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Gender Equality as the Determinant of FDI Flows to Central European Countries*

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Abstract

The purpose of this paper is to asses the weight of human capital and gender equality in explaining the bilateral FDI inflows to 11 Central European economies. The group comprises the ten countries that acceded to the EU in 2004 or 2007 and Croatia which is a candidate country since 2004. The focus on the region is justified by the fact that the European Commission acknowledged that fostering human capital development and gender equality is a condition of economic development. The period under investigation encompasses 2000-2009 and includes both the global FDI flows peak achieved in 2007 as well as the two years of sharp declines in 2008 and 2009. If FDI is mostly low-cost seeking oriented, however, gender inequality in health and access to education may create a pool of low-pay workers that can be profitably exploited unless the level of productivity is not seriously hindered by gender disparities. In this paper I argue that women's representation in parliaments is another aspect of the gender gap that may shape foreign investors decisions. These hypotheses are verified in the framework of a standard gravity model using System Generalized Method of Moments technique.

Keywords: Foreign direct investment, gender inequality, economic development, Central and Eastern Europe, gravity equation.
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Introduction

The foreign direct investment (FDI) flows are regarded as the main channel of international technology diffusion and important growth enhancing factor in the recipient economies and a preferred way of financing current account deficits. The issue of FDI-friendly climate has been particularly relevant in Central Europe where physical capital and state-of-the-art technologies are scarce and persisting current account deficits are widespread.

The purpose of this paper is to asses the weight of human capital and gender equality in explaining the bilateral FDI inflows to 11 Central European economies. The group comprises the ten countries that acceded to the EU in 2004 or 2007 and Croatia which is a candidate country since 2004. The focus on the region is justified by the fact that the European Commission acknowledged that fostering human capital development and gender equality is a condition of economic development. The period under investigation encompasses 2000-2009 and includes both the global FDI flows peak achieved in 2007 as well as the two years of sharp declines in 2008 and 2009.

The standard argument posits that healthy and well educated workers raise labor productivity and entice foreign investors. If FDI is mostly low-cost seeking oriented, however, gender inequality in health and access to education may create a pool of low-pay workers that can be profitably exploited unless the level of productivity is not seriously hindered by gender disparities. In this paper I argue that women's representation in parliaments is another aspect of the gender gap that may shape foreign investors decisions. These hypotheses are verified in the framework of a standard gravity model using System Generalized Method of Moments technique.

Gender equality constitutes an element of the multidimensional concept of human development which is much broader than that allowed by income alone. The Human Development Report defines it as a process of enlarging people's choices and underscores the critical importance of three aspects: long and healthy life, level of education and decent standard of living[1].

The discrimination against women in health, education, and in the labor market may hinder human development in the broader sense, that is people's ability to make informed choices and actively shape their environment. The transition from communism to the market economy has transformed the gender regime in Central Europe (Pascall and Lewis, 2004). The dual earner model, alternative to male breadwinner / female carer model predominant in the Western European countries, has been undermined by ideologically and economically motivated decisions of governments to retrench and reduce involvement in childcare. On the other hand, market-based democracy and the emergence of collective action have enabled an improvement in women's position in public life. Unfortunately,

[1] See UNDP (2010), pp. 24-25.

despite the development of civil society, women's representation in politics and governments has been generally low (UNICEF, 1999).

The UNDP (UNDP, 2010) has recently elaborated a new measure of gender inequality, the Gender Inequality Index (GII), which captures unequal distribution of human development in education, reproductive health, political representation, and labor market participation[2]. Even though the GII has been calculated solely for 2008 and gives only a snapshot picture of gender inequality, it reveals substantial differences between Central European countries. The value of the GII is equal to 0.478 in Romania and 0.293 in Slovenia showing that the degree of women discrimination in the former is larger by 60% than in the most gender equal country in the region.

The objective of the paper is to assess the likely influence of the differences in educational attainment and health between women and men and female parliamentary representation on FDI location in Central Europe. The rest of the paper is structured as follows. I begin with section 1 by reviewing the literature dealing with the dependence of FDI on human capital and gender equality in education. Section 2 contains model specification and hypothesizes that FDI responds to gender inequality in education and health because of recent changes in relative demand for cognitive and physical skills, and to female political activism because of its impact on wages. The empirical results discussed in section 3 show that women's advantage over men in education in the hosting economy and greater proportion of seats held by women in the source country give impetus to FDI inflows. Better health status of women compared to men and larger parliamentary representation of women in the host country have the opposite effect. The concluding section underlines that these findings are novel.

1. Literature review

The literature dealing with the role of human capital in attracting foreign investors can be seen against the backdrop of the general FDI theories. The assumption that an economy's technology level is the average level of its workers' human capital led Lucas (1990) to challenge the neoclassical theory prediction that wealthy countries invest in poorer ones. Higher productivity of physical capital in the latter group vanishes if one takes into account differences in the level of human capital. To be more specific, correcting for skills differentials reduces the ratio of returns on physical capital in rich and poor countries by a factor of ten, from 58 to 5.

In the international trade theory which endogenizes multinational firms under assumptions of imperfect competition and scale economies in production, the importance of human capital is stressed in vertical FDI models. Zhang and Markusen (1999) focused on skilled labor as one of the main determinants of

[2] The value of the GII ranges from zero (perfect equality) to 1 (total inequality).

costs of investing abroad. Although the unskilled labor in the assembly process is employed by multinationals, minimal levels of skilled labor must be drawn from the host economy in order to set up a plant abroad. If the relative endowments in skilled and unskilled labor diverge significantly, the scarcity of skilled-labor required to establish a plant in the host economy becomes prohibitive and no FDI takes place.

The role of human capital is discernible in the theoretical approaches that emphasize the importance of technology and productivity as explanatory factors behind FDI flows. The idea that superior knowledge gives temporary monopolistic advantage and motivate foreign investors can be traced back to Vernon's (1966) product life cycle hypothesis. More recently Helpman et al. (2004) highlight the vital role of within-sector firm productivity differences in explaining the engagement in foreign activities. A certain threshold level of productivity has to be achieved in order to profitably serve the foreign market through FDI, because only the most productive firms can build subsidiaries and cover fixed costs abroad.

The results of empirical research are far from being clear-cut which is partly due to difficulties in gauging without a measurement error the level of human capital[3]. Nunnenkamp and Spatz (2003) compiled data for the US FDI stocks in 166 countries and found a positive and statistically significant impact of average years of schooling in both 1995 and 2000. The regression analysis of FDI in 165 countries between 1980 and 1999 in Akin and Vlad (2011) revealed that the relationship between educational attainment and FDI seems to be negative for high income countries but it switches to positive in the middle income group.

Agosin and Machado (2006) employ the UNDP's education index which couples both the rate of investment in and the level of basic education. It is equal to the weighted average of the adult literacy rate (two thirds) and the combined gross school enrolment rate (one third). Applying several panel data estimation methods to the data set collected for more than 100 countries in 1990, 1996 and 2002, they supported the view that education is among the primary determinants of FDI flows.

The importance of stock and flow of human capital for FDI flows to 36 developing countries over the period 1980-1994 was scrutinized by Noorbakhsh et al. (2001). Secondary school enrolment ratio is a measure of the flow of investment in human capital and two variables were taken by the authors to quantify the stock of human capital, namely mean years of secondary and the sum of mean years of secondary and tertiary education in the working age population. The coefficients of all three measures of human capital are positive and statistically significant and the effect of human capital on FDI inflows was estimated to be considerably larger when the last three years 1991-1994 are added to the regression, suggesting an upward trend in its importance across time.

[3] For a comprehensive review of the early literature Miyamoto (2003) is strongly recommended.

The availability of skilled and educated labor proxied by the percentage of government spending going to education turn out insignificant in Ismail's (2009) study of the determinants of inward FDI into 8 ASEAN economies. The ratio of total federal government education development expenditure to GDP was found by Tsen (2005) to attract FDI in the long-run in Malaysia. By contrast, Cheng and Kwan (2000) appraised three alternative proxies for labor quality in their analysis of the determinants of FDI in 29 Chinese regions from 1985 to 1995 but none was proved to be significant.

Firms contemplating direct investment abroad face a two-stage decision process. First, they decide how much to invest. Second, they must also decide whether to carry out at all new investments. Razin et al. (2008) in their study of the determinants of bilateral FDI flows among 62 countries over the period 1987-2000 found that differences in average years of schooling in educational attainment discourage the decision to invest abroad but they do not influence the magnitude of FDI once the decision to invest is taken.

Access to skilled labor is considered to be a major advantage of Central European countries in the competition for FDI. This view was corroborated by Carstensen and Toubal (2004) who measured skills as the fraction of medium and higher education workers in the relevant labor force. The estimated coefficient for this indicator was positive and statistically significant in all specifications. Authors conjectured that the importance of skills in Central Europe stems from their influence on the ease of the adaptation to a Western business culture.

Majeed and Ahmad (2008) recognized the fact that the concept of human capital goes beyond education and embraces good health. In their analysis of FDI determinants in 23 developing countries over 1970-2004 health expenditures was found a significant attractor of multinationals and the effect of illiteracy was negative but insignificant. Alsan et al. (2006) who conducted a panel data analysis of 74 industrialized and developing countries over 1980-2000, also detected a strong and positive influence of population health on FDI in low- and middle-income countries.

While the literature on the link between human capital, education in particular, and long-term capital inflows is inconclusive but abundant, the documented evidence on the role of gender inequality is very scarce. A noticeable exception is the work by Busse and Nunnenkamp (2009) who assessed the importance of gender inequality in education as a determinant of FDI. On theoretical grounds, the authors point to the twofold effect of gender disparities on host countries' attractiveness for FDI. On the one hand, educational attainment gap between sexes may stimulate efficiency-seeking FDI. Low-skilled and therefore low-wage labor may offer a cost advantage to investors. On the other hand, low-wage unskilled labor is not necessarily cheap in terms of unit labor costs. The benefits of low compensation costs may be completely outweighed by low productivity of less educated workers. Both arguments are relevant for the cost-oriented or vertical FDI.

Since the impact of gender inequality in education on FDI is theoretically ambiguous, the results of empirical investigation merit special attention. The analysis of Busse and Nunnenkamp seeks to explain bilateral FDI flows from 28 source to 77 host economies and covers the period 1978-2004. Gender disparity in education is measured by the ratio of male to female years of schooling at all levels of education or at specific, namely primary, secondary and tertiary, level of schooling. The average number of years of schooling of both sexes taken together in the population aged 25 and above, as well as the mean years of schooling of both sexes at all levels of education separately, were shown to be strongly and positively associated with FDI flows. All coefficients on education inequality, at all levels of education were statistically significant and negative. The size of the coefficient was, however, higher at the secondary and tertiary level. Moreover, the robustness tests revealed that discouraging effects of gender disparity on FDI are confined to middle income developing host countries and to investors from developed countries.

2. Model specification and the variables to be tested

Model specification and selection of control variables are governed by the gravity equation framework. The theoretical rationale for estimating gravity equations of bilateral FDI flows has been recently elaborated by Bergstrand and Egger (2007), and Kleinert and Toubal (2010). Waglé (2010) adapted the heterogeneous firms model of Helpman et al. (2008) to the FDI flows and their approach is adopted below.

Consider the world constituted of J countries, indexed by $i = 1,...,J$. There are B_i products available for consumption in country i which utility function is given by:

$$U_i = \left[\int_{l \in B_i} x_i(l)^{\alpha} dl\right]^{\frac{1}{\alpha}}, \quad 0 < \alpha < 1, \tag{1}$$

where $x_i(l)$ is consumption of product l and $1/(1-\alpha)$ is the elasticity of substitution across products.

The demand for product l depends on its price $p_i(l)$ relative to the price index P_i and the level of expenditures equal to the country i's level of income, Y_i:

$$x_i(l) = \frac{p_i(l)^{-\varepsilon} Y_i}{P_i^{1-\varepsilon}}, \tag{2}$$

where the country's ideal price index is defined as:

$$P_i = \left[\int_{l \in B_i} p_i(l)^{1-\varepsilon} dl\right]^{\frac{1}{1-\varepsilon}}.$$

To produce domestically one unit of output each firm uses a combination of inputs that cost $c_i a$, where c_i is the cost of a bundle of inputs and a is the number of bundles or the inverse of firm's productivity. Note that the costs of inputs are country-specific whereas the level of productivity is intrinsic to the firm. Moreover, there is a fixed cost of producing in country i which equals f_i and thus the expression for profits takes the following form:

$$\pi_i(l) = p_i x_i - c_i a x_i - c_i f_i . \tag{3}$$

Profit maximization leads to the standard markup pricing equation, with a markup varying inversely with the elasticity of demand, α:

$$p_i(l) = \frac{c_i a}{\alpha}. \tag{4}$$

If a producer from country i in an attempt to avoid the transport costs of serving the foreign market through exports establishes a subsidiary in country j, it has to bear two types of costs. First, there are coordination and transaction costs τ_{ij}, which are increasing in the distance between two countries, inadequate communication facilities and technical incongruity. The latter is rooted in differences in factor endowments, namely physical capital and skilled labor relative abundance in the parent and host countries. Second, the multinational firm incurs the fixed cost of setting a new plant in country j, equal to $c_j f_{ji}$. I assume that the costs of buying a bundle of inputs in the host economy, c_j, depend on women's empowerment, education, and health and dwell on this issue later. As a result, the profits from production and sales abroad are given by:

$$\pi_{ij}(a) = (1 - \alpha)\left(\frac{\tau_{ij} c_j a}{\alpha P_j}\right)^{1-\varepsilon} Y_j - c_j f_{ij} . \tag{5}$$

Production and sales in country j are profitable only if $a < a_{ij}$, where a_{ij} is defined by $\pi(a_{ij}) = 0$, or:

$$(1 - \alpha)\left(\frac{\tau_{ij} c_j a}{\alpha P_j}\right)^{1-\varepsilon} Y_j = c_j f_{ij} . \tag{6}$$

It can be deduced from equation (6) that the number of firms that become multinationals and invest in country j increases when the cut-off level of technology is higher, that is when the fixed and variable costs of undertaking FDI are lower and the level of income of the host country is larger.

Let $G(a_{ij})$ be the fraction of the total number N_i of country's i firms that invest in country j. If the least productive firm that can profitably set up a subsidiary abroad has the productivity level a_L, the total value of FDI inflow from i to j equals:

$$\Delta fdi_{ij} = \int_{a_L}^{a_{ij}} p_j x_j N_i \, dG(a). \tag{7}$$

Let's define $V_{ij} = \int_{a_L}^{a_{ij}} a^{1-\varepsilon} dG(a)$ for $a_{ij} > a_L$ and substitute for p_j and x_j into (7) to get

$$\Delta fdi_{ij} = \left(\frac{\tau_{ij} c_j}{\alpha P_j} \right)^{1-\varepsilon} Y_j N_i V_{ij} . \tag{8}$$

Increasing returns to scale imply that the number of firms is proportional to the economy's size measured by Y_i. Total income of country i is defined as the sum of the sales of domestic firms in the local and foreign markets. Taking into account that $\tau_{ii} = 1$ and $f_{ii} = f_i$, the value of sales at home can be represented as Δfdi_{ii} and the value of income is

$$Y_i = \sum_{j=1}^{J} \left(\frac{\tau_{ij} c_j}{\alpha P_j} \right)^{1-\varepsilon} Y_j N_i V_{ij} . \tag{9}$$

It follows that the number of country's i firms equals:

$$N_i = Y_i \Big/ \sum_{j=1}^{J} \left(\frac{\tau_{ij} c_j}{\alpha P_j} \right)^{1-\varepsilon} Y_j V_{ij} .$$

Let's define $Z_{ij} = V_{ij} \Big/ \sum_{j=1}^{J} \left(\tau_{ij} c_j / \alpha P_j \right)^{1-\varepsilon} Y_j V_{ij}$ and substitute for N_i into (8) to obtain the gravity equation for FDI flows:

$$\Delta fdi_{ij} = \left(\frac{\tau_{ij} c_j}{\alpha P_j} \right)^{1-\varepsilon} Y_j Y_i Z_{ij} . \tag{10}$$

Equation (10) implies that the long-term capital flows are increasing in the size of the partner countries and decreasing in the coordination and transaction costs and the price of inputs in the host economy. The empirical counterpart of the gravity model is derived by taking logs of (10) which yields the log-linear form of the estimation equation.

In studying FDI determinants, the procedure that consists in writing regression equation as a dynamic panel data model in first differences has noticeable advantages over simple cross-section or other panel estimation methods. First, unobserved time-invariant country specific effects are removed. Second, the use of instrumental variables allows parameters to be estimated consistently in models where some of the explanatory variables are endogenous. One prominent way to take advantage of the virtues of the dynamic panel data model in first differences is to apply first-differenced generalized method of moments (GMM) estimators. I adopt this approach below to study the determinants of bilateral flows of long term capital between countries listed in Appendix 1.

The basic idea behind the System GMM estimator is to estimate a system of equations in both first-differences and levels, where the instruments used in the levels equations are suitably lagged first-differences. Blundell and Bond (1998) showed that the first-differenced GMM estimator might be subject to a large downward finite-sample bias, particularly when the number of time periods available is small, which is a common feature of many empirical studies. By imposing an additional set of moment restrictions which allow the use of lagged first-differences of the series as instruments for equation in levels, Blundell and Bond obtained a linear GMM estimator better suited for estimating autoregressive models with persistent panel data, which has superior finite sample properties than the GMM Arellano and Bond (1991) estimator.

To be more specific, the empirical model estimated in the next section has the following form:

$$\Delta fdi_{ijt} = a_t + bfdi_{ij,t-1} + cx_{ijt} + d_{ij} + e_{ijt}, \qquad (11)$$

where the independent variable, fdi_{ij}, is the log of real FDI stock of country j in country i, and Δ denotes first difference[4]. It should be noted that the first difference of the FDI stock corresponds to FDI flow. The explanatory variables set embraces the period-specific effects, at, the lagged value of the regressand, the vector of control variables, x_{ijt}, and the unobserved bilateral-pair fixed effects, d_{ij}. The last term in equation (11) denotes the error term.

Taking the lagged FDI stock as one of the independent variables deserves explanation. General location theory, which is the term borrowed from Fujita (2010), highlights the role of agglomeration effects in the formation of spatial clusters of economic activity which are pertinent also to FDI location choices. The strength of agglomeration effects depends on various location-specific and

[4] GDP deflator was used to obtain FDI stock in constant prices.

industry-specific factors and the lagged value of FDI stock is a useful proxy in this context. The accumulated stock of foreign capital enables the materialization of externalities which rise productivity of newcomers.

Secondly, the lagged value of FDI stock on the right-hand side of Equation (11) attenuates the problem of omitted variables. Numerous factors that affect FDI are hard to identify or it is difficult to collect data on them. If they are not excessively volatile, however, their operation in the current period resembles very closely the influence they exerted in the past. The lagged value of FDI has been shaped by omitted factors and reflects their strength in the current period. Consequently, the positive sign is expected to be associated with the coefficient of $fdi_{ij,t-1}$.

The gravity-equation derived above predicts that bilateral FDI flows would be determined by the size of the source and host countries. Hence, the vector of control variables, x_{ijt}, contains the logarithms of the source and host economies' GDP measured in constant prices and named *gdp_source* and *gdp_host*, respectively. Trade costs affect FDI flows, hence the bilateral FDI gravity equation shares with trade gravity equation the trade costs variable which is proxied by the logarithm of distance between the most important cities of the host and source countries, *dist*, calculated following the great circle formula.

As mentioned before, coordination and transaction costs depend on technical incongruity captured by relative endowments differentials. Two proxies have been added to the control variables set to account for technical incongruity. One is a very general measure of labor productivity differential, namely the logarithm of the ratio of per capita GDP in the source and host countries, *gdppc_rel*. The second indicator of differences in relative endowments pertains to human capital development and in particular to education. The variable *skills_rel* is equal to the logarithm of the ratio of average years of tertiary schooling to the average years of secondary schooling in the population aged 25 or more in the source country divided by the analogous ratio in the host country.

The concept of firms' heterogeneity can be broadened to include differences in access to external financing. Financial constraints might be a barrier to the cross-border expansion of the most productive firms in the Helpman's et al. (2004) model. Buch et al. (2009) and Li et al. (2011) showed that the source country's degree of financial development is conducive of FDI flows. Hence, the amount of domestic credit to private sector in percent of GDP in the source country, *finance_source*, has been added to the set of independent variables.

The growing importance of efficiency-seeking FDI has accentuated the advantage that low labor and other inputs costs, notably the communication costs, give to the host economies in the competition to attract foreign investors. In this paper the real unit labor costs, *ulc_host*, calculated as the labor share of income is intended to capture both the levels of productivity and wages of workers in the host economy and reflect the lion's share of the costs of buying the bundle of inputs in the host country. The number of mobile telephones per 100 inhabitants

in the host country, *tel_host*, is employed to proxy the inverse of communication costs.

The remaining explanatory variables represent various dimensions of human development and gender equality. First of all it has to be stressed that gender-related labor market characteristics are not among viable FDI determinants. Wage inequality or gaps in labor market participation between women and men can be both the determinant as well as the outcome of the presence of multinationals. The causality may go from the FDI inflow to the demand for specific female labor characteristics. Thus the concerns of reversed causality preclude the analysis of labor market discrimination as the likely determinant of FDI inflows.

There are, however, three other aspects of gender equality of which this paper takes account. They are the relative level of educational attainment and health of women, and their political activism. The progress of women relative to men in skills, health and parliamentary representation translates into labor market developments with diverse consequences for the operation of multinationals.

Relative female levels of skills and health can be jointly examined through the lens of the labor demand shifts associated with the dissemination of information and communication technologies and the computerization of the workplace. The technological change has transformed the composition of the economy's occupational structure, increasing the demand for brain (cognitive) and nonroutine skills at the expense of brawn (manual) and routine skills. Developed as well as developing countries have experienced an increase in brain requirements and a decline in brawn requirements over the past 15 years[5].

However, judging from the experience of the US, in the developed countries the increase in demand for female brain skills outpaced that for male's[6]. The level of demand for brawn among man remains considerably higher, although it was declining at a comparable pace for both sexes. Hence the impact of globalization in developed countries is evaluated to be larger among men than among women because men have been traditionally employed in sectors with higher brawn requirements which are most affected by relocation of production to the emerging and developing countries.

This process sheds new light on the link between FDI inflows and the relative female educational attainment and health. The subsidiaries may perform the occupational tasks with high brawn requirements and the efficiency-seeking FDI might be located in sectors with relatively high brawn requirements and increase the demand for physical skills, especially among men. As a result, a relative improvement in women's health, corresponding to relative deterioration of male health, would discourage FDI.

Of course one could make an opposite argument that inasmuch as foreign investors attempt to seize the opportunity of exploiting poorly compensated female

[5] See World Bank (2011), pp. 259-261.
[6] See Rendall (2010).

labor, they would find desirable a rise in productivity by virtue of good health. Better condition would alleviate women's absenteeism, which is usually higher because of family-related commitments. Reduced absence from work need not push female earnings up since the relationship between wages and absenteeism is more negative for men than for women. This is due, according to Ichino and Moretti (2009), to the fact that signal extraction based on absenteeism is more informative about shirking for males than for females. Provided that theoretical arguments are ambiguous, the importance of the gap between female and male condition has to be empirically assessed. It is measured by the logarithm of the ratio of female to male life expectancy at birth, *lifef_host*.

Having in mind that FDI is a vehicle for technology transfer and that Central European countries achieved sizeable multifactor productivity growth rates, it becomes clear that the region has also witnessed a rise in brain requirements. As was abovementioned, modern production methods boost the demand for brain skills because technological change is brain biased. The concentration of FDI in male brawn-intensive sectors can coexist with an overall rise in brain requirements having roots in technological progress. Women have comparative advantage in brain skills relative to men and the adoption of new technologies embodied in FDI may be conditional on the availability of skilled female labor. To verify the hypothesis that high-skilled female labor is appealing to foreign investors, the logarithm of the ratio of female average years of secondary schooling to the average years of secondary schooling in the entire population, *skills2f_host* is inserted in the set of independent variables. The significance of an analogous indicator constructed for the tertiary level of education, *skills3f_host*, is also tested.

Non-involvement in politics is the third facet of sex discrimination studied in the paper. More specifically, I conjecture that women's representation in parliament in both source and host countries influences the intensity of FDI flows. At first sight it is hard to establish a connection between women's position in public life and cross-border activities of multinationals. It has to be recognized, however, that women add new dimensions to policy agenda which may affect investment climate indirectly. The evidence from the UK and Scandinavia, reported in Squires and Wickham-Jones (2001) and Sainsbury (2004) respectively, showed that women in parliaments integrated gender into the issues of employment and pay. It can thus be argued that the parliamentary representations of women can impact on labor costs and in particular on the availability of low-wage female workers.

In fact, it seems to exist a connection between wage-gap differential and the percentage of parliamentary seats held by women in the group of source and host countries studied in this paper. Data in Table 1 shed some light on the dynamic relationship between the ratio of female to male wages in the source and host countries, labeled *wagef_source* and *wagef_host* respectively, and the proportion of seats in parliaments held by women in both countries, denoted *parlf_source* and *parlf_host*.

Table 1. Correlation coefficient between *wagef_source* and *wagef_host* at time *t* and, respectively, *parlf_source* and *parlf_host* at time *t*, *t* – 1, ..., *t* – 5.

Lag of % of seats held by women	*t*	*t* – 1	*t* – 2	*t* – 3	*t* – 4	*t* – 5
wagef_source (No. of obs.)	0.5816 (143)	0.6032 (124)	0.6220 (106)	0.6476 (86)	0.6793 (66)	0.7091 (46)
wagef_host (No. of obs.)	-0.0245 (37)	0.0480 (33)	0.1166 (29)	0.3166 (24)	0.5360 (18)	0.5425 (12)

Source: Own calculations.

A diversified picture of the relationship between female representation in parliaments and wage gaps in the host and source countries emerges from Table 1. In the recipient states in Central Europe a strong and positive impact of the percentage of seats held by women and the ratio of female to male wages is observed with a considerable lag of four to five years. By contrast, there is a stable, contemporaneous, strong, and positive link between the two variables in the source economies.

The correlation coefficients reported in Table 1 should be interpreted with caution since data on the ratio of women to men wages is scant, especially so in the case of host countries. Moreover, simple correlations do not necessarily imply causality and their manifestation may be confined to the investigated region. Nevertheless, it can be argued that greater women's participation in public life is accompanied by a narrowing of the wage gap between sexes. This process is realized with a certain lag in Central European democracies.

The proponents of the view that an increased women's representation has little effect on policy output could claim that the mere granting of political rights to various social strata may trigger greater interest in issues of equality, inter alia in sex discrimination in the labor market[7]. To evaluate whether the women's presence in public life and the state of political rights have a similar impact on FDI, I append to the set of independent variables the survey measure of the latter elaborated by the Freedom House. The political rights rating process is based on the checklist of 10 political rights questions grouped into three subcategories: electoral process, political pluralism and participation, and functioning of government. The scores that were awarded to these questions in both the source and host countries are labeled *prights_source* and *prights_host*, respectively. If political rights influence the multinationals' decision to invest abroad through a similar channel as the political representation of women, the statistical significance of the latter variable should hinge on the inclusion of the former in the regression equation.

In light of the theoretical model presented above, gender equality in education, health, and political participation can be interpreted as the component of the

[7] Devlin and Elgie (2008) document little effect of women's representation in parliament on policy output in Rwanda.

costs of the bundle of inputs in the host country. They are related either indirectly to the level of wages or directly to the availability of specific skills required by multinationals. To put it in a nutshell, *skills2f_host*, *lifef_host*, *parlf_host*, as well as *ulc_host* represent the elements of the costs of the bundle of inputs in the host country, c_j.

Finally, in all specifications there are time dummies incorporated in the set of explanatory variables. In System GMM the autocorrelation test and the robust estimates of the coefficient standard errors assume no correlation across individuals in the idiosyncratic disturbances. This condition is more likely to be met with time dummies among the regressors. To save space the coefficients and the standard errors of the time dummies would not be presented. All variables which are defined above are listed in the Appendix 2 with the data sources.

3. Results

This section is devoted to the empirical tests of hypotheses regarding the impact of gender inequality in education and health, and women's representation in parliament on FDI inflows into the Central European countries. The determinants of bilateral FDI flows in the period 2000-2009 are investigated using the methodology and variables described in the previous section. To confirm that the choice of System GMM technique was accurate I first contrast the dynamic panel regression results with the pooled and static fixed effects estimates in Table 2.

To detect problems with moment conditions validity in System GMM estimates displayed in the last column of Table 2, the Sargan test of over-identifying restrictions was applied and the corresponding *p*-values are reported. The Sargan test χ^2 statistic is not robust to heteroskedasticity or autocorellation and therefore Hansen statistic is also reported, although one has to be aware that the Hansen J-test can be greatly weakened by instrument proliferation[8]. It can be assumed that some of the variables are strictly exogenous, for instance the geographical distance between source and host, relative skills endowments and the size of the source economy, whereas the remaining variables are endogenous. The former instrument themselves (IV-style instruments), while the latter are instrumented with their lagged values (GMM-style instruments)[9]. To check whether the assumption of instrument exogeneity holds I rely on difference-in-Hansen statistics for the two subsets of instruments.

The consistency of estimators is conditional on the assumption that the error term in Equation (1) is not serially correlated. Then the first-differenced residuals should display a negative first-order serial correlation but not second-order serial

[8] See Roodman (2009).

[9] Lags $t - 2$ and further of variables in levels were used instruments for equation in differences, and lagged value of variables in first differences were used as instruments for equation in levels in Table 2 and Table 3.

correlation. I report the *p*-value of the Arellano-Bond test of first- and second-order serial correlation, denoted, respectively, AR1–p and AR2–p.

Table 2. Benchmark regression results. Dependent variable: *fdi*(*t*).

Variables	OLS	Fixed effects	System GMM
fdi(*t* – 1)	0.924***	0.569***	0.686***
	(0.00824)	(0.0192)	(0.0585)
dist	-0.0890***		-0.400***
	(0.0213)		(0.0907)
gdp_host	0.0457***	-0.900	0.255***
	(0.0160)	(0.942)	(0.0722)
gdp_source	-0.00275	2.147**	0.185***
	(0.00945)	(0.938)	(0.0555)
gdppc_rel	0.0525**	-1.073	-0.310*
	(0.0223)	(0.845)	(0.173)
skills_rel	-0.0232	0.206*	-0.303***
	(0.0272)	(0.114)	(0.102)
finance_source	0.00111***	0.00220**	0.00700***
	(0.000342)	(0.000975)	(0.00200)
ulc_host	-0.118	0.648	-2.504**
	(0.212)	(0.585)	(1.064)
tel_host	-0.000461	-8.95e-05	0.00393**
	(0.000672)	(0.00102)	(0.00164)
Constant	-0.0302	-31.65***	
	(0.466)	(11.44)	
Year dummies	Yes	Yes	Yes
Observations	2,103	2,103	2,103
R-squared	0.938	0.619	
AR1–p			7.38e-07
AR2–p			0.178
Sargan (*p*-value)			31.63 (0.918)
Hansen (*p*-value)			35.40 (0.819)
Dif Hansen IV (*p*-value)			0.78 (0.853)
Dif Hansen GMM (*p*-value)			3.79 (0.705)

Notes: Two-step standard errors with Windmeijer's (2005) small-sample correction in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Dif Hansen IV is the difference-in-Hansen test applied to the subset of exogenous variables: *dist*, *skills_rel*, *gdp_source*; Dif Hansen GMM is the difference-in-Hansen test applied to the subset of endogenous variables: *fdi*(*t* – 1), *gdp_host*, *gdppc_rel*, *finance_source*, *ulc_host*, *tel_host*.

The results of the benchmark equation estimates presented in Table 2 reveal that there exists a positive correlation between the lagged value of FDI stock and the error which gives rise to a dynamic panel bias and inconsistency of Ordinary Least Squares (OLS). The coefficient estimate for *fdi*(t – 1) in the first column of Table 2 has been attributed the predictive power of the fixed effect belonging to the pair of host-source countries and is biased upward. On the other hand, the fixed effects estimates presented in the second column do not eliminate the dynamic panel bias since *fdi*(t – 1) correlates negatively with the error. As a result the coefficient estimate for *fdi*(t – 1) is biased downward in the second column. Good estimates of the true parameter should lie in the range between the OLS and fixed effects estimates of the coefficient on lagged FDI stock. Indeed, the coefficient estimated using System GMM meets this condition, proving that the dynamic panel bias has been removed.

The statistics of Sargan and Hansen tests of over-identifying restrictions hint at the proper selection of instruments. Both subsets of instruments pass the difference-in-Hansen test of exogeneity. The error term is first-order but not higher-order serially correlated. Overall, the estimates of the benchmark equation in the last column of Table 2 speak in favor of the empirical strategy adopted in the paper.

Turning to the interpretation of the regression results showed in the last column of Table 2, it can be concluded that the coefficients of variables derived from the gravity model are significant and have expected signs. The sizes of the host and source economies stimulate FDI flows, whereas the distance between them puts a break on capital flows. Both indicators designed to gauge endowment differences, namely relative skills, *skills_rel*, and per capita GDP, *gdppc_rel*, have been estimated to hamper multinationals' expansion, although the coefficient of the latter is significant only at the 10% confidence level. The significance of *finance_source* shows that the development of the source country's financial market helps the multinationals penetrate the economies of the Central European region. Finally, low unit labor cost and low communication costs seem to lure foreign investors, because the sign of the coefficient of *ulc_host* is negative and that of *tel_host* is larger than zero.

Table 3. Impact of gender inequality on FDI flows.
Dependent variable: *fdi*(t); Estimation method: System GMM.

Variables	(1)	(2)	(3)	(4)	(5)
fdi(t–1)	0.662***	0.658***	0.707***	0.708***	0.677***
	(0.0599)	(0.0607)	(0.0557)	(0.0548)	(0.0572)
Dist	-0.443***	-0.452***	-0.247***	-0.249***	-0.302***
	(0.0949)	(0.0966)	(0.0930)	(0.0923)	(0.0916)
gdp_host	0.239***	0.243***	0.210***	0.211***	0.191***
	(0.0754)	(0.0775)	(0.0661)	(0.0662)	(0.0720)
gdp_source	0.202***	0.209***	0.159***	0.152***	0.177***
	(0.0557)	(0.0550)	(0.0479)	(0.0456)	(0.0489)

Variables	(1)	(2)	(3)	(4)	(5)
gdppc_rel	-0.290*	-0.297*	-0.375*	-0.379**	-0.307*
	(0.163)	(0.162)	(0.192)	(0.193)	(0.171)
skills_rel	-0.243**	-0.233**	-0.350***	-0.323***	-0.279***
	(0.100)	(0.100)	(0.106)	(0.0976)	(0.102)
finance_source	0.00714***	0.00725***	0.00543***	0.00512***	0.00529***
	(0.00196)	(0.00196)	(0.00161)	(0.00154)	(0.00152)
ulc_host	-2.895***	-2.887***	-2.957**	-2.981***	-3.271***
	(1.097)	(1.090)	(1.146)	(1.143)	(1.176)
tel_host	0.00474***	0.00483***	0.00464***	0.00489***	0.00540***
	(0.00168)	(0.00171)	(0.00176)	(0.00182)	(0.00186)
skills2f_host	2.409**	2.459**			2.522**
	(1.027)	(1.020)			(1.028)
skills3f_host		0.267			
		(0.338)			
lifef_host	-4.024**	-4.612**			-4.770***
	(1.760)	(1.891)			(1.829)
parlf_source			0.0153***	0.0137***	0.0144***
			(0.00566)	(0.00474)	(0.00534)
parlf_host			-0.0166**	-0.0169**	-0.0184**
			(0.00762)	(0.00745)	(0.00769)
prights_host				0.0272	
				(0.0713)	
prights_source				-0.0776	
				(0.0681)	
Year dummies	Yes	Yes	Yes	Yes	Yes
Observations	2,103	2,103	2,103	2,103	2,103
AR1-p	9.42e-07	1.06e-06	5.09e-07	3.86e-07	6.74e-07
AR2-p	0.187	0.191	0.191	0.200	0.204
Sargan (p-value)	29.59 (0.953)	29.50 (0.954)	31.05 (0.930)	31.19 (0.927)	30.33 (0.942)
Hansen (p-value)	33.50 (0.875)	33.28 (0.881)	34.09 (0.859)	34.19 (0.856)	33.17 (0.884)
Dif Hansen IV	3.21	3.40	1.26	1.29	4.57
(p-value)	(0.667)	(0.757)	(0.939)	(0.989)	(0.712)
Dif Hansen GMM	4.25	4.45	3.99	3.53	5.32
(p-value)	(0.642)	(0.616)	(0.679)	(0.740)	(0.503)

Two-step standard errors with Windmeijer's (2005) small-sample correction in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Dif Hansen IV is the difference-in-Hansen test applied to the subset of exogenous variables: *dist*, *skills_rel*, *gdp_source*, *skills2f_host*, *skills3f_host*, *lifef_host*, *parlf_source*, *parlf_host*, *prights_host*, *prights_source*; Dif Hansen GMM is the difference-in-Hansen test applied to the subset of endogenous variables: *fdi*(*t*–1), *gdp_host*, *gdppc_rel*, *finance_source*, *ulc_host*, *tel_host*.

The benchmark equation estimation sets up the stage for the verification of the main hypotheses of the paper. Table 3 exhibits the results obtained from the System GMM estimates of regression equations with gender-related independent variables. The satisfaction of the Sargan, Hansen, difference-in-Hansen, and the Arellano-Bond autocorrelation tests is a property of all specifications which reinforces the case for using System GMM technique.

It can be inferred from columns (1) and (2) of Table 3 that a better women's relative to men's performance in educational attainment and in health, respectively, attracts and discourages foreign investors. The women's mean years of schooling matters at the secondary level while their advantage over men in tertiary education is not statistically significant. This finding seems to corroborate the hypothesis that technology embodied in FDI located in Central Europe raises the demand for female brain and male brawn.

In other words FDI in Central Europe seems to be a channel for cross-border transmission of technology with high female secondary school level skills and male brawn requirements. Such a composition of the demand for skills is certainly not an outcome of the state-of-the-art international technology diffusion. It rather suggests that the Central European countries witness two FDI-related phenomena, namely the relocation of male brawn-intensive industries and the transmission of technology in medium tech sectors. This is consistent with the findings of Rojec and Damijan (2008) who analyzed the structural trends in inward FDI to the new EU member states. They contended that the efficiency-seeking FDI in manufacturing is at the heart of the relocation process. They also ascertained that FDI in the new member states has been increasingly in medium tech and in lower end segments of high tech industries.

The issue of the association between FDI influx and women's parliamentary representation is addressed in columns (3) and (4) of Table 3. The results presented in column (3) corroborate the conjecture that efficiency-seeking multinationals more willingly invest in countries where cheap (but not necessarily unskilled) female labor is plentiful. Higher female parliamentary representation in the source country narrows the wage gap between sexes, reduces the availability of cheaper female labor and constitutes a FDI push factor. By the same token, women's political activism in the host countries may lead to a rise in female labor compensation and thereby weaken FDI inflows. This conclusion is robust to the inclusion of public rights index among the explanatory variables in column (4). Although *prights_host* and *prights_host* have the same signs as, respectively, *parlf_source* and *parlf_host*, they are not statistically significant.

The last column of Table 3 present the test of joint validity of the hypotheses put forward in the paper. It shows that *skills2f_host*, *lifef_host*, *parlf_source*, *parlf_host* are statistically significant when simultaneously included in the regression model. To sum up, higher educational attainment of women at the secondary school level in the recipient economy and women's representation in parliament in the source country increase FDI inflows. The opposite is true of

relatively better female health status and the proportion of seats held by women in the host country.

The main conclusions drawn above remain valid after additional control variables have been taken into account. Political and macroeconomic stability, as well as respect for property rights in the host countries are regarded as preconditions for a successful promotion of a country as an FDI-friendly economy. Busse and Hefeker (2007) showed that political risk is a highly significant determinant of foreign investment inflows in developing countries and Bénassy-Quéré et al. (2001) found that exchange rate instability is detrimental to FDI in both developing and industrial countries. The strength of the property rights protection may be of great importance in transition countries because communist regimes rejected the idea of private property rights and foreign investors could be concerned with the implications of this legacy.

Based on this premise, three variables were added to the set of independent variables. The average percentage of the potential term that governments actually fulfill (*politperf_host*) elaborated by Courtenay and Golder (2010) is a proxy for political stability. The coefficient of variation of the daily exchange rate between the euro and the local currency (*forexcov_host*) is intended to reflect macroeconomic stability crucial for the multinationals. The strength of property rights protection (*property_host*) is measured by the Area 2 component of the Economic Freedom of the World index constructed by Gwartney et al. (2011).

Recognizing the key role the availability of infrastructure plays in reducing operational costs to business, the second, besides telecommunications services, vital component of infrastructure has been considered as a plausible FDI determinant. More precisely, two measures of the transportation network development were added to the set of controls. They were the road density (*roaddens_host*) and the railway density (*raildens_host*) in the host countries.

The results of this robustness study are presented in the Table in Appendix 3. None of the additional control variables proved to be significant. The variables of interest that reflect gender disparities remain significant and thus the robustness tests reinforce the case for heeding gender issues in academic discussions of FDI determinants.

Conclusions

The paper inquired into the determinants of FDI flows in the Central European countries through the prism of gender inequality. The implications of discrepancies in education, health status and parliamentary representation between men and women have been beyond the scope of the existing literature on multinationals' motives to invest in the region. The evidence on the connection between gender disparities and FDI in other countries is extremely scare and confined to differences in educational attainment. The path-breaking analysis conducted in this paper merits to be extended to other regions.

It can be deduced from the System GMM regression results that multinationals are mostly efficiency-seeking and horizontal in nature. Their activity is in part driven by the need to relocate production of male brawn-intensive goods in the Central European region. The relative advantage of women in brain skills-intensive industries is also exploited but solely at the secondary school level.

Female political representation influences the cross-border firms' expansion. The link between the size of the wage gap between sexes and the number of parliamentary seats held by women is a plausible explanation of the latter's impact on FDI inflows. Provided that unit labor costs deter FDI from entering, a parliamentary fight against wage discrimination of women in the host country may decrease capital inflows. The same process in the source economy seems to magnify capital outflows to destinations in Central Europe.

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Appendix 1.
The list of countries included in the regression analysis.

Host countries: Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia.

Source countries: Austria, Belgium, Canada, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Korea, Latvia, Lithuania, Luxemburg, Malta, Netherlands, Norway, Poland, Portugal, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, UK, US.

Appendix 2.
Definitions of variables and data sources.

Variable name	Definition	Source of data
fdi_{ij}	Logarithm of the bilateral FDI stock in current prices deflated with the aid of GDP deflator.	Eurostat
gdp_source	Logarithm of GDP in 2000 prices in the source country.	The World Bank, World Development Indicators (WDI)
gdp_host	Logarithm of GDP in 2000 prices in the host country.	WDI
dist	Logarithm of the distance between the source and the host country calculated following the great circle formula.	Centre d'études prospectives et d'informations internationales (CEPII)
gdppc_rel	Logarithm of the ratio of per capita GDP in 2000 prices of the source to the host country.	WDI
skills_rel	Logarithm of the ratio of the mean years of tertiary schooling divided by the mean years of secondary schooling in the source to the mean years of tertiary schooling divided by the mean years of secondary schooling in the host country. The linear interpolation was used to estimate the mean years of schooling for the years within the original 5-years intervals.	Barro-Lee (2010) database
finance_source	Domestic credit to private sector in percent of GDP in the source country.	WDI
ulc_host	Real unit labor costs equal to the ratio of labor income to GDP in the host country	OECD
tel_host	Mobile cellular subscriptions (per 100 people) in the host country.	WDI
skills2f_host	Logarithm of the ratio of average years of secondary schooling of women to average years of secondary schooling of total population aged 25 and over.	Barro-Lee (2010) database

Variable name	Definition	Source of data
skills3f_host	Logarithm of the ratio of average years of tertiary schooling of women to average years of tertiary schooling of total population aged 25 and over.	Barro-Lee (2010) database
lifef_host	Logarithm of the ratio of women's to men's life expectancy at birth.	WDI
parlf_source	Percentage of seats in parliament held by women in the source country.	UN Millennium Development Goals (MDG) database
parlf_host	Percentage of seats in parliament held by women in the host country.	UN MDG database
prights_source	Index of political rights in the source country.	Freedom House
prights_host	Index of political rights in the host country.	Freedom House
wagef_source	Ratio of female to male wages in manufacturing in the source country.	WDI
wagef_host	Ratio of female to male wages in manufacturing in the host country.	WDI
politperf_host	Average percentage of the potential term that governments in the host country actually fulfilled (average 1990-2008, new caretaker governments excluded).	Courtenay, Golder (2010)
forexcov_host	Annual coefficient of variation of the EUR/host country currency exchange rate (calculated using daily quotations).	European Central Bank
property_host	Value in the host country of the Economic Freedom chain-linked index in Area 2: Legal Structure and Security of Property Rights.	Gwartney, Hall, Lawson (2011)
roaddens_host	Total length of roads divided by the host country surface.	Eurostat and WDI
raildens_host	Total length of railways divided by the host country surface.	United Nations Economic Commission for Europe

Appendix 3. Robustness tests.

Dependent variable: *fdi*(*t*); Estimation method: System GMM.

Variables	(1)	(2)	(3)	(4)
fdi(*t* – 1)	0.666***	0.679***	0.681***	0.682***
	(0.0604)	(0.0577)	(0.0577)	(0.0605)
Dist	-0.350***	-0.329***	-0.291***	-0.276***
	(0.0933)	(0.0918)	(0.0904)	(0.0989)
gdp_host	0.231***	0.217***	0.183**	0.183***
	(0.0833)	(0.0751)	(0.0737)	(0.0700)

Variables	(1)	(2)	(3)	(4)
gdp_source	0.171***	0.164***	0.186***	0.191***
	(0.0491)	(0.0513)	(0.0476)	(0.0450)
gdppc_rel	-0.207	-0.175	-0.337*	-0.417**
	(0.152)	(0.171)	(0.171)	(0.193)
skills_rel	-0.187**	-0.216**	-0.287***	-0.319***
	(0.0914)	(0.107)	(0.101)	(0.106)
finance_source	0.00494***	0.00452***	0.00543***	0.00588***
	(0.00151)	(0.00148)	(0.00156)	(0.00165)
ulc_host	-3.108***	-2.386**	-3.195***	-3.369***
	(1.184)	(1.159)	(1.179)	(1.164)
tel_host	0.00513***	0.00466**	0.00532**	0.00581***
	(0.00181)	(0.00186)	(0.00207)	(0.00186)
skills2f_host	3.419**	2.073**	2.376**	2.665**
	(1.358)	(1.004)	(1.042)	(1.054)
lifef_host	-4.746**	-3.643**	-4.560**	-4.644**
	(1.840)	(1.752)	(1.911)	(1.956)
parlf_source	0.0122**	0.0108**	0.0151***	0.0172***
	(0.00487)	(0.00538)	(0.00527)	(0.00542)
parlf_host	-0.0126*	-0.0140*	-0.0168**	-0.0216***
	(0.00732)	(0.00729)	(0.00715)	(0.00801)
politperf_host	0.00592			
	(0.00514)			
forexcov_host		0.268		
		(0.273)		
property_host			-0.0204	
			(0.0606)	
roaddens_host				-0.0792
				(0.107)
raildens_host				-0.000338
				(0.000683)
Year dummies	Yes	Yes	Yes	Yes
Observations	2,103	2,103	2,103	2,103
AR1-p	7.95e-07	6.06e-07	6.42e-07	6.63e-07
AR2-p	0.209	0.210	0.201	0.203
Sargan (*p*-value)	25.40 (0.989)	26.34 (0.984)	27.35 (0.977)	24.13 (0.994)
Hansen (*p*-value)	33.74 (0.869)	38.36 (0.711)	33.07 (0.886)	32.03 (0.910)
Dif Hansen IV (*p*-value)	5.39 (0.715)	10.82 (0.212)	4.93 (0.765)	6.49 (0.690)
Dif Hansen GMM (*p*-value)	6.22 (0.399)	4.44 (0.618)	5.70 (0.458)	5.23 (0.514)

Notes: Two-step standard errors with Windmeijer's (2005) small-sample correction in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Dif Hansen IV is the difference-in-Hansen test applied to the subset of exogenous variables: *dist*, *skills_rel*, *gdp_source*, *skills2f_host*, *lifef_host*, *parlf_source*, *parlf_host*, *politperf_host*, *forexcov_host*, *property_host*, *roaddens_host*, *raildens_host*; Dif Hansen GMM is the difference-in-Hansen test applied to the subset of endogenous variables: *fdi*(t – 1), *gdp_host*, *gdppc_rel*, *finance_source*, *ulc_host*, *tel_host*.