity model pervades the empirical literature on potential flow calculations (see, for example, Baldwin 1994; Nilsson 2000; Papazoglou *et al.* 2006). In essence, the standard gravity model of traditional determinants explains bilateral trade flows by the economic size of two countries and the distance between them. In the augmented version of the gravity

[1] The CMEA, also known as COMECON, was formed in 1949 to co-ordinate economic development and industrial production between the Soviet Union and its member countries.

[2] Bulgaria, Czechoslovakia, Hungary, Poland, Romania, the Soviet Union.

model, trade is expressed as a function of income and income per head of each country in addition to bilateral trade-impeding or trade-stimulating factors. The gravity equation of traditional trade determinants follows the theoretical specification by Bergstrand (1989) in which separate roles for GDP and per capita GDP are identified. Equivalently, Linnemann (1966) specified the augmented gravity model in terms of GDP and the population for both the exporting and the importing countries. The model of traditional trade determinants provides a reasonably neutral basis as to what normal or potential trade levels should be.

These early studies of trade projections based on the gravity specification of traditional determinants, however, ignore the important new insights of the new trade theorists (Helpman 1984; Helpman and Krugman 1985). In response to the empirical observation that a disproportionate volume of trade occurs between the industrialised countries, the importance of increasing returns to scale and imperfect competition is emphasised in explaining the growth of intra-industry trade. In a gravity model of new trade theory (NTT) determinants estimated by Helpman (1987), a similarity of size index is included by way of capturing intra-industry trade patterns between similar countries. The gravity model of NTT determinants thus takes on an alternative characterisation to the traditional specification of the gravity model with consequential implications regarding the projected bilateral trade volume calculations.[3]

[3] Otherwise, the gravity model specifications differ only in form: whereas GDP and per capita GDP enter separately for both countries in the traditional specification of the gravity model, they are specified in joint form in the gravity specification of new trade theory determinants.

Three distinguishing features characterise this paper. First, the potential trade volumes are calculated using a gravity equation of NTT determinants for a panel data set of bilateral export flows from twelve EU countries to twenty OECD trading partners over the 1992-2003 period. Most studies calculate potential trade volumes using a gravity model of traditional trade and hence do not adequately capture trade patterns between the EU and its main trading partners. Two notable exceptions exist: in using both the traditional and the new trade theory specification of the gravity model, Breuss and Egger (1999) demonstrate the unreliability of potential trade calculations from a cross-sectional gravity equation, but do not use panel methods. Panel methods are used by Egger (2002) for a similar specification, but the data set of intra-OECD countries' exports estimated over the 1986-1997 period include pre-reform data for ten CEE countries, which may not be reliable in generating gravity coefficients representing normal trade relations.

Second, an out-of-sample approach to calculating potential trade volumes is adopted. The inherent assumption of the out-of-sample approach is that the projected trade patterns for the countries of interest, which are strongly linked to Europe, fit a model of how a normal country's geographic trade patterns are related to various characteristics. On the assumption that the twenty countries of interest are as integrated into the world economy as the EU–OECD countries, the gravity model parameter estimates are used to project the trade volumes for ten new member states (NMS) and ten associated countries located on the Mediterranean sea.

Third, the gravity model is used for forecasting purposes in preference to using past information. In particular, potential trade volumes are calculated by inserting forecast 2008 data for GDP and per capita GDP into the gravity equation. The forward-

looking data avoids the problems associated with using pre-reform or pre-transition data, which fail to account for the rapid opening of the formerly planned economies and their accompanying re-orientation of trade towards Europe. The findings of this paper indicate a trajectory of further trade growth absent any sudden shocks to the region.

The layout of this paper is as follows. Following the main developments in the traditional trade literature and the new trade theory literature, Section II sets out two alternative econometric specifications of the gravity model. The model data sources and expected coefficients are also given in this section. The results in Section III are split between the gravity model coefficient estimates and the potential to actual trade ratios. Section IV concludes.

II. MODEL SPECIFICATION AND DATA

The Gravity Model

The gravity model specification used in the traditional trade literature for calculating trade volumes (Baldwin 1994; Nilsson 2000; Papazoglou *et al.* 2006) is typically of the following form:

$$\begin{aligned} EXP_{ij}^{t} = \alpha + \lambda_1 GDP_i^t + \lambda_2 GDP_j^t + \lambda_3 GDPPC_i^t + \lambda_4 GDPPC_{j\,ij}^{t} \\ + \lambda_5 DIST + \lambda_6 ADJ_{ij} + \lambda_7 LANG_{ij} + \lambda_8 EU_{ij}^{t} + \mu_{ij}^{t} \end{aligned} \quad (1)$$

where EXP_{ij}^{t} are the bilateral export flows from twelve EU countries i to twenty OECD partner countries j over the 1992-2003 period t; GDP_i^t and GDP_j^t denote the economic size of the exporting and the importing countries respectively; and $GDPPC_i^t$ and

$GDPPC_j^t$ are the respective countries' per capita income levels, all of which are expressed in US dollars at constant 2000 prices.

Identifying separate roles for GDP and per capita GDP of both countries, Bergstrand (1989) assigns theoretical coefficients to the gravity model parameters: the income and factor endowment coefficients are expected to be positively signed in aggregate trade flow regressions if the good exchanged is capital-intensive in production, is a luxury in consumption and its elasticity of substitution exceeds unity. If instead the coefficients are negatively signed, the traded good tends to be labour-intensive in production and a necessity in consumption.

The geographic distance, $DIST_{ij}$, is measured in kilometres between the economic centres of the exporting and the importing countries. The greater is the physical distance between two countries' economic centres, the higher is the cost of transporting goods between them hence the coefficient for distance is expected to be negative. The counterpart to geographic distance is geographic proximity, captured by a dummy variable denoting shared land borders. Adjoining land borders, ADJ_{ij}, tends to increase trade between neighbouring countries mainly because lower costs lure individuals into conducting more cross border transactions. A dummy for a shared official language, that is, the language spoken by most of the population in both countries, $LANG_{ij}$, is also included in the gravity equation. Reflecting a similarity of tastes partly explained by historically established trade ties or shared cultural links, a trade-enhancing effect is also expected for the common language dummy.

Also featured among the explanatory variables in the gravity model is a binary-coded EU dummy variable, which takes the value of one when both countries are EU

members, otherwise it is zero. The designated values of unity hold for member countries throughout the sample period; for Austria, Finland and Sweden, values of unity are assigned only after gaining official membership in 1995 when the EU-12 became the EU-15. The expected positive effect of EU membership on trade stems mainly from the deposed trade barriers initiated under the programme to complete the single market.

Binary-coded dummy variables are frequently used to assess the trade effect of regional integration within a gravity model framework. For example, Aitken (1973) estimates a gravity model as a cross-section for each year over the period 1951-1967 to examine whether the trade effects of the dummy variables denoting the European Economic Community (EEC) and the European Free Trade Association (EFTA) are consistent with theoretical predictions. Bayoumi and Eichengreen (1998) continue with the theme of the trade effects of the EEC and EFTA using a gravity model for the industrialised countries over the period 1956-1992. The final term, μ_{ij}^{t}, is the random error term. All non-dummy variables in equations (1) are estimated in logarithmic form.

Following Helpman (1987), the gravity specification of new trade theory determinants is represented as follows:

$$\begin{aligned} EXP_{ij}^{t} &= \alpha + \beta_1 TGDP_{ij}^{t} + \beta_2 SGDP_{ij}^{t} + \beta_3 DGDPPC_{ij}^{t} \\ &\quad + \beta_4 DIST_{ij} + \beta_5 ADJ_{ij} + \beta_6 LANG_{ij} + \beta_7 EU_{ij}^{t} + \varepsilon_{ij}^{t} \end{aligned} \tag{2}$$

where EXP_{ij}^{t} are as before; total GDP denotes the overall economic size of the exporting and the importing countries, $TGDP_{ij}^{t} = \ln(GDP_{i}^{t} + GDP_{j}^{t})$; the similarity of size index is based on the two countries' shares of GDP, given by

$SGDP_{ij}^t = \ln\{1-[GDP_i^t/(GDP_i^t + GDP_j^t)]^2 - [GDP_j^t/(GDP_i^t + GDP_j^t)]^2\}$; and the absolute difference in GDP per capita income levels is a measure of relative factor endowments between two trading partners, $DGDPPC_{ij}^t = \left|\ln GDPPC_i^t - \ln GDPPC_j^t\right|$. The remaining right-hand side variables are as before. All non-dummy variables in equations (2) are estimated in logarithmic form.

A positive coefficient for total GDP is expected in line with the view that larger markets foster higher volumes of trade. The role of differential country size has been emphasised by Helpman and Krugman (1985). Given economic size, bilateral trade will be lower between countries of dissimilar size when compared with countries of equal size. Put another way, countries that are similar in size engage in two-way trade of differentiated goods and hence trade more, implying the coefficient for the similarity of size index is expected to be positive.

The inclusion of the per capita income differential provides an indirect way of testing the Linder hypothesis. Although Linder (1961) presented no formal model, the demand-based theory suggests that if an importing country's aggregated preferences for goods are similar to an exporting country's consumption patterns, country j will develop industries similar to country i. Gruber and Vernon (1970) include the absolute difference in per capita incomes in the standard gravity equation as a way of capturing differences in consumption patterns. A negative coefficient, suggesting trade is positively related to consumers with similar per capita incomes and therefore having similar consumption patterns, indicates support for the Linder hypothesis.[4]

[4] In short, the Linder hypothesis is concerned with similarities of income per capita; Helpman and Krugman (1985) emphasise similarities of income.

The reference group of countries in the panel data set comprise bilateral export flows from twelve EU countries[5] to twenty OECD trading partners[6] over the period 1992–2003, with Belgium and Luxembourg treated as a single country. These countries are characterised with a relatively high degree of economic integration into world markets, including a predominant share in global trade.[7]

The data sources are as follows. Nominal export flow data, denominated in US dollars, are from the *Direction of Trade Statistics* (DOTS), International Monetary Fund (IMF). This database has the advantage of distinguishing between reporter and partner countries and thus provides a useful basis with which to capture the desired bilateral trade flows. The export data are expressed in real terms based on US producer prices (2000 = 100), sourced from the *International Financial Statistics* (IFS), IMF.

Data on GDP and GDP per capita at constant 2000 US dollars are sourced from the *World Development Indicators* (WDI), World Bank. GDP (at constant prices) is a measure of a country's total production or value added by all resident producers during a year, converted from domestic currencies using 2000 official exchange rates. GDP per capita is simply GDP divided by mid-year population, which apart from some exceptions, counts all residents regardless of legal status or citizenship. The geographic distance

[5] Austria, Belgium–Luxembourg, Denmark, Finland, France, Germany, Italy, the Netherlands, Spain, Sweden, Switzerland, the United Kingdom. Although not a member of the EU, Switzerland is its closest neighbour – geographically, culturally and economically. .

[6] Austria, Belgium–Luxembourg, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Korea, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, the United States.

[7] The OECD countries account for about 75% of global exports.

between two economic centres as well as the adjacency and the common language dummy variables are sourced from the CEPII.[8]

Bilateral Trade Projections

On the assumption that the twenty countries of interest become fully integrated into the world economy, an out-of-sample approach to estimating the gravity model is adopted. The sample of EU–OECD countries are chosen to represent a normal country's behaviour of trade patterns.[9] Bilateral export volumes are projected for two groups of countries that have strong links with Europe. The first group of countries are involved in the process of EU enlargement and consist of ten new member states (NMS), segregated by their timing of EU entry (eight new members joined the EU in 2004: the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia; two newer members joined in 2007: Bulgaria and Romania). The second group of countries refer to nine associated countries which benefit from a privileged relationship with the EU under the European Neighbourhood Policy (ENP). The ENP, developed in 2004, is distinct from the process of enlargement and instead focuses on strengthening deeper political and economic co-operation with the neighbouring countries of the EU, whether connected by land or by sea. The selected ENP countries, formerly known as the Euro–Mediterranean partners

[8] Le Centre d'Etudes Prospectives et d'Informations Internationales, available at http://www.cepii.org.

[9] The out-of-sample approach implicitly assumes that the projected bilateral trade relations are explained by the same factors determining EU–OECD trade patterns. The volume of trade that would prevail between the countries of interest and the Western countries is calculated by inserting values for GDP, per capita income, bilateral distance and so on into the gravity equation and transforming the logarithmic model back into levels variables.

under the MEDA II system are Algeria, Egypt, Israel, Jordan, Lebanon, Libya, Morocco, Syria, and Tunisia. For geographical reasons, Turkey is added to this group of countries.

Potential trade volumes are calculated using forecast 2008 data for GDP and per capita GDP, sourced from the *World Economic Outlook Database* (WEO), IMF. The forward-looking data avoid the pitfalls of past information. Simulated export flows based on pre-reform or pre-transition data are not likely to be a good indicator of prospective trade integration. Gros and Gonciarz (1996), for example, refer to the general unreliability of GDP data under the CMEA system. Neither do pre-reform data account for the rapid opening of the formerly planned economies and the accompanying re-orientation of trade towards the Western nations, especially Europe.[10] Pre-transition data do not adequately capture the changing trade structures of the CEE countries as the transition process got underway (Nilsson 2000).

To make the data compatible with the constant price data in the panel data set, the 2008 data are deflated by the US GDP deflator (2000 = 100), obtained from the same source. By way of indicating the likelihood of further trade integration, the simulated export flows are then expressed as a ratio of actual 2003 trade data.[11]

[10] Gros and Gonciarz (1996) point out that once the CEE countries began to trade competitively in convertible currencies, their trading regimes soon shared the main features of their European counterparts: state monopolies were abolished allowing private activity in the foreign trade sector to flourish, licensing and quotas were largely removed and tariffs and the exchange rate became the primary instruments of trade policy. If these countries' actual trade patterns are not unlike those of the Western market economies, there is little opportunity for further growth in bilateral trade.

[11] As per the information in the panel data set, the 2003 trade data are sourced from the DOTS, IMF and deflated by US producer prices (2000 = 100), sourced from the IFS, IMF.

III. EMPIRICAL RESULTS

Gravity Model Estimates

Table 1 presents the results for the gravity specification of new trade theory (NTT) determinants of EU–OECD export flows over the 1992-2003 period, estimated by the pooled ordinary least squares (POLS) estimator and by the random effects (RE) estimator, the latter with and without time effects. The performance of the model in terms of goodness-of-fit (88 per cent) is highly satisfactory with the independent variables explaining a high proportion of the variance of the dependent variable. The Lagrange multiplier (LM) test for random effects (Breusch and Pagan 1980) rejects the null hypothesis that the variance of the residuals equal zero, hence, the RE estimator is preferred to the POLS estimates. The significance of the time effects, which control for common shocks affecting all countries in the sample, indicates their inclusion is warranted.

[Insert Table 1 here]

Regarding the GDP-related parameter estimates, the positive and significant coefficient estimates for overall economic size and the similarity of size index support the new trade theory. Increased volumes of trade occur between large countries and large countries of similar size. In terms of the absolute difference in income per head, its negative and significant coefficient estimate supports Linder's hypothesis that a similarity of relative factor endowments will increase trade between the OECD countries, although this is not significant. The trade-impeding effect of transport costs and trade-related costs is apparent from the negative and significance coefficient for distance. Contiguous borders increase trade but historical and cultural ties are not important in explaining

bilateral trade flows, according to the RE estimates. Finally, the positive and significant coefficient estimate for the EU dummy confirms the trade-enhancing effect of EU enlargement. Overall, the results for the gravity specification of NTT determinants provide a reasonable approximation of the factors governing the trade patterns between the EU–OECD countries over the period 1992-2003.

Potential to Actual Trade Ratios

Having estimated the gravity equation, the trade volumes are calculated by taking the two-way RE parameter estimates and inserting their corresponding 2008 values into the estimated equation. The bilateral predictions of export flows include the quantified potential gains of assumed EU membership. Expressing the projected trade volumes as a ratio of actual 2003 trade data for each pair of countries, the trade ratios associated with the gravity model of NTT determinants are presented in Table 2. Summary information is also given for the twenty countries of interest, calculated as a simple average of the bilateral trade ratios vis-à-vis the EU-12 countries and the OECD countries, which additionally includes Japan, Korea and the US in the calculations.

[Insert Table 2 here]

Regarding the trade ratios for the ten accession countries, the predictions of the gravity model of NTT determinants suggest trade expansion looks set to continue absent any unforeseen shocks to the global trading system. For most country-pairs, sizeable increments in trade are indicated, involving multiples of actual 2003 levels. High projected ratios are also in evidence, especially for the Baltic countries as well as the two newest member countries, Bulgaria and Romania. A minority of country-pair trade ratios

suggest some of the accession countries are on the brink of achieving potential trade. For example, the near unity values suggest trade between Hungary vis-à-vis Belgium and the Netherlands is nearly expended as is trade between Estonia and its neighbouring countries, Finland and Sweden. Indeed, a sprinkling of less than unity values suggest trade between Hungary and Slovakia vis-à-vis Germany is already exhausted.

From the perspective of the EU countries, there tends to be a clear geographical divide. Together with Belgium and the Netherlands – two of the most open countries among the EU-12 – Germany and Italy tend to exhibit relatively low trade potential, most likely reflecting already well-established trade links with the new member states. On the other hand, the group of countries comprising Austria, France, Spain, Switzerland and the UK tend to indicate higher trade ratios, implying plenty of scope for more trade integration. The trade ratios are rather mixed for the Nordic countries (Denmark, Finland and Sweden); whereas the relatively low trade ratios vis-à-vis the Baltic countries suggests a key role of proximity, the benefits of close trading links seems to lose their appeal further south.

On the whole, the summary trade ratios suggest that Slovakia, Latvia and Romania are in best position to benefit from the gains of increased trade vis-à-vis the EU-12 countries. On the other end of the spectrum, Hungary's position of compromised trade growth likely reflects its early programme of liberalisation. Ranging from 1.28 (Hungary) to 3.18 (Slovakia), the predicted trade ratios for the ten accession countries are within the range obtained by Baldwin (1994) who in using a similar approach combines actual 1989 values with a gravity equation of OECD countries estimated over the period 1979 to 1988. The summary ratios vis-à-vis the OECD countries carry similar rankings.

A rather mixed degree of trade integration with Europe is shown for the ENP Mediterranean countries. On the one hand, some countries exhibit trade patterns more akin to a normal country's trade behaviour, for example, the trade ratios are close to unity for Lebanese trade vis-à-vis several EU countries. On the other hand, high trade ratios indicate ample manoeuvre for more trade integration. For example, Algerian and Libyan bilateral trade with several EU countries could be as high as ten times 2003 levels.

Overall, the summary trade ratios for the Mediterranean partner countries indicate greatest trade potential for Libya and Algeria, albeit starting from a low level because of their inward orientation. Egypt and Syria are also in a strong position to increase East–West trade. A similar story emerges for Turkey, which has yet to reap the benefits of its customs union with the EU, initiated 1 December 1995; its trade with the EU as a whole could well double 2003 levels. The trade ratios, however, suggest Israel, Jordan and Lebanon have limited scope for increased trade, assuming they were fully integrated into global markets. In studying the trade and growth prospects for the Middle East and North African (MENA) countries, Ekholm, Torstensson and Torstensson (1996) also find a mix of trade ratios for this group of countries.

IV. CONCLUSIONS

The break-up of the Soviet Union spurred an interest in a particular application of the gravity model: in anticipation of a re-orientation of CEE trade towards Western Europe, the gravity model coefficients can be used to project East–West trade flows to gauge the likelihood of further trade integration. The empirical literature of trade flow projections, however, has largely ignored the insights of new trade theory and its implications for the appropriate gravity model specification.

Using an out-of-sample approach to project the trade volumes for ten new member states and ten associated countries, a gravity equation is estimated for a panel data set of bilateral export flows from twelve EU countries to twenty OECD trading partners over the 1992-2003 period. The projected trade patterns for the twenty countries of interest, which have strong links with Europe, are assumed to fit a model of a normal country's geographic trade patterns, as given by the sample of EU–OECD countries. The potential trade ratios are calculated using the parameter coefficients estimated for a gravity model specification of NTT determinants, which, in accounting for two-way trade flows, is claimed by Helpman (1987) to better explain trade patterns among the industrialised countries.

Inserting forecast 2008 data into the respective gravity equations, the potential to actual trade ratios indicate a divergence of patterns for the two groups of countries: while a trajectory of further trade integration is suggested for the countries which have already acceded into the EU with only a few exceptions, a more disparate degree of trade integration with the EU is predicted for the associated countries. Countries of initial low levels of trade integration, for example, Jordan and Lebanon are shown to have limited opportunities for further trade integration while Algeria and Libya display greatest potential for increasing trade links with the EU countries if they continue on the path of strengthening deeper political and economic co-operation under the auspices of the European Neighbourhood Policy.

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Table 1 A Gravity Model of New Trade Theory Determinants of Export Flows

Regressors	POLS[a]	One-way RE[a]	Two-way RE[a]
GDP total	1.50** (110.00)	1.40** (46.12)	1.60** (39.67)
GDP similarity	0.81** (42.78)	0.71** (13.47)	0.86** (15.71)
GDP per capita difference	–0.04 (–1.11)	–0.04 (–0.50)	–0.05 (–0.69)
Distance	–0.74** (–53.53)	–0.79** (–17.15)	–0.87** (–18.32)
Adjacency	0.54** (17.44)	0.58** (5.68)	0.46** (4.69)
Language	0.19** (6.32)	0.08 (0.74)	0.07 (0.64)
EU dummy	0.40** (17.84)	0.13** (9.78)	0.08** (6.05)
Intercept	–13.65** (–38.80)	–10.42** (–13.98)	–15.14** (–15.18)
Nr of obs	2709	2709	2709
R^2	0.885	0.877	0.877
LM test[b]	–	11 222**	11 698**
Time effects	–	–	663.19**

[a] The reported test statistics in parentheses (*z* statistics for RE) are heteroskedasticity robust (White 1980).
[b] Lagrange multiplier (LM) test for random effects (Breusch and Pagan 1980).
** denotes significance at the 5% level; * denotes significance at the 10% level.

Table 2 Potential to Actual ratios of Bilateral Trade: calculations from a New Trade Theory Specification of the Gravity Model[a]

	AUT	BEL	DNK	FIN	FRA	DEU	ITA	NLD	ESP	SWE	CHE	UK	EU	OECD
New Member States														
Bulgaria	1.57	1.73	3.59	6.57	2.39	1.07	1.74	1.78	3.14	3.91	2.58	4.50	1.92	2.17
Czech Rep	3.01	1.66	6.91	3.73	3.10	1.16	2.21	2.02	2.85	3.21	3.07	4.41	1.95	2.05
Estonia	2.58	1.68	1.72	1.35	3.18	1.27	2.74	1.62	4.37	1.09	5.10	5.07	1.74	1.89
Hungary	1.98	1.04	4.09	1.58	2.01	0.49	1.72	1.10	2.40	2.16	2.22	3.04	1.28	1.33
Latvia	3.29	2.70	2.46	1.65	5.51	1.38	2.34	2.28	5.53	2.30	2.90	5.33	2.42	2.71
Lithuania	3.33	1.79	1.63	1.69	3.30	1.03	1.85	1.97	4.26	2.11	4.44	4.19	1.95	2.20
Poland	3.23	1.34	3.84	2.48	2.32	1.45	1.79	1.62	2.88	2.58	3.24	4.53	2.03	2.23
Romania	1.50	2.56	10.30	13.16	2.46	1.43	1.27	2.63	5.96	6.29	4.89	4.97	2.16	2.49
Slovakia	10.79	2.16	7.92	4.30	4.35	0.85	3.10	3.08	2.50	4.60	4.93	7.79	3.18	3.37
Slovenia	1.37	2.07	6.57	5.95	1.58	1.10	2.04	2.11	2.59	3.05	3.78	7.40	1.87	1.99
ENP (Mediterranean Partner Countries)														
Algeria	8.79	1.86	14.28	3.65	0.95	5.25	3.45	5.15	5.52	4.07	9.97	11.92	3.03	3.21
Egypt	5.24	1.61	3.63	2.64	1.61	1.75	1.88	2.06	3.25	2.19	1.76	2.76	2.08	1.75
Israel	4.73	0.23	3.56	2.49	1.94	1.06	1.98	0.84	2.20	2.27	1.12	1.02	1.20	0.97
Jordan	3.81	0.75	1.40	1.82	1.11	0.83	1.19	0.91	1.70	1.59	0.96	1.19	1.13	1.00
Lebanon	4.90	0.53	1.98	2.75	0.51	0.73	0.76	1.13	1.42	2.60	0.67	1.40	0.87	1.00
Libya	9.68	4.53	10.00	22.52	5.42	3.39	1.77	4.23	9.42	3.07	5.32	4.25	3.50	3.89
Morocco	6.86	1.31	7.07	2.75	0.57	1.79	1.50	1.65	1.26	1.81	3.51	3.10	1.35	1.54
Syria	5.66	0.86	6.33	3.15	1.45	1.49	1.44	2.06	2.84	2.53	2.11	4.90	1.91	1.95
Tunisia	6.71	0.83	7.95	2.12	0.43	1.40	1.11	1.91	1.63	2.04	5.50	4.91	1.17	1.32
Turkey	3.45	0.93	5.56	3.05	1.98	1.00	1.90	1.29	2.17	2.76	1.64	2.73	1.71	1.80

[a] Calculations are based on the two-way RE parameter estimates presented in Table 1.

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