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GLOBALIZATION, INTERNATIONAL TRADE, AND HUMAN DEVELOPMENT: A CASE OF CENTRAL AND EASTERN EUROPE

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Abstract

Our paper focuses on estimating the effect of human development on international trade flows in the global economy with the help of the generalized gravity model. We are particularly interested in the countries of Central and Eastern Europe (CEECs). Previous research and empirical studies also investigated the determinants of trade flows but concentrated only on traditional gravity variables such as the size of trading partners, factor abundance, technology differences, and/or distance. Our novel approach introduces the role of aggregate human development indicators such as Human Development Index and its constituent components on top of the standard set of gravity model variables. Our findings confirm that both aggregate and disaggregate indicators of human development influence the volume of international trade flows.

Keywords: bilateral trade flows, globalization, human development indices

JEL classification: F63, O15, P33

Introduction

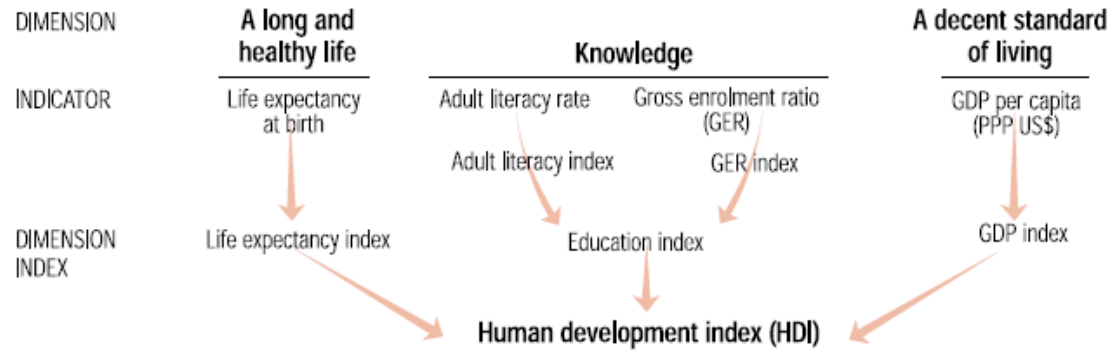
Our paper investigates the relationship between globalization, international trade flows and human development with the special focus on Central and Eastern European (CEE) countries. Several theoretical and empirical articles in the sociological literature study the linkages between globalization and human quality of life (QOL). For example, Tsai (2007) and Sapkota (2011) tested of some of these linkages proposed by Sirgy et al. (2004) and found that globalization had both positive and negative effects on human QOL in the context of developing countries. In the more recent study for post-transition countries of Central and Eastern Europe, Cieślik (2014) demonstrated that there was a positive and statistically significant relationship between globalization and human development in the case of unconditional regressions, however, when differences in the level of economic development were taken into account the globalization variable lost its previous statistical significance. Although the aforementioned studies tried to investigate the effects of globalization on human aspects of development the empirical efforts to study the opposite relationship are still quite preliminary, especially for CEE countries, and deserve more theoretical and empirical attention. In particular, the evidence on the relationship between human development and international trade flows remains scarce.

Traditional as well as the new trade theory (NTT) stress the importance of various factors for shaping the pattern of international trade flows. For example, traditional Ricardian trade theory predicts that differences in technology at country level can create the basis for international comparative advantage and in turn may affect trade flows. Similarly, the role of labour productivity is stressed by the latest strand in the NTT initiated by Melitz (2003) that focuses on firm heterogeneity and shows that export decisions are affected by labour productivity at the firm level. However, both traditional and new trade theories treat labour productivity at the country as well as at the firm level as an exogenous variable. In contrast, in our view labour productivity may in fact depend on stock of human and social capital. Therefore, we can expect that the higher level of human development may be positively associated with the efficiency of human capital and thus may positively affect firm productivity and their decisions to export.
The main goal of this paper is to study the role of human development in increasing the volume of international trade in CEE countries using the theory based augmented gravity model. The structure of this paper is as follows. In the next section we discuss the concept and measures of human development in the context of the global economy with the special focus on the case of CEE countries. Subsequently, we present the analytical framework and discuss data sources and definitions of our explanatory variables. Finally, we present estimation results. The last section summarizes and concludes with directions for future studies.

Human Development in Global Perspective: Concept and Measures

Human development is a process in which people can develop their full potential and lead productive, creative lives in accord with their needs and interests and thus improving the usage of human capital. According to Gary Becker (1964) human capital is similar to 'physical means of production', such as factories and machines. One can invest in human capital (via education, training, medical treatment) and one's output depends partly on the rate of return on the human capital one owns. Human capital accumulation depends on the level of human development. In particular, various measures of the level of human development, such as the level of education and quality of the healthcare system, affect human capital formation.

Figure 1: Construction of Human Development Index



Source: Human Development Indices (2010)

Human development is a very broad concept that has many dimensions. In our study to measure the level of human development we use the hybrid Human Development Index (HDI). The values of this index are available for the period 1970-2010. This index is the original and best-known composite index of human development. Among the most important dimensions are: i) healthy life, ii) access to knowledge, and iii) a decent standard of living. The Human Development Report (HDR), introduced the HDI by combining indicators of

income, education, and health into a single index. By ranking countries according to their HDI value, the HDR has helped to shift the debate away from GDP per capita as the only measure of human development. The construction of the HDI is shown in

Figure 1.

The HD index measures country's average achievement in attaining:

- A long and healthy life (as measured by life expectancy at birth).
- Access to knowledge (the adult literacy rate and the combined gross enrolment ratio (GER) in primary, secondary, and tertiary education).
- A decent standard of living (as measured by the GDP per capita expressed in purchasing power parity [PPP] US dollars).

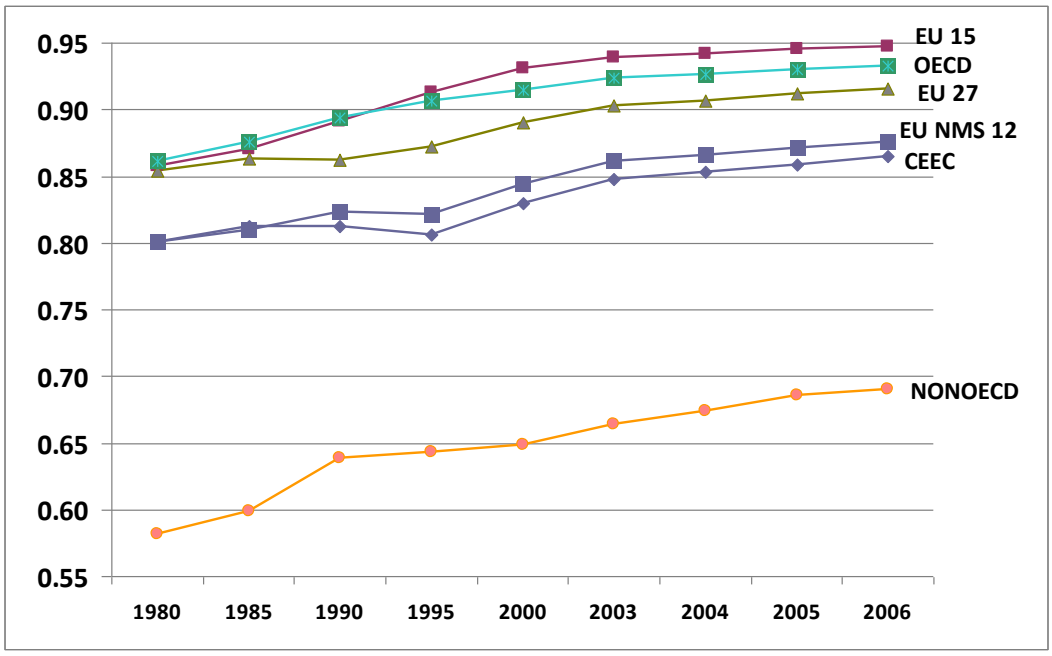
These three dimensions are standardized to values between 0 and 1, and the simple geometric mean is taken to calculate HDI value in the range 0 to 1. The equal weights are not crucial for the level of indices. The application of other weights (e.g. 0.25; 0.25 and 0.5) does not change significantly the ranking of countries, according to Human Development Indices (2010). The HDI components include:

- GDP_pc – GDP per capita measured in current US dollars;
- Literacy – adult literacy rate, percentage of population aged 15 and above;
- Life expectancy – expected number of years at birth, expressed in terms of relevant indices ranging from 0 to 1.

Three thresholds are used to classify HDI values as high, medium or low (at or above 0.800; between 0.500 and 0.800; and below 0.500, respectively). The differences among countries with high and low levels of HDI are very important not only in terms of GDP per capita. For example, the life expectancy in the top 20 countries is close to 80 years, but in one of the bottom 20 countries, life expectancy is only 49 years on average.

The relative position of all CEE countries treated jointly as one group based on HDI indices, in comparison to EU-15, EU-27, OECD and non-OECD countries is shown in Figure 2. The differences between OECD and non-OECD member states (developing countries) remain very significant although they decreased slightly over the years. The old member states of the EU on average are more developed than the whole group of the OECD countries.

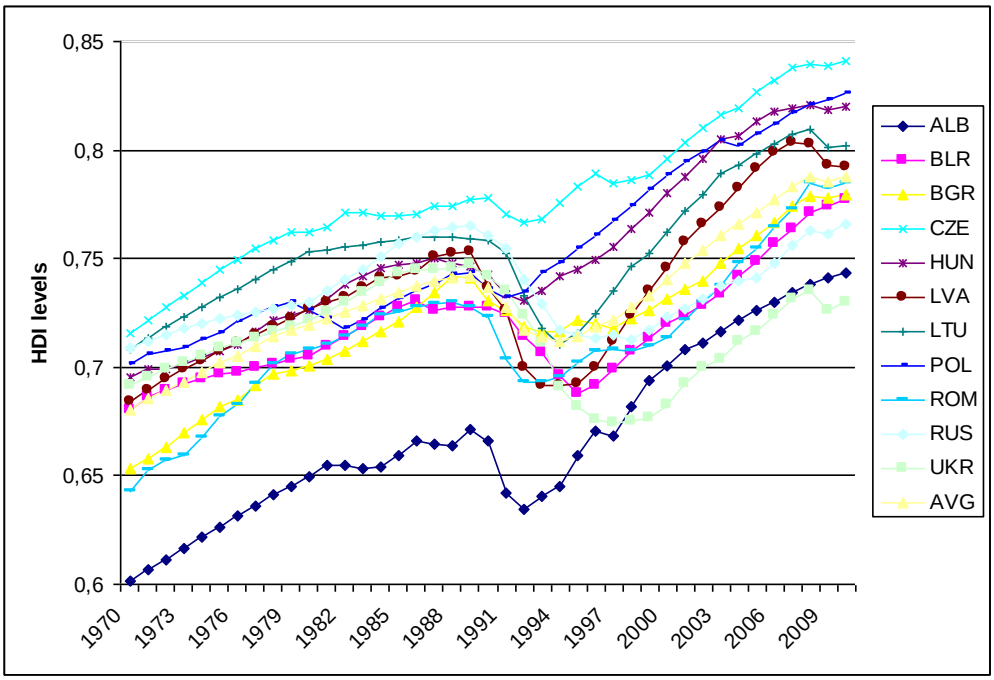
Figure 2: Human Development Index: Changes in country groups (1980-2006)



Source: Own elaboration based on *Human Development Indices* (2010)

The differences between the CEE countries and old EU member states (EU-15) are still quite significant but they are gradually narrowing down over time. Moreover, it can be noted that the CEE countries experienced a decline in the value of the HDI indices during the transition shock in the late 1980s and early 1990s. Since that time a divergence between the CEE countries as a whole and the group of countries which became the new member states of the EU (EU NMS-12) can be observed.
The changes in the value of the HDI indices for particular CEE countries over time are shown in Figure 3.

Figure 3: Human Development Index: Changes in CEE countries (1970-2010)



Source: Own elaboration based on *Human Development Indices* (2010)

Figure 3 shows more clearly that the value of the HDI declined significantly in all CEE countries during the period of economic and political transition initiated in the region in the late 1980s and early 1990s. This decline was mainly due to the sharp decline in the level of GDP per capita and to some extent also in life expectancy following the collapse of the state healthcare system in many countries of the region. The recovery from the transition shock varied across the region. In Central European countries including the Czech Republic, Hungary and Poland the decline in the HDI index was relatively small and short lived. However, in the Baltic states, such as Latvia and Lithuania, and the Southern European countries such as Albania and Bulgaria the decline was much bigger but they recovered relatively faster. Finally, in some countries like Ukraine the decline was deep and recovery slow.
In the next sections we will study the relationship between human development and international trade flows. In particular we will study the relationship between the HDI index and its components and bilateral exports using the generalized gravity equation.

Analytical Framework and Data Sources

According to Anderson and van Wincoop (2004) the gravity equation is one of the most popular empirical equations that has been successfully used to study the whole range of spatial interactions in economics for a half of the century. In particular, it has been most often applied to study the determinants of bilateral trade flows and to assess the impact of various forms of regional economic integration such as the establishment of free trade areas or introduction of the common currency.

The gravity equation in its most basic form postulates that the amount of trade between two countries increases in their sizes, as measured by their national incomes, and decreases in the cost of transport between them, as measured by the distance between their economic centres. This relationship closely resembles Newton's (1687) law of universal gravitation which states that every particle in the universe attracts every other particle with a force that is proportional to the product of their masses and inversely proportional to the square of the distance between the particles.

Although the gravity equation in its basic form does a pretty good job at explaining bilateral trade with just the size of trading partners and distances between them, however, there is still a huge variation in trade it is unable to explain. Therefore, in order to improve the performance of the gravity equation in empirical studies of bilateral trade flows it has been also common to specify it in a more general form that takes into account also the impact of other factors that may affect trade.

One of the most frequently used variables to augment the baseline gravity equation is per capita income. The first formal justification for the inclusion of the per capita income variables was provided by Bergstrand (1989, 1990) who concentrated on the demand-side. He assumed complete specialization in production and in order to provide the theoretical justification for the use of per capita incomes in his estimating equations he had to depart from the standard assumption of homothetic and identical preferences across countries. Instead, he assumed non-homothetic preferences in the manner of Markusen (1986), however, his approach was not very successful empirically (a similar approach based on non-homothetic preferences was also proposed by Markusen (2013)).

More recently, Cieślik (2009, 2015) demonstrated how the augmented gravity equation can be derived from a variety of models based on both neoclassical and monopolistic competition approaches that assume incomplete specialization in production and provided a supply-side justification for the inclusion of per capita income variables. According to him, income per capita variables could serve as a proxy for the differences in relative factor endowments between trading partners.

Per capita incomes constitute an important component of the HDI and will be used as one of main explanatory variables in the disaggregated analysis of components of the HDI. In our specification in addition to the standard gravity variables we use also the arable land per capita of trading partners as a measure of their relative factor endowments. Moreover, we also control for changes in trade policy that occurred during the period covered by our sample that reflect multilateral as well as regional trade liberalization (for details concerning trade liberalization in the CEE countries see Cieślik and Hagemejer (2011)). Our estimating equation used to study the determinants of bilateral trade flows, specified in the logarithmic form, is as follows:

$$\ln Exports_{ijt} = \alpha_0 + \alpha_1 rep\_\ln GDP_{it} + \alpha_2 part\_\ln GDP_{jt} + \alpha_3 rep\_\ln Land_{it} +$$
$$\alpha_4 part\_\ln Land_{jt} + \alpha_5 \ln Distance_{ij} + \alpha_6 contig_{ijt} + \alpha_7 EU_{ijt} + \alpha_8 GATT\_WTO_{ijt}$$
$$+ \alpha_9 OECD_{ijt} + \alpha_{10} rep\_land\_locked + \alpha_{11} part\_land\_locked + \alpha_{12} Col45$$
$$+ \xi' Z_{ijt} + c_{ij} + \varepsilon_{ijt}$$

where:

- $Exports_{ijt}$: bilateral exports between country *i* and *j* in period t; measured in current US dollars;
- $rep\_\ln GDP_{it}$: GDP in reporting country *i* in period t; measured in current US dollars;
- $rep\_\ln Land_{it}$: arable land per capita proxying for the factor proportions in reporting country *i* in period t; measured in hectares per person;
- $part\_\ln GDP_{jt}$: GDP in partner country *j* in period t; measured in current US dollars;
- $part\_\ln Land_{jt}$: arable land per capita proxying for the factor proportions in partner country *j* in period t; measured in hectares per person;
- $Distance_{ij}$: distance proxying for the trade cost between country *i* and *j*; measured in kilometres;
- $contig_{ijt}$: dummy variable that has an impact on trade cost and takes value 1 if there is a common border between countries *i* and *j* in period t and 0 otherwise;
- EU_{ijt}: dummy variable that takes value 1 if both countries are members of the European Union in period t and 0 otherwise;
- GATT_WTO: dummy variable indicating whether both countries are the GATT/WTO members or otherwise.
- OECD: dummy variable indicating whether both trading countries are the OECD members or otherwise;
- LandLocked: dummy variable that affects trade cost and takes value 1 for landlocked countries and 0 otherwise;
- *Col*45: dummy variable that affects trade cost and takes value 1 for countries having common colonial past and 0 otherwise
- Z_{ijt}: vector of human development variables that affect labour productivity in country *i* and country *j* in period *t*. These variables include HDI and its components. The detailed description of these variables is provided in the next section.
- c_{ij}: individual country-pair specific effect that may be fixed or random depending on model specification;
- ε_{ijt} : error term.

Our empirical specification includes an unobserved effect c_i that can be often correlated with explanatory variables. In this case the joint error term can be defined as: $v_{ijt} = c_{ij} + \varepsilon_{ijt}$. We examine the role of aggregate human development indicators such as HDI as well as its components. In particular, we aim at verifying three main research hypotheses:

- *Hypothesis 1:* The higher value of *Human Development Index (HDI)* is positively associated with larger trade;
- *Hypothesis 2:* The higher value of life expectancy (a proxy for the quality of the healthcare system and a reflection of the level of social development) should be associated with larger international trade;
- *Hypothesis 3:* The higher literacy rate, reflecting better access to education and skills, should be associated with higher levels of international trade.

To verify those hypotheses we used the panel covering all Central and Eastern European reporting countries and over 150 partner countries (depending on the data availability) over the period 1970-2009 (this study complements the earlier studies by Cieślik *et al.* (2012a,b; 2013) who used different samples of countries and estimation methods).
In our study, we used bilateral trade exports of all countries that were treated as *reporters*, with all other countries, that were treated as *partners* (importers), excluding the smallest countries with a population less than 200 thousand inhabitants were dropped from the sample. This yielded a total of more than 200 thousands of bilateral observations.
Our dependent variable is defined as bilateral exports form a reporter to a partner country. Export data is expressed in current US dollars for exports (gross exports). Trade data comes from the WITS (World Integrated Trade Solution) database, complied jointly by the World Bank, WTO and UNCTAD. Macroeconomic data were obtained from the World Development Indicators (WDI) 2011 database published online by the World Bank in Washington at www.worldbank.org. Data on distance comes from the CEPII (*Centre d'Etudes Prospectives et d'Informations Internationales*) database. Data on social and human development were obtained from the last edition of Human Development Indices (2010), prepared by United Nations Development Programme.

Results of estimations

In Table 1 we present two sets of estimation results. First, in columns (1)-(2) we discuss the general results obtained using the HDI index for the period of 1970-2009. Then, in columns (3)-(4) we present estimation results for the particular components of HDI. We start with the discussion of estimation results obtained from the benchmark gravity model with the fixed effects estimator and later we show the robustness of our results with the random effects estimator. Our specification of the estimating equation included the extended set of gravity variables: GDP, distance, and land per capita proxying for factor proportions of the trading partners. In addition, we included trade policy variables such as membership in the OECD, EU, and GATT-WTO.
The benchmark estimation results for bilateral exports are presented in column (1) in Table 1 below. In our results, the estimated parameters for *reporters* should be interpreted as accompanying characteristics of exporting countries, while the parameters for *partners* as accompanying characteristics of importing countries.
Our estimation results reveal that both in the case of partner and reporter countries the estimated parameters on HDI variables are statistically significant and display the expected and positive signs. The standard gravity variables generally display the expected signs and are statistically significant. For example, the positive values of the estimated parameters on the GDP variables of both exporting and importing countries show that trade flows are bigger between larger countries. The positive values of the parameters on trade policy variables suggest that the membership in the GATT-WTO, OECD, and EU promotes trade.
In column (2) we verify the robustness of our results with the random effects estimator. It turns out that the estimation results are very similar to those obtained with the use of the fixed effects estimator. Both in the case of partner and reporter countries the estimated parameters on HDI variables are statistically significant and display expected and positive signs. As in the case of the fixed effects estimator the standard gravity variables display expected signs and are statistically significant. Moreover, all time-invariant variables such as colonial past, distance, common border (contiguity) and land-locked geographic location are statistically significant and display expected signs. However, the Hausman test favours the use of fixed effects as the proper estimation format.

Table 1: Results of estimation (t and z-stats in parentheses)

	(1)	(2)	(3)	(4)
lrep_GDP	**0.588*** **	**0.752*** **	**-0.017**	**0.918*** **
	(6.33)	**(118.87)**	**(0.51)**	**(91.03)**
lpart_GDP	**0.486*** **	**0.519*** **	**0.766*** **	**0.703*** **
	(57.26)	**(84.43)**	**(26.37)**	**(70.34)**
lrep_Land	**-0.350*** **	**0.032*** **	**-0.459*** **	**-0.002**
	(20.92)	**(2.85)**	**(26.46)**	**(0.18)**
lpart_Land	**-0.033** **	**0.068** **	**-0.036** **	**0.024** **
	(2.06)	**(6.20)**	**(2.17)**	**(2.14)**
Oecd	**0.448*** **	**0.576*** **	**0.378*** **	**0.606*** **
	(13.62)	**(18.56)**	**(11.42)**	**(19.42)**
eu	**0.279*** **	**0.184*** **	**0.215*** **	**0.251*** **
	(9.88)	**(6.54)**	**(7.52)**	**(8.87)**
gatt_wto	**0.092*** **	**0.066*** **	**0.110*** **	**0.057*** **
	(8.86)	**(6.59)**	**(10.44)**	**(5.66)**
Col45		**3.087*** **		**2.939*** **
		(17.32)		**(16.54)**
ldist		**-1.335*** **		**-1.415*** **
		(58.70)		**(62.02)**
contig		**1.743*** **		**1.375*** **
		(14.79)		**(11.66)**
rep_land_locked		**-0.586*** **		**-0.564*** **
		(13.27)		**(12.77)**
part_land_locked		**-1.158*** **		**-1.154*** **
		(27.04)		**(26.92)**
rep_hdi	**1.352*** **	**1.041*** **		
	(23.31)	**(23.51)**		
part_hdi	**0.756*** **	**0.361*** **		
	(16.48)	**(9.54)**		
Rep_GDP_pc			**0.622*** **	**-0.199*** **
			(18.32)	**(17.45)**
Part_GDP_pc			**-0.199*** **	**-0.216*** **
			(6.87)	**(19.18)**
Rep_life_expectancy			**2.360*** **	**1.994*** **
			(23.14)	**(22.17)**
Part_life_expectancy			**0.384*** **	**0.348*** **
			(4.84)	**(4.82)**
Rep_literacy			**-0.086** **	**-0.334*** **
			(2.38)	**(12.47)**
Part_literacy			**0.057** **	**-0.066*** **
			(2.03)	**(3.09)**
_cons	**-17.720*** **	**-11.041*** **	**-25.659*** **	**-24.353*** **
	(80.86)	**(42.53)**	**(47.37)**	**(57.12)**
Country-specfic effects	**fixed**	**random**	**fixed**	**random**
r2_within	**0.332**	**0.330**	**0.332**	**0.329**
r2_between	**0.451**	**0.642**	**0.230**	**0.653**
r2_overall	**0.455**	**0.594**	**0.260**	**0.602**
Hausman chi2 test		**3093.62**		**80.91**
p-value		**(0.000)**		**(0.000)**
No. of observations	**279004**	**279004**	**279004**	**279004**

Note: *** denotes statistical significance at the 1% level,- ** denotes statistical significance at the 5% level, - * denotes statistical significance at the 10% level.

Source: Own results

In column (3) and (4) we disaggregate the HDI into its constituent components. Our estimation results reveal that in the case of the fixed effects estimator the literacy variable is statistically significant for both countries at the 5 per cent only. However, it displays an unexpected negative sign for the reporting country. This puzzling result might be due to the fact that the simple

education index is a very crude measure of the level of education and human capital. The estimated parameters on life expectancy for the partner and reporter countries are both positive and statistically significant already at the 1 per cent level. Thus, the quality of the healthcare system and social environment can positively affect international trade flows.
Finally, the estimated coefficients on the GDP per capita variables are statistically significant at the 1 per cent levels. However, the GDP per capita for partner country displays a negative sign while the GDP per capita for the reporting country displays a positive sign.
The estimation results obtained in the case of the random effects estimator are quite similar to those obtained with the use of the fixed effects estimator. The literacy variable is statistically significant for both countries already at the 1 per cent level. However, this time it displays an unexpected negative sign for both countries. The estimated parameters on life expectancy for the partner and reporter countries are also both statistically significant at the 1 per cent level and display expected positive signs. Finally, the estimated coefficients on the GDP per capita variables are statistically significant at the 1 per cent levels and both display negative signs. However, the Hausman test prefers the use of fixed effects as the proper estimation format.

Summary and conclusions

In this paper, we studied the effect of human development on international trade in Central and East European countries using the generalized gravity model. In our study both aggregate and disaggregate measures of human development were used. Our empirical results showed that there is a positive relationship between our most general measure of human development (HDI) and the level of exports for the reporting and partner countries both in the case of fixed and random effects estimators. The Hausman test preferred the use of the fixed effects estimator as the proper format for the calculations in our model. The disaggregation of HDI into its constituent components showed that these results were mostly driven by the life expectancy variable. In particular, the only puzzling result is related to the negative relationship between the literacy rate and the volume of exports in the case of the reporting country. Therefore, future studies are needed to explain this puzzling result.

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