Trade and migration flows between some CEE countries and the UK**

by

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ABSTRACT

The recent enlargement of the European Union [EU] has enhanced interest in the causes and consequences of migration between Central and Eastern European [CEE] and Western European countries. This paper considers immigration from CEE countries into the UK and the consequences for these countries' trade with the UK. Using a panel of data covering selected CEE countries between 1996 and 2003, we employ an augmented gravity model to examine the effects of immigration from these transition countries on trade flows with the UK. We pay attention to a number of issues that have been raised within the literature on gravity models. We find evidence that migration positively enhances the bi-lateral exports of the migrants' home country; there is less (but some) evidence that the imports from their destination country are also enhanced.

Keywords: ***trade, migration, gravity models***

JEL classification: **F10, F22**

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I. Introduction

It is now increasingly recognized that it can be useful to include migration amongst the factors that may influence bilateral trade flows between countries [Head and Ries (1998); Dunlevy and Hutchinson (2001); Gould (1994); Girma and You (2002); Parsons (2005); Piperakis, Milner, et.al. 2003]. Thus, Head and Ries (1998) using Canadian trade with 136 partners find a strong impact of immigration on imports. The impact of immigration on bilateral trade was also tested by Dunlevy and Hutchinson (2001) on US exports to 17 European countries at an interval of 5 years. They found a significant impact of immigration on trade. When countries were divided in groups, the impact was proportionately greater for particular regional groupings of countries that reflect the historical pattern of immigration to USA. Min (1990) reports that Korean exports to USA have increased since 1970 due to large Korean migration to USA. Gould (1994) uses a gravity model and a panel data set for 47 US partners and finds that trade- especially exports - is positively influenced by immigration. Girma and You (2002) use an augmented gravity model to analyze the bilateral trade between UK and 48 trading partners including both Commonwealth and Non-commonwealth countries. The results show a significant impact of immigration on exports to Commonwealth countries. Dunlevy and Hutchinson (2001) argue that the impact of migration on trade may be greater when factors like proximity is included (trade flows within Europe).This idea is in accord with the standard form of gravity models in the analysis of trade flows where distance is supposed to matter.

The main objective of this paper is to assess the impact upon their bilateral trade flows with the UK of migration from some Central and East European (CEE) countries - Romania, Bulgaria, Czech Republic, Hungary and Poland and Slovenia, into the UK. In previous analyses of the determinants of trade, simple gravity models relating trade flows to distance and size have been augmented by such variables as a common language, migration, a common border, historical association, participation in a free trade agreement etc. We employ this well-tried device of augmenting a basic gravity model for trade flows. Within this exercise we pay attention to some concerns that have been raised in the literature. These include the potential for the choice of data structure to effect the conclusions (Cheng & Wall, 2005), and the concept of "multilateral resistance" (Anderson and van Wincoop, 2003). We also consider how a panel data structure can impinge on the specification of a gravity model and strategies for assessing its applicability. Finally, we note some evidence that the stock of migrants and flow of migrants may both be influential factors for bilateral trade flows.

There are few existing studies of the bilateral trading relationship between these CEE countries and the UK. So far as we know, none have considered the relevance of migration. We consider that the recent history of these countries is an interesting opportunity for assessing the impact of migration upon trade flows. There is relatively little previous linkage between some of these CEE Countries and the UK. Several have recently undergone considerable structural adjustment, including liberalization of trade and migration. There has been a strong increase in trade with the EU, while intra-regional

trade with CMEA (Council for Mutual Economic Assistance) has dramatically collapsed. In a relatively short period of time, their trade integration with Western Europe has approached levels that would be expected given their proximity to the EU markets (see, Zoltan et al., 2001). This situation of rapidly changing circumstances provides an unusual and useful context within which to assess the evidence for a "migration effect" in bilateral trade flows.

The reminder of this paper is organized as follows. Section II presents a brief overview of trade and migration flows between CEE countries and the EU and some aspects of the patterns of specialization. In section III we present the empirical specification of our model and our results. Section IV concludes.

II. Trade and migration flows between CEE countries and the EU/UK

In this section, we will provide an overview of the evolution of trade flows between the EU and the CEE countries. The integration of the CEE countries into the EU means much greater challenges than those implied by the earlier expansion of the EU. This is especially due to the huge real income gap between the 'old' EU and the new members. The process of accession will imply essential changes within the CEE countries and, if managed properly, these changes can offer great opportunities for the region.

According to IMF Direction of Trade Statistics, the share of EU trade in the total trade of CEE countries exceeds 50% in almost all cases, and has been increasing throughout the duration of our data for almost all countries in the study. These trends reflect in part the steps taken so far toward a full membership of the EU.

The share of trade with the UK within CEE countries' total trade with the EU is also generally increasing. If we rank these countries according to their average share of trade with UK relative to their total trade with EU, the order is: Latvia, Estonia, Lithuania, Romania, Bulgaria, Hungary, Slovakia, Czech, Poland and Slovenia.

CEE countries are traditionally characterized by labor-intensive and resource-intensive industries and by disadvantage in capital-intensive sectors. In the reform period (1989-1995), the trade pattern of CEE countries has experienced significant changes. Guerrieri (1998) shows that the massive geographical reorientation of trade has led to significant changes in the commodity composition of CEE countries' trade. Within the CEE countries, there is evidence that three of them (Poland, Hungary, and the Czech Republic) had recorded a greater success in restructuring trade specialization patterns. The principal reason advanced by Guerrieri (1998) was their different economic and social starting points. This and other factors explain the trade composition of these countries which, besides traditional industries (wearing, apparel, woods, basic metal) contains fabricated metal products and complex manufacturing, sectors also defined with comparative advantage. Hungary, by virtue of changes that occurred inside the country during 1993-

1996, has even succeeded in developing motor vehicles manufacturing - which most other countries are lacking.

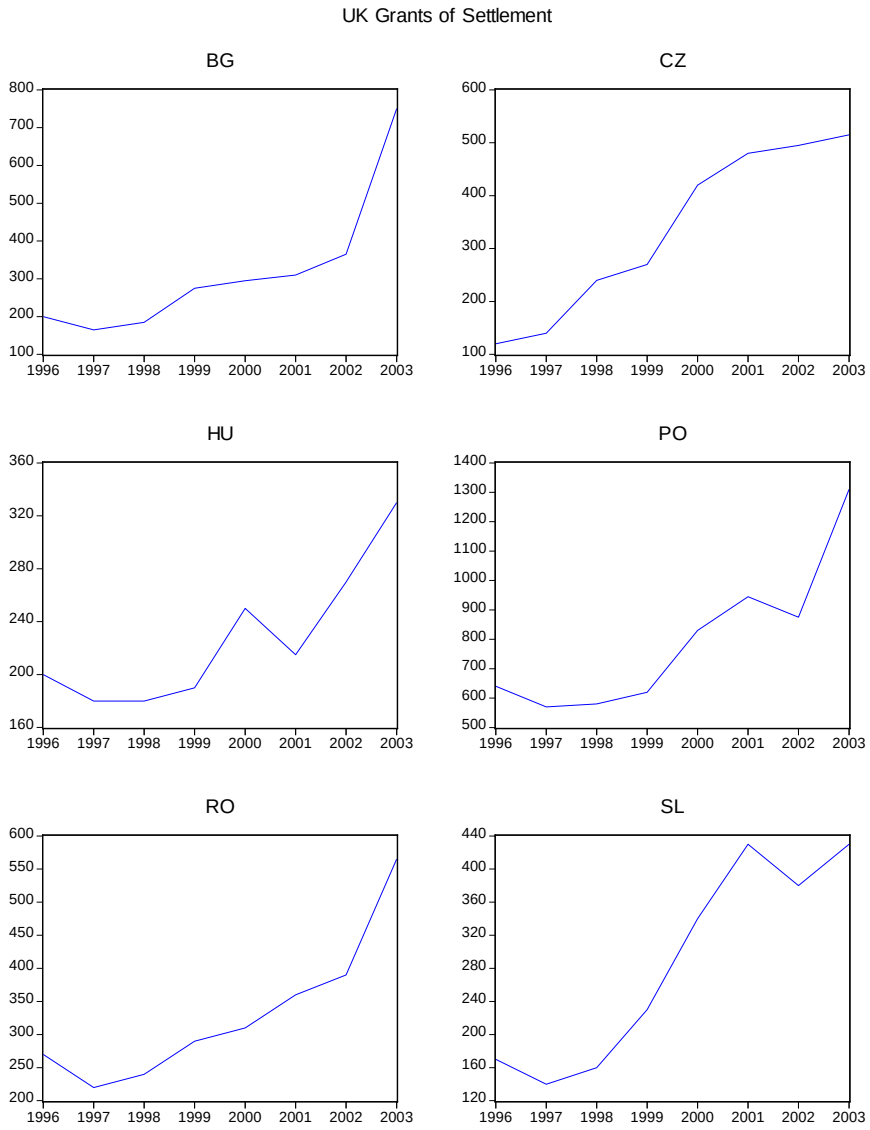
A sensible objective for the CEE countries is to increase bilateral trade flows with the EU, and migration can have a significant role in enhancing these flows. The existing literature on migration shows two important basic channels through which immigrant-links influence bilateral trade flows. Firstly, the immigrants bring with them a preference for home country products. Secondly, immigrants can reduce transaction costs of trade with their home countries. The former seems to be evident and we can assume that it will reflect in the impact upon imports of the host country, but the latter is much more important as it can influence both, imports and exports as well. Girma and Yu (2002) classify the mechanisms through which immigrants can reduce transaction costs into two: individual specific and non-individual specific. In the former case, transaction costs are reduced because of individual immigrant' business connections or personal contacts with his/her home country. If the mechanism is non-individual specific the transaction costs are reduced because of knowledge brought by immigrants about foreign markets and social institutions.

Migration from CEE countries to the EU has become increasingly common in recent years. Following the fall of the communism, a redefinition of individual freedoms, particularly the removal of travel restrictions, greatly increased the opportunity for East-West migration, even before the accession of some of the CEE countries into the EU as part of the 5^{th} enlargement programme. CEE citizens rapidly appreciated these new

opportunities and moved to countries such as the Austria, Italy, UK, the Nordic Countries (especially Finland), Spain, Greece from 1989 onwards. Thus, the relatively sudden transformation of the CEE countries' regulations concerning out-migration provides interesting data with which to investigate various aspects of migration. The number of grants of settlements accorded annually by the UK has been increasing since 1996 every year till 2003, the last year before accession of some countries – see Figure 1, below.

This substantial increase in permanent resettlement from the CEE countries to the UK may, according to the theoretical arguments given above, be an important factor in explaining increasing trade between that region and the UK. To assess the empirical support for this hypothesis we follow the common strategy of augmenting a standard gravity model with the variables whose influence is under scrutiny.

Figure 1



III. Empirical specification and results

Gravity models in economics are analogous to the Newtonian law in mechanics which states that two bodies attract each other proportionally to the product of their masses and

in inverse proportion to the square of the distance between them. Thus, a basic gravity model for trade flows would employ measures of economic size, e.g. GDP, and of geographical distance to explain trade flows:

$$X_{ij} = KY_i^{\beta} Y_j^{\gamma} D_{ij}^{\delta} \qquad [1]$$

Here, X_{ij} is trade flow from the ith to jth countries, with GDPs of Y_i and Y_j respectively, and separated by a distance of D_{ij}. Equation [1] can be written in log-linear form as follows:

$$\log\left(X_{ij}\right) = \alpha + \beta \log\left(Y_i\right) + \gamma \log\left(Y_j\right) + \delta \log\left(D_{ij}\right) \qquad [2]$$

A gravity model may be theoretically justified as a reduced form equation derived from a system of demand and supply relations [Karemera et al. 2000]. Such supply and demand for goods/factors can be linked systematically to measures of scale such as the respective countries' populations or national incomes, to per capita incomes – to express income effects, and to distance – to express transaction costs. Use of the basic form, as in equation [2], has yielded some useful results in explaining trade flows. However, many applications augment this basic gravity model with additional explanatory factors and/or dummy variables to express time-specific or country-specific effects.

Gravity models have been frequently employed in the analysis of trade flows. Anderson (1979) provides a theoretical explanation of the gravity equation applied to commodities. These models suggest that the trade flows between two countries depend on the supply conditions in the origin country, the demand conditions in the host country. Such notions

are consistent with standard models of international trade (see Deardorff, 1995, and Anderson, 1979, Anderson and van Wincoop, 2003).

To improve the explanation of bilateral trade flows, the basic gravity model has been augmented by inclusion of a variety of additional variables, for example measures of infrastructure, per capita income differences, exchange rates. Martinez-Zarzoso and Lehman-Nowak (2003) provide a recent example of using such an augmented gravity model to model trade flows between Mercosur and the European Union. Recent empirical applications show a variety of augmentations of the basic gravity equation, including the addition of migration as an explanatory variable (Gould (1994), Min (1990), Girma and You (2002), Ghatak and Piperakis (2007), Parsons (2005)).

Given our focus on the potential influence of migration on trade flows, we similarly augment a basic gravity model to include a measure of migration. Additionally, we include a measure of each country's overall trade openness. We rationalize this as a proxy for changes in general transaction costs, i.e. what Anderson and Van Wincoop (2003) call "multilateral resistance". Their paper points out that Anderson's initial (1979) advocacy of the gravity model for a country's trade flows with its trading partners was in the context of that country's given extent of "multilateral resistance", i.e. its barriers to trade – whether geographical or institutional. The gravity model is then proposed as useful for explaining how the country's overall volume of trade is distributed amongst its trading partners. For our present study, the institutional developments within the EU accession countries are so marked as to motivate the inclusion of a measure of changing

"multilateral resistance". Initially, we allow the possibility that the trade openness of the UK should also be included. Our augmented gravity model is then

$$y_{it} = \alpha_0 + \alpha_1 M_{it} + \beta_0 GDP_{it} + \beta_1 GDP_{UK,t} + \beta_2 DOP_{it} + \beta_3 DOP_{UK,t} + \beta_4 Dist_i + \varepsilon_{it} \qquad [3]$$

where:

y_{it} is trade flow – imports or exports, between the UK and CEE country i at time t ;

(NOTE: direction of trade is relative to the UK, i.e. *exports* are *from* the UK and *imports* are *into* the UK.)

M_{it} measures immigration from CEE country i to the U.K.;

GDP_{it} is GDP of country i at time t

DOP_{it} is the degree of trading openness of country i at time t in the relation to the world

$Dist_i$ is the distance from the capital of CEE country i to London

(Variables are measured in logarithms.)

Our dataset includes Romania, Bulgaria, Czech, Hungary, Poland and Slovakia. Data are available for each of these separately from 1996 until 2003 As an exploratory exercise, assuming parameter constancy across countries as well as across dates, we pooled the data and applied OLS. Table 2 shows the results for the basic gravity model. The explanatory variables of the basic gravity model – GDP and distance, have correct signs and are significantly non-zero. Goodness of fit is satisfactory.

Table 2: basic gravity model, pooled data

Regressors	LOG(Exports) coefficient	t-prob[1]	LOG(Imports) coefficient	t-prob
C	-81.450	0.001	-137.766	0.000
LOG(GDP)	0.348	0.000	1.084	0.000
LOG(GDPUK)	3.389	0.000	4.351	0.000
LOG(DIST)	-2.143	0.000	-0.757	0.005
R-squared	0.812		0.834	

The pooled data OLS regressions for the augmented gravity model are as follows in table 3.

Table 3: augmented gravity model, pooled data

Regressors	LOG(Exports) coefficient	t-prob	LOG(Imports) coefficient	t-prob
C	-90.888	0.037	-96.071	0.048
LOG(M)	-0.330	0.029	-0.267	0.110
LOG(GDP)	0.710	0.000	1.595	0.000
LOG(GDPUK)	3.230	0.053	1.988	0.279
LOG(DOP)	0.655	0.022	1.223	0.000
LOG(DOPUK)	0.892	0.473	-0.236	0.865
LOG(DIST)	-1.058	0.018	1.164	0.020
R-squared	0.884		0.913	

For both exports (from the UK) and imports (into the UK), the degree of openness of the CEE countries enters significantly and with the expected sign. Other than this, the pooled data offers little support for the augmentation of the basic gravity model. The degree of openness of the UK appears to make no contribution, which might be expected given that this variable has been fairly stationary during the period in question. From the perspective

[1] The "t-prob" column shows the "prob" values associated with the t-tests of the individual coefficients, i.e. the probability of obtaining an estimated coefficient of this size if the true parameter value is zero.

of this study, it is noteworthy that immigration enters with an unanticipated sign, and significantly so in the case of exports.

Cheng and Wall (2005) and Bussière et al. (2005) argue that analysis of gravity models based on pooled data is unreliable because its dismissal of between-countries heterogeneity is likely to be a specification error leading to biased estimation. Cheng and Wall draw evidence from a panel of 29 countries over 4 quinquennial years to support this argument and to conclude that a panel structure in which each trading country pair is allotted a fixed effect is superior to other cross-sectional fixed effect structures.

We proceed now to adopt such a fixed-effects panel structure. In the current study the UK is the only trading partner considered; allotting a cross-sectional fixed effect to each CEE country is therefore sufficient. Time-period fixed effects would be perfectly collinear with UK GDP, which is also a constant in the cross-section dimension. Additionally, Cheng and Wall (2005, fn. 8) note reservations concerning the use of time-period fixed effects when the time periods are, as here, contiguous.

For estimation within the panel framework we use the seemingly unrelated regression [SUR] approach, permitting cross-sectional heteroscedasticity and contemporaneous cross-sectional correlation in the disturbances. The variance matrix is estimated by a version of the (Beck and Katz, 1995) “Panel Corrected Standard Errors” (PCSE)

estimator[2] that is robust against time period heteroscedasticity. The resulting estimation of the basic gravity model for exports and for imports is shown in table 4.

Table 4: basic gravity model, panel data with cross-section fixed effects

	LOG(Exports)		LOG(Imports)	
Regressors	coefficient	t-prob	coefficient	t-prob
C	-89.352	0.000	-144.779	0.000
LOG(GDP)	1.501	0.000	1.083	0.000
LOG(GDPUK)	2.050	0.000	4.400	0.000
R-squared	0.998		0.999	
DW	2.121		1.939	
Fixed Effects				
BG	-0.023		-0.269	
CZ	0.353		0.487	
HU	0.228		0.596	
PO	-1.415		-0.302	
RO	-0.501		-0.212	
SL	1.358		-0.299	

The estimated influence of home and destination country's GDP is significantly positive, as predicted by the gravity model. Since the distance variable is invariant across time periods then it is perfectly collinear with these cross-sectional fixed effects so cannot be included in the model. Cheng and Wall (2005, p55) argue that this might be seen as usefully dispensing with the implicit assumption of the basic gravity model that geographical distance between country capitals is a good measure of transportation costs.

[2] We are using Eviews 5.1

Noting that the empirical success of the basic gravity model is susceptible to the move from pooled data to panel data, we next consider the augmented gravity model within the panel context. The regressors are as previously in table 3, excepting that distance must now be excluded for the reasons given above. The details of the estimation method are as described above for the basic gravity model presented in table 4. The results for the augmented model are now presented in table 5.

Table 5: augmented gravity model, panel data with cross-section fixed effects

	LOG(Exports)		LOG(Imports)	
Regressors	coefficient	t-prob	coefficient	t-prob
C	-58.629	0.000	-24.642	0.000
LOG(M)	-0.029	0.334	0.332	0.000
LOG(GDP)	1.041	0.000	0.139	0.000
LOG(GDPUK)	1.413	0.000	0.946	0.000
LOG(DOP)	0.537	0.000	0.983	0.000
LOG(DOPUK)	0.356	0.123	-0.160	0.224
R-squared	0.995		0.999	
DW	1.913		2.235	
Fixed Effects				
BG	-0.317		-0.852	
CZ	0.285		0.428	
HU	0.051		0.423	
PO	-0.682		0.827	
RO	-0.145		0.465	
SL	0.808		-1.291	

The positive influence of home country and destination country GDP, proposed by the gravity model, appears to be more clearly supported in the augmented version of the model than was the case with pooled data (table 3). As with the exploratory exercise using pooled data, the rapidly increasing general openness to trade of the CEE countries appears as a significant augmenting factor in explaining trade with the UK in particular. The influence of migration upon trade is supported only for imports into the UK from the

CEE countries, with the migration coefficient in the equation for exports from the UK showing the wrong sign and being reported as insignificantly different from zero.

The implications of table 5 are in partial agreement with the results of Ghatak and Piperakis (2007, table 1). In applying an augmented gravity model to their panel of 70 countries over the period 1991-2001 they introduce intercept and slope dummies for a set of Eastern European (EE) countries that partially overlaps with our set of CEE countries. They discover that, although the impact of migration upon imports is insignificant across the panel at large, a significant positive effect exists for the EE countries, which is consistent with our findings here. In the case of exports from the UK, contrary to our results in table 5, they find that migration shows a significant positive effect across the panel at large, including the EE countries.

As a final exercise we further augment the gravity model. We include per-capita GDP as an income measure for the purchasing country, i..e. of the UK for the imports equation and of the CEE countries for the exports equation. Additionally, since the theoretical justification for the inclusion of migrant numbers might apply to the stock of resident migrants as much as to the annual increase, we include the accumulating total grants of settlement (MSTOCK) as well as the annual flow of new grants (M). This general specification is then reduced by step-wise removal of variables with coefficients that are insignificantly different from zero or whose sign is difficult to explain. The results for exports from the UK to the CEE Countries are presented in table 6.

Table 6: Exports model, panel data with cross-section fixed effects

SPECIFICATION:	General		Reduced	
Regressors	coefficient	t-prob	coefficient	t-prob
C	-49.093	0.029	-23.460	0.000
LOG(GDP)	1.036	0.000	1.193	0.000
LOG(GDPUK)	1.067	0.183		
LOG(GDPPC)	0.011	0.859		
LOG(GDPPCUK)				
LOG(DOP)	0.519	0.000	0.626	0.000
LOG(DOPUK)	0.334	0.207		
LOG(M)	-0.029	0.438	-0.059	0.027
LOG(MSTOCK)	0.025	0.671	0.085	0.000
R-squared	0.995		0.997	
DW	1.892		1.839	
Fixed Effects				
BG			-0.144	
CZ			0.231	
HU			0.022	
PO			-0.879	
RO			-0.121	
SL			0.892	

The basic gravity model does not survive the process of model reduction. UK GDP fails to appear significantly with the expected sign, though this may be in part because of the limited variation in this variable in a study, such as this, which considers only a single trading partner. The distance measure, another usual feature of the gravity model, has insignificant correlation with the estimated country-specific fixed effects, though this may result from the limited variation of distance to London within the CEE countries. Thus, we have some grounds for arguing that the influence of UK GDP and distance to London may be absorbed within the common intercept term. The significant positive effect of CEE country GDP seen in table 6 is then sufficient evidence for the relevance of the basic gravity model. Of the augmenting variables, the degree of openness of the CEE countries is significant without question, whereas acceptance of the existence of a

migration effect requires that we both accept the accumulating grants of settlement within the sample period as a useful measure of the growing size of an immigrant community and also rationalize the negative coefficient on the annual flow as the result of double counting the current flow in the stock figure. These are fragile arguments but we present them as a pointer to the usefulness of further investigation into the stock vs. flow effects of migrant numbers.

Table 7 reports a similar reduction of the augmented gravity model in the case of imports into the UK from the CEE Countries.

Table 7: Imports model, panel data with cross-section fixed effects

SPECIFICATION:	General		Reduced	
Regressors	coefficient	t-prob	coefficient	t-prob
C	17.229	0.387	-0.437	0.588
LOG(GDP)	0.230	0.000	0.129	0.000
LOG(GDPUK)	-0.796	0.291		
LOG(GDPPC)				
LOG(GDPPCUK)	0.367	0.279	0.222	0.002
LOG(DOP)	0.886	0.000	0.880	0.000
LOG(DOPUK)	-0.522	0.293		
LOG(M)	0.302	0.000	0.295	0.000
LOG(MSTOCK)	0.103	0.093	0.081	0.000
R-squared	0.999		0.999	
DW	1.991		2.150	
Fixed Effects				
BG			-0.878	
CZ			0.482	
HU			0.469	
PO			0.762	
RO			0.407	
SL			-1.241	

As with exports the fixed effects are uncorrelated with distance, so that neither distance nor UK GDP is found to have significant influence. As argued in the commentary on

table 6, this is not necessarily evidence against the basic gravity model in the context of the current study. We find that income levels in the UK are relevant for imports demand and that the openness to trade of the CEE countries is, as for exports, influential. As to the influence of CEE migrants upon UK imports from the CEE countries, our preferred model shows a positive impact for both the annual number of grants of settlement and also its accumulating total.

III. Conclusions

The objective of this paper has been to analyse the determinants of bilateral trade flows between the CEE countries: Romania, Bulgaria, Czech, Poland, Hungary and Slovakia, and the UK in a Gravity model, paying particular attention to the strength of evidence for "migration effects". We confirm the advice of Cheng and Wall (2005) that conclusions with regards to the gravity model are sensitive to the choice of data structure. In particular, we find that the impact of geographical distance and UK GDP, both of which are anticipated by the gravity model, is apparently evident in pooled data but not when unobserved country-specific heterogeneity is admitted via a panel structure with cross-sectional fixed effects. We argue that although this illustrates the sensitivity of results to estimation method, it is not convincing evidence against the continuing usefulness of the gravity model in studies where the range of variation for distance and for partner country GDP is greater than here. As in Ghatak and Piperakis (2007), we find that the evidence for the influence of migrant numbers on trade is more convincing for the case of imports

into the migrants' destination country than it is for exports from there to their home country.

We find that the rapidly expanding CEE countries' trade openness is an important explanatory variable, concluding that this illustrates the assertion of Anderson and van Wincoop (2003) that bilateral trade developments should be understood within the context of countries' "multilateral resistance" to trade.

We find some grounds for suggesting that the stock of migrant numbers are an important factor additional to the flow of new migrants and that exports from the UK may possibly be influenced by an accumulation of migrant numbers. Whilst it may be possible to rationalize such a hypothesis in terms of the difficulties of establishing export arrangements relative to import arrangements, we prefer to see this finding as grounds for further research.

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