



Original Article

Foreign Direct Investment Drivers and Growth in Central and Eastern Europe in the Aftermath of the 2007 Global Financial Crisis

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Our paper provides new insights on the developments and the drivers of foreign direct investment (FDI) in Central and Eastern European countries over the period 1993–2014, whilst taking into account the occurrence of the 2007 and 2011 crises. We apply a panel data general-to-specific approach and show that FDI inflows are driven by both external (i.e. macroeconomic and financial conditions in the euro area, global macroeconomic conditions and global risk environment) and domestic determinants (past FDI, human capital, market size, infrastructure, competitiveness, corporate tax system, risk premium, trade openness, geographical proximity to Western Europe, accession to the European Union and progress in implementing structural reforms). In addition, through a dynamic panel data analysis, we find a positive impact of FDI inflows on economic growth. We show that, despite the severe decline in FDI and real GDP growth rates at the onset of the 2007 crisis, the positive impact of FDI inflows on economic growth has amplified during this crisis, whilst it has become non-significant during the 2011 crisis.

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INTRODUCTION

Against the backdrop of the recent growth path in emerging Europe, our paper aims to complement the existing literature on foreign direct investment determinants and the relationship between FDI inflows¹ and economic growth in the European Union (EU) member states from Central and Eastern Europe (CEECs).² In the region, during the last years, real GDP growth and capital flows were rather volatile. The boom phase before the 2007 global financial crisis was followed by a deep recession and, afterwards, by a sluggish resumption of economic growth, the 2011 euro area sovereign debt crisis further contributing to a slight slowdown. In addition, the large capital inflows in the region in the period preceding the 2007 crisis clearly unwound after the 2007 global financial crisis and the 2011 euro area sovereign debt crisis.

Our paper adds to the debate on the role played by FDI in the economic growth process. On one hand, FDI inflows (referring here to long-term capital investment such as the purchase or construction of machinery, buildings, or whole manufacturing plants³), have been considered a somewhat natural factor of the catching-up process of CEECs with the old EU Member States.⁴ Developments in growth theory have confirmed the beneficial impact of FDI inflows, improvements in technology, productivity and efficiency being found to be crucial for growth (Lim, 2001). Additionally, it has been shown that FDI contributed to technical progress in host countries through efficiency “spillovers” (for instance, via the linkages between multinational corporation affiliates and their local suppliers and customers) (Lall, 1980). On the other hand, there is the belief that prior to the 2007 global financial crisis, the growth pattern in the region was excessively dependent on capital inflows that have led to the built up of unsustainable macroeconomic and financial imbalances and of large vulnerabilities (Lane and Milesi-Ferretti, 2007). In this line, a pattern of growth excessively dependent on capital inflows has been judged to be undesirable (EBRD, 2009).

These considerations raise several questions that we seek to answer through our analysis. What are the drivers of FDI inflows in CEECs? How

¹ The predominant focus on FDI flows rather than stocks reflects the fact that FDI data are widely available only for flows. The Vienna Institute for International Economic Studies provides yearly FDI stock data for the countries in our sample, but its use in a quarterly frequency analysis could be cumbersome.

² The non-euro area EU countries made the object of our work when this paper was written.

³ For a complete definition of FDI refer to “Data” section.

⁴ Over the period 1993–2014, a significant progress in the catching-up process took place in the region. However, a marked gap still exists compared to the “old” EU Member States; end 2014, the average GDP per capita in terms purchasing power standards equalled 69.8 in CEECs for an EU-27 average of 100.



important is FDI for economic growth in the region? Has the economic growth – FDI link been impacted by the 2007 and 2011 crises?

Through a general-to-specific approach, we show that FDI inflows in CEECs are explained by a large variety of domestic and external factors. Among the domestic drivers, past FDI, human capital, market size, infrastructure, competitiveness, the corporate tax system, risk premium, trade openness, geographical proximity to Western Europe, the EU accession, and progress in the implementation of structural reforms are key. On the side of external drivers, macroeconomic and financial developments in the euro area, the global risk environment and global macroeconomic prospects are crucial; the “sensitivity” of FDI inflows to developments in the euro area is largely justified by the high exposure, through trade and financial channels, of CEECs to the euro area. Our results are in line with those of the existing empirical literature. The originality of our analysis consists in the use of panel data general-to-specific modelling that allows us to avoid ad-hoc decisions, the final model being selected from a large set of variables.

Moreover, our paper adds to the existing literature illustrating a positive impact of FDI on economic growth. The growth potential of recipient countries is crucial for attracting FDI, but, at the same time, FDI contributes further to enhancing economic growth in recipient economies. The span of time of our analysis incorporates the 2007 global financial crisis and the 2011 euro area sovereign debt crisis, events that could have disturbed the existing relationship between FDI inflows and economic growth. We apply a dynamic panel data technique and show that, during the 2007 crisis, FDI inflows not only continue to have a positive impact on economic growth but this positive impact becomes even larger; however, this no longer holds for the 2011 crisis period during which the impact of FDI inflows on economic growth becomes non-significant.

Based on our findings, we consider that, in the current context of relatively low levels of FDI in CEECs and of a sluggish recovery in the euro area, host countries in the region could further encourage, to a certain extent, the entry of FDI flows so as to foster economic growth.

The remainder of our paper is organised as follows. “[FDI and Growth in Emerging Europe Before, During and After the Onset of the 2007 Crisis](#)” section presents some stylised facts, whilst an overview of the literature is presented in “[Overview of Literature](#)” section. In “[Econometric Strategy and Data](#)” section there is a description of the econometric model and the data, as well as of the empirical results. The last section summarises the main conclusions.



FDI AND GROWTH IN EMERGING EUROPE BEFORE, DURING AND AFTER THE ONSET OF THE 2007 CRISIS

We proceed to an event study analysis of FDI dynamics around crises like in Broner *et al.* (2013). The focus is on the dynamics of FDI not only during the years of crisis, but also in the run-up to crises and their immediate aftermath by analysing the 2 years preceding and following the crises. We estimate the following equation:

$$FDI_{i,t} = \alpha_i + \gamma_i t + \sum_{k=-2}^{k=2} \beta_i Crisis_{i,t+k} + \epsilon_{i,t} \quad (1)$$

where $FDI_{i,t}$ stands for year-on-year growth rates in FDI net inflows in country i at time t and $Crisis_{i,t+k}$ makes reference to the 2007 and 2011 crises.

Two dummy variables ($crisis_{07}$ and $crisis_{11}$) are built to consider the occurrence of the 2007 global financial crisis and 2011 euro area sovereign debt crisis. For the 2007 crisis, given the use of quarterly data in our analysis, we apply the Brunnermeier (2009) definition⁵; thus, $crisis_{07}$ takes the value 1 over the period 2007:Q2–2009:Q2 and 0 otherwise. For the 2011 euro area sovereign debt crisis, we define $crisis_{11}$ as taking the value 1 over the period 2009:Q2–2011:Q4 and 0 otherwise, in line with Ehrmann *et al.* (2013).⁶ In our setting, the aftermath of the 2007 crisis corresponds to the 2011 crisis.

Table 1 illustrates the dynamics of net FDI inflows (in % y-o-y) during crisis periods, with all countries pooled together. The results (in column 1) show evidence of net FDI inflows retrenchment over the period 2007:Q2–2009:Q2, the decline in FDI being not only statistically significant, but also economically large. Moreover, net FDI inflows are found not to be statistically significant outside the 2007 crisis period.

Additionally, we examine the dynamics of GDP around crises, using the same reasoning. We report the results in column (2) of Table 1. According to our findings, real GDP growth started to decline with the outbreak of the 2007 crisis, and the biggest decline took place during the 2011 crisis.

The event study shows that net FDI inflows and GDP have been negatively affected by the 2007 crisis, the timing of the collapse of these indicators being, however, different. Two issues should be highlighted: the

⁵ Fratzscher (2012) and Brunnermeier (2009) provided valuable evidence in this respect. The 2007 crisis went from 7 August 2007 till 15 March 2009 according to Fratzscher (2012), and, respectively, from the 2nd quarter of 2007 till the 2nd quarter of 2009 according to Brunnermeier (2009).

⁶ They define the euro area sovereign debt crisis as taking place between the 1 October 2009 and end of November 2011.

**Table 1:** FDI and GDP around crises

	FDI (% , y-o-y)	GDP (% , y-o-y)
$Year_{t-2}$	-1.107 (0.824)	2.492*** (0.462)
$Year_{t-1}$	-1.639 (1.082)	3.175*** (0.372)
$Crisis_{07}$	-2.222** (1.026)	-2.099*** (0.744)
$Crisis_{11}$	4.463 (6.529)	-4.514*** (0.622)
$Year_{t+1}$	-0.087 (3.750)	-2.811*** (0.458)
$Year_{t+2}$	-1.705 (1.277)	-3.219*** (0.380)
Country dummies	Yes	Yes
Observations	752	766
No. of countries	10	10
R^2	0.19	0.21

$Year_{t-2}$ is the period 2005:Q2–2006:Q2, $Year_{t-1}$ is the period 2006:Q2–2007:Q2, $Year_{t+1}$ is the period 2011:Q4–2012:Q4, $Year_{t+2}$ is the period 2012:Q4–2013:Q4.

Fixed-effect panel data regression estimates with robust standard errors.

high persistence of the negative impact of both crises on economic growth, and the recovery in FDI during the 2011 crisis when, despite the prolonged decrease in real GDP growth rates, CEECs restarted to attract FDI. This effect did not last long, with net FDI inflows beginning to decline the first year preceding the 2011 crisis and the year after.

The results of the event study are confirmed by the statistics on FDI in the region. Indeed, during the pre-crisis period, CEECs attracted large capital inflows, in particular FDI, enhanced by privatisations and prospects of EU accession. The region has been particularly successful in attracting FDI compared to other emerging market economies (Castejón and Wörz, 2007; Estrin and Uvalic, 2014). The inflows of FDI have been the main vehicle of economic restructuring and technology diffusion in the region, triggering the productivity convergence (EBRD, 1994; Damijan and Rojec, 2007; Bijsterbosch and Kolasa, 2009). At the same time, in the early to mid-2000, the massive scale of capital flows contributed to the build-up of macro-financial vulnerabilities in a number of CEECs (Lane and Milesi-Ferretti, 2007).

Over the period 1995–2005, in CEECs, annual FDI inflows averaged roughly 5% of GDP (Arratibel *et al.*, 2007). The inward stock of FDI grew to 30% of GDP in 2000 and, respectively, to 43% of GDP (nearly 211 billions of euro) in 2005. Estonia, the Czech Republic and Hungary, benefited from the largest inflows (in % of their GDP).



After the outbreak of the 2007 global crisis, the sharp macroeconomic and financial adjustment in the region, coupled with the drying-up of net FDI inflows on the financing side of the current account, led to important losses in output, particularly pronounced in the Baltic States.

During the period 2010–2011, owing to a certain improvement in macroeconomic fundamentals, the return of risk appetite and accommodative monetary policy in advanced economies, balance-of-payments imbalances returned in many CEECs, along with the rebound of external financing to emerging economies. The reorientation of capital flows was more pronounced in Latin America and Emerging Asia. In contrast, Emerging Europe received substantially smaller capital flows.⁷ Moreover, after this relative improvement, the intensification of the euro area sovereign debt crisis in late 2011 has had significant repercussion in CEECs through a decline in net FDI inflows that coincided with a drop in outward investment from the euro area (EBRD Transition Report, 2012).

OVERVIEW OF LITERATURE

The Determinants of FDI

For FDI to occur, three conditions must be satisfied simultaneously (Dunning, 1981). The firm must have both an ownership (O) advantage and an internalisation (I) advantage, whilst the foreign market must offer a locational (L) advantage. The ownership advantages take the form of firm-specific assets, both tangible (products or technologies) and intangible (patents or brands). Multinational firms equally need an internalisation advantage in the sense that benefits grow to the enterprise choosing to produce abroad internally, rather than through the market (by franchising or licensing the product or process internationally). Moreover, location advantages (in the form of factor prices, access to customers, government regulations with respect to trade, capital flows, exchange rates, and institutional and political stability) are relevant in determining where the firm chooses to manufacture its products.

Despite the useful organising framework, Dunning's model has not succeeded in explaining the rapid increase in FDI since the mid-1980s and the growth of regional integration (Brenton *et al.*, 1999). The new theory of FDI integrates OLI with general equilibrium models that focus on relative factor endowments (Helpman 1984), proximity and concentration advantages

⁷The rebound of exterior financing in CEECs has been anaemic compared to the 2004–2007 average (before the 2007 crisis) or the 1991–1997 average (prior to the Asian crisis) (IMF World Economic Outlook, 2011).



(Brainard 1997), and with gravity models of trade and FDI (Hejazi and Safarian 1999).

The empirical studies on FDI in transition economies use aggregate inflow data (Brenton *et al.*, 1999; Sapienza, 2009), enterprise surveys (Meyer, 1999) or bilateral flows (Holland and Pain 1998; Carstensen and Toubal, 2004; Bevan and Estrin, 2004; Estrin and Uvalic, 2014). According to the existing literature, the main determinants of FDI are: the production cost, including wage differences (Holland and Pain, 1998); host-country market size and relative factor prices, as well as infrastructure availability (Wheeler and Mody, 1992); the past stock of FDI and the riskiness of investment in terms of economic and political environment; the structural reforms, mainly financial liberalisation and privatisation (Forbes, 2006; Campos and Kinoshita, 2008); the institutional factors (Wheeler and Mody, 1992; Resmini, 2000). Moreover, FDI flows are found to be complementary to trade flows (Carstensen and Toubal, 2004; Nath, 2009; Sapienza, 2009). Positive initial conditions have been found to favour the attraction of substantial FDI in the early stage of transition (Garibaldi *et al.*, 2001). Additionally, in Central and Eastern Europe, the anticipation of EU membership was found to play an important role (Resmini, 2000; Bevan and Estrin, 2004; Coricelli and Ianchovichina, 2004). Finally, external factors like the short-term financing conditions and the business cycle in the euro area, as well as the global risk environment were shown to be key drivers of capital flows to CEECs (Jevčák *et al.*, 2010).

FDI as a determinant of economic growth

The relationship between internationalisation of firms, technology transfer and host-country effects has long been a concern in economic research (Giroud *et al.*, 2012).

In general, FDI is thought of as a composite bundle of capital stocks, know-how, and technology, and hence its impact on growth is expected to be manifold and vary a great deal between technologically advanced and developing countries. The ultimate impact of FDI on output growth in the recipient economy depends on the scope for efficiency spillovers to domestic firms, by which FDI leads to increasing returns in domestic production, and increases in the value-added content of FDI-related production (de Mello, 1997).

The economic rationale for offering special incentives to attract FDI derives from the belief that foreign investment produces externalities in the form of technology transfers and spillovers (Carkovic and Levine 2005). The transfer of technological and business know-how to poorer countries can be eased by foreign investment (Romer, 1993). FDI may boost the productivity of all firms not just those receiving foreign capital. Thus, transfers of technology through



FDI may have substantial spillover effects for the entire economy. By contrast, some theories predict that in the presence of pre-existing trade, price, financial and other distortions, FDI will hurt resource allocation and slow growth (Boyd and Smith, 1992). Thus, theory produces ambiguous predictions about the growth effects of FDI, and some models suggest that FDI will promote growth only under certain policy conditions (Carkovic and Levine, 2005).

Investigating the impact of foreign capital on economic growth has important policy implications. If FDI is found to have a positive impact on economic growth, then this will weaken arguments for restricting foreign investment. If, however, FDI is found not to exert a positive impact on growth, then this would suggest the need to reconsider the measures adopted by countries to attract FDI (i.e. tax incentives, infrastructure subsidies, import duty exemptions).

The analysis of the role played by FDI flows in the process of technology diffusion and economic growth in CEECs is of particular relevance, as the catching-up process of these countries has coincided with large inflows of FDI. Unlike many developing countries, East European transition countries started out with an existing industrial structure and relatively educated workforce. Most of these economies initiated comprehensive privatisation processes when FDI started to peak worldwide.

The existing studies on the effects of FDI on economic growth in CEECs are rather controversial. Some have shown a positive impact of FDI on economic growth and productivity⁸ (Holland and Pain, 1998; Bijsterbosch and Kolasa, 2009; Sapienza, 2009; Weber, 2011). By contrast, others were less conclusive and found a negative relationship between FDI and economic growth (Djankov and Hoekman, 2000; Mencinger, 2003; Lyroudi *et al.*, 2004; Nath, 2009). FDI was shown to represent an important vehicle for the transfer of technology in host countries having a minimum threshold of human capital (Borensztein *et al.*, 1998). Furthermore, a curvilinear relationship has been found between FDI spillovers and the host-country's level of development in terms of income, institutional framework and human capital (Meyer and Sinani, 2009). In addition, the nature of FDI and on the absorptive capacity of domestic firms were shown to influence the productivity spillovers from foreign-owned companies to other firms in the economy (Görg and Greenaway, 2004; Kolasa, 2008; Damijan *et al.*, 2013). More recently, Bruno *et al.* (2016)⁹ show that FDI has "overall" effects that depend on minimum levels of

⁸ Generally, since World War II, FDI has been a consistently important source of capital in developing countries.

⁹ They use a completely new methodology in both the meta-regression analysis and FDI literatures, and a unique data set covering 564 firm-to-firm and 554 overall estimates of the effects of FDI.



human capital or financial development and “firm-to-firm” effects that depend on the type of linkage – forwards, backwards, or horizontal. The magnitude of overall effects was shown to be systematically larger than those of firm-to-firm effects, the absorptive capabilities explaining the gap identified between these effects.

ECONOMETRIC STRATEGY AND DATA

Data

Our analysis is realised over the period 1993:Q1–2014:Q1, and the sample is formed by ten EU member states.¹⁰ We use quarterly data.

Our main variable of interest is represented by the net inflows of FDI.¹¹ Data come from Eurostat and are consistent with the OECD Benchmark Definition of FDI (third edition) and the IMF Balance of Payments Manual definition (IMF, 2009). FDI corresponds to the category of cross-border investment that is associated with a resident entity in one economy (direct investor) having a lasting interest, in the form of control or a significant degree of influence, in an enterprise resident in another economy (direct investment enterprise). An immediate direct investment relationship is defined by its ownership of equity that entitles it to 10 per cent or more of the voting power in the direct investment enterprise, whereas indirect direct investment relationships are defined by the ownership of voting power in one direct investment enterprise that owns voting power in another enterprise. We use the total FDI flows data.¹²

¹⁰ We consider countries having joined the EU in 2004 and 2007, respectively, (Bulgaria, the Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Romania, Slovakia and Slovenia). We include in the analysis Slovenia, the Slovak Republic, Estonia and Latvia, even though they have joined the euro area (in 2007, 2009, 2011, and 2014, respectively) and are in a different position vis-à-vis international investors.

¹¹ FDI net inflows are the value of direct investment made by non-resident investors in the reporting economy. The expression “net” does not mean that FDI outflows are subtracted out. It stands for the use of data on net bases (capital transactions’ credits less debits between direct investors and their foreign affiliates). FDI inflows with a negative sign indicate that at least one of the components of FDI is negative and not offset by positive amounts of the remaining components, corresponding to instances of reverse investment or disinvestment.

¹² FDI flows can be broken down by type of instruments used for making the investment: equity capital (equity in branches, all shares in subsidiaries and associates and other contributions like the provision of machinery), reinvested earnings (direct investor’s share of earnings not distributed by the direct investment enterprise), and other FDI capital (inter-company transactions like borrowing and lending of funds, including debt securities and trade credits between direct investors and direct investment enterprises).



The use of FDI measured in terms of flows is debatable.¹³ Our arguments in using this type of data are in line with Globerman and Shapiro (2002).¹⁴ To the extent that inward FDI has been going on for a long time, recent and relatively large changes in FDI behaviour may not be apparent if FDI stock figures are used. Changes in stocks on a year-to-year basis will be quite small when they occur against an absolutely large accumulated base value. As a consequence, it may be difficult to identify the empirical factors affecting stock FDI values given the relatively small variations in the FDI stock dependent variable. Moreover, inward FDI behaviour is more comprehensively measured for flows than for stocks. In addition, data on FDI inflows are less vulnerable to the “book-value bias”¹⁵ (Root and Ahmed, 1979; Noorbakhsh *et al.*, 2001).

The definitions and the sources of all the indicators, and their descriptive statistics are presented in Tables 6 and 7 of Appendix .

Estimating the Determinants of FDI

In our analysis, we consider the external and domestic determinants of net FDI inflows in CEECs, this distinction being important from the perspective of policy implications. If FDI is mainly driven by domestic factors, policymakers are better able to affect it, whilst if FDI reacts mainly to global factors, recipient countries are vulnerable to global shocks even if domestic policymakers maintain prudent macroeconomic policies.

The following equation is estimated:

$$FDI_{i,t} = \alpha_0 + \alpha_1 FDI_{i,t-1} + \alpha_2 C_{i,t-1} + \alpha_3 INST_{i,t-1} + \alpha_4 REF_{i,t-1} + \alpha_5 EAmacro_{t-1} + \alpha_6 EAfin_{t-1} + \epsilon_{i,t} \quad (2)$$

where $FDI_{i,t}$ are the net FDI inflows (in logarithmic scale), and $C_{i,t-1}$ represents a set of classical determinants in country i at time $t - 1$: human capital (proxied by the gross tertiary school enrollment rate), macroeconomic stability (proxied by the inflation rate), infrastructure (the number of main telephone lines per 100 people as a proxy for communication infrastructure, and the log of the total distance in kilometres of highways network as a proxy for transportation infrastructure), market size (proxied by the year-on-year GDP growth and the growth rate of population), the risk premium or the country risk profile (proxied by the 10-year government bond yields spread

¹³ As suggested by one anonymous referee, stock FDI data should be preferred for analyses of FDI determinants in general.

¹⁴ Through an analysis on a broad sample of developed and developing countries over the period 1995–1997, they show that governance infrastructure is an important determinant of both FDI inflows and outflows.

¹⁵ Data on capital stocks are not comprehensive and are expressed in book values without any adjustment for inflation and exchange rate variations.



relative to German bonds), competitiveness (proxied by the year-on-year growth rate of the share of each country's unit labour cost (ULC) in the German unit labour cost), trade openness (proxied by the ratio of total trade to GDP). Some additional factors that might affect the attractiveness of FDI¹⁶ are equally included: geographical proximity to Western Europe¹⁷; the stages of integration in the EU accession process¹⁸; the corporate tax system¹⁹; the world economic growth (as a proxy for the global macroeconomic environment); and the global risk environment (proxied by the VIX index in logarithmic scale). $INST_{i,t-1}$ represents the institutional quality in country i at time $t-1$, $REF_{i,t-1}$ the structural reforms in country i at time $t-1$, $EAmacro_{t-1}$ the euro area business cycle (proxied by the euro area output gap) at time $t-1$, and $EAFin_{t-1}$ the euro area financing conditions at time $t-1$ (proxied by the spread between each country's three month interest rates and the three month EURIBOR).

The euro area macroeconomic and financial conditions ($EAmacro_{t-1}$, $EAFin_{t-1}$) are among the external factors that may alter the attractiveness of investment in our sample, given their large exposure to the euro area through the financial and trade channels. In addition, global macroeconomic conditions and the global risk environment are considered.

The domestic determinants are represented by classical determinants, institutional factors and structural reforms. As regards the institutional factors, we use the categories of the overall Index of Economic Freedom that relate to the rule of law (property rights, freedom from corruption) and open markets (trade freedom and investment freedom). They are expected to affect the attractiveness of FDI in a positive way, except for the freedom from corruption component. We assess the role of structural reforms by using four EBRD reform indices that relate to large-scale privatisation; competition policy; banking reform and interest rate liberalisation; securities markets and non-bank financial institutions.

We choose a semi-log model in which the only variables that are given in a logarithmic scale are net FDI inflows, transportation infrastructure, geographical proximity and global risk, all the other variables being expressed in percentage points. To gauge the impact of the 2007 and 2011 crises on FDI inflows we introduce in Equation (2) the dummy variables defined in the

¹⁶ We thank one anonymous referee for pointing us in this direction.

¹⁷ This variable takes the form of the distance, in kilometres, between each country's capital and Vienna. Austria is one of the major investors in the region, fact that explains the choice of Vienna as a reference.

¹⁸ A dummy variable takes the value 1 starting with entry into the EU and 0 otherwise.

¹⁹ We compute the difference between the corporate income tax in each country and the euro area average equivalent tax.



event study analysis in “FDI and Growth in Emerging Europe Before, During and After the Onset of the 2007 Crisis” section. In addition, all the explanatory variables are lagged by one period to mitigate reverse causality problems.²⁰

We apply a ‘general-to-specific’ approach (GETS)²¹ that has been proposed as a prescriptive way to select a parsimonious final model from a large set of real world variables whilst avoiding unnecessary ambiguity or ad-hoc decisions. This approach involves the definition of some general model which contains all potentially important variables, and then, via a series of step-wise statistical tests, the removal of empirically ‘unimportant’ variables to arrive at the proposed specific or final model. The theoretical merits and drawbacks of such a process of model selection are described by Krolzig and Hendry (2001), Campos *et al.* (2005) and Hendry and Krolzig (2005).

The initial battery of tests includes a test for serial correlation of the idiosyncratic portion of the error term [discussed by Wooldridge (2002)]; a Lagrange multiplier test for random effects (Breusch and Pagan 1980); a Doornik-Hansen type test for normality of the idiosyncratic portion of the error term, and in-sample and out-of-sample Chow tests.²² In order to determine the final specification from the potential resulting terminal specifications, an encompassing procedure is used. Each variable included in at least one terminal specification is included in the potential terminal model. This model is then tested according to a specific algorithm, in line with Clarke (2014).

Equation (2) is estimated by introducing simultaneously the domestic and external determinants. We first analyse the correlation of variables. As we seek to avoid multicollinearity, we do not introduce in the same regression highly correlated variables,²³ so that we end up with a relatively large number of terminal specifications. The results are reported in Tables 2 and 3.

²⁰ We thank one anonymous referee for pointing out the potential endogeneity issues in the model.

²¹ We thank one anonymous referee for pointing us in this direction. In a previous version, a ‘specific-to-general’ approach was implemented (i.e. the two-step system Generalised Method of Moments), and the model might have been misspecified by potentially omitting some relevant variables.

²² These two final tests consist of a comparison of regressions of each subsample to estimation results for the full sample: in the in-sample case, the two subsamples are made up of two halves of the full sample, whilst in the out-of-sample test this is a comparison between the 90 per cent and ten per cent samples.

²³ The real GDP growth is highly correlated with the euro area output gap (0.5) and, respectively, with the world economic growth (0.53); world economic growth with the global risk environment (−0.50); the euro area output gap with the world economic growth (0.50); human capital with EU membership (0.75); inflation with both the short (0.80) and long-term (0.50) interest rate spread, and the unit labour cost differential (0.86); population growth with geographical proximity (−0.55); transportation infrastructure with geographical proximity (−0.50) and EU membership (0.50).



Table 2: FDI determinants

Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Lagged FDI (ln)	0.331*** (0.070)	0.341*** (0.075)	0.352*** (0.079)	0.287*** (0.063)	0.281*** (0.062)	0.289*** (0.073)	0.272*** (0.067)
Human capital _{t-1}	0.014*** (0.004)		0.015*** (0.004)				
<i>Classical determinants</i>							
Real GDP growth _{t-1}	0.026** (0.010)						
Communication infrastructure _{t-1}		0.042*** (0.008)	0.049*** (0.012)	0.029*** (0.012)		0.046*** (0.008)	0.257*** (0.098)
Transportation infrastructure (ln) _{t-1}							
Competitiveness _{t-1}	-0.001*** (0.0002)					-0.001*** (0.0005)	-0.031*** (0.003)
Country risk _{t-1}				-0.028*** (0.002)			0.007*** (0.002)
Trade openness _{t-1}				0.005** (0.002)			-0.011** (0.004)
Tax system _{t-1}		-0.015** (0.004)	-0.014*** (0.005)				
EU membership		0.558*** (0.139)			0.572*** (0.110)		
Geographical proximity (ln) _{t-1}		-1.021*** (0.137)	-1.336*** (0.200)	-0.508*** (0.185)		-0.915*** (0.119)	
<i>External factors</i>							
Euro area cycle _{t-1}		0.122*** (0.022)			0.157*** (0.110)		
Interest rate differential _{t-1}					-0.011*** (0.001)		
Global risk environment (ln) _{t-1}			-0.204*** (0.068)	-0.339*** (0.079)			
World economic growth _{t-1}						0.111*** (0.019)	0.103*** (0.026)



Table 2: (Continued)

Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crisis 2007			-1.595** (0.677)	-1.681** (0.804)	-1.830** (0.877)		
Crisis 2011	-3.010** (0.865)	-3.117*** (0.602)	-3.389*** (0.635)	-3.190*** (0.724)	-2.865*** (0.677)	-3.183*** (0.701)	-3.261*** (0.822)
Observations	609	689	689	557	602	613	517
R ²	0.668	0.721	0.723	0.664	0.654	0.686	0.662

Panel data general-to-specific approach, random effects general least square regressions. The dependent variable is the FDI in logarithmic scale. Standard errors in parenthesis. *, **, *** denotes significance at 10, 5, 1% level. All regressions include a constant and country dummies that are not reported.



Table 3: FDI determinants

Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Lagged FDI (ln)	0.382*** (0.069)	0.337*** (0.059)	0.359*** (0.085)	0.321*** (0.070)	0.308*** (0.046)	0.286*** (0.050)	0.333*** (0.059)
Human capital _{t-1}		0.014*** (0.004)					
<i>Classical determinants</i>							
Real GDP growth _{t-1}			0.028*** (0.009)				
Communication infrastructure _{t-1}	0.038*** (0.007)						
Transportation infrastructure (ln) _{t-1}					0.490*** (0.064)		
<i>External factors</i>							
Euro area cycle _{t-1}		0.129*** (0.028)			0.113*** (0.031)		
Interest rate differential _{t-1}				-0.010*** (0.003)		-0.008*** (0.002)	-0.008*** (0.003)
Global risk environment (ln) _{t-1}	-0.339*** (0.107)					-0.282*** (0.142)	-0.333*** (0.133)
<i>Structural reforms</i>							
Privatisation _{t-1}	0.706*** (0.148)	0.530*** (0.201)					
Competition policy _{t-1}			0.602*** (0.128)	0.456*** (0.109)			
Banking sector _{t-1}					0.898*** (0.213)	0.754*** (0.195)	
Financial sector _{t-1}							0.429*** (0.147)
Crisis 2007	-1.805*** (0.688)	-2.241*** (0.800)		-1.765** (0.873)		-1.687*** (0.857)	-1.644*** (0.802)
Crisis 2011	-3.093*** (0.578)	-2.920*** (0.724)	-2.992*** (0.796)	-3.277*** (0.657)	-2.837*** (0.704)	-3.106*** (0.596)	-3.139*** (0.617)



Table 3: (Continued)

Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Observations	689	689	633	602	617	602	602
R ²	0.718	0.725	0.680	0.634	0.700	0.654	0.638

Panel data general-to-specific approach, random effects general least square regressions. The dependent variable is the FDI in logarithmic scale. Standard errors in parenthesis. *, **, *** denotes significance at 10, 5, 1% level. All regressions include a constant and country dummies that are not reported.



The coefficients of classical determinants are mostly consistent with the existing literature.

Past FDI incorporates information on operating conditions and the general quality of the business climate in host countries. It gives an indication on the average perception about a country, and influences investors' insight on potential locations (Kinoshita and Mody, 1997). Our results show a positive and statistically significant coefficient for lagged FDI, in line with expectations.

Human capital is found to present a positive and statistically significant coefficient, confirming the importance of human capital in attracting FDI. High levels of education are regarded as the most important element in human resources development (OECD, 1998; World Bank, 1999). As illustrated by Noorbakhsh *et al.* (2001), the locational advantage of a country can be substantially improved through educational policies that raise the supply and quality of human capital. We use the gross average tertiary school enrollment rate as a measure of human capital.²⁴ Indeed, given that the services sectors (predominantly information-intensive services: financial intermediation, business-related services, trade, transports, storage and communication) are the major recipients of FDI in CEECs, this measure of human capital is the most appropriate.²⁵

Continued expansion of FDI requires favourable market growth prospects. We use two different indicators for the market size: the real GDP growth and, respectively, the growth rate of population. The use of the GDP growth rate is common in the literature on FDI drivers. Our results indicate that the growth potential in recipient countries influences the incentive to invest in CEECs, real GDP growth rate presenting a positive and statistically significant coefficient. An alternative proxy is the growth rate of population.²⁶ This variable is not selected by the GETS algorithm in any specification, not allowing us to state whether demographic growth potential of CEECs gives an incentive to invest in the region. Our results are in line with UNCTAD (1998) and Noorbakhsh *et al.* (2001). The long-term commitment of foreign investors is conditioned by rapid economic growth that leads to increases in income and consumer demand for goods and services.

Inflation (the proxy for macroeconomic stability) was dropped by the GETS algorithm in all the specifications.

²⁴ We thank one anonymous referee for pointing us in this direction.

²⁵ In a previous version the gross secondary school enrollment rate was used and the results were counter-intuitive. In all the countries in the sample, the level of the gross secondary school enrollment ratio is quite high reflecting a substantial number of overage children enrolled in each grade because of repetition or late entry rather than a successful education system.

²⁶ The use of this indicator was suggested by one anonymous referee.



The quality of infrastructure is found to affect the attractiveness of FDI in the region. The two measures present positive and statistically significant coefficients, confirming the beneficial impact of the high-quality infrastructure (related to communications and transportation) on FDI inflows in CEECs.

Competitiveness is found to affect significantly the inflows of FDI in CEECs. As underlined by trade theory, relative low unit labour costs are the main incentive of vertical FDI by multinational companies that can reduce the overall costs of production by locating their labour-intensive activities in countries with low unit labour costs. We compute competitiveness as the year-on-year growth rate of the share of each country's ULC in the German ULC.²⁷ According to our results, its increase is associated with a decrease in net FDI inflows in the region, in line with expectations. The higher the share of each country's ULC in the German ULC, the lower is the difference in ULC and, thus, the lower is the incentive to locate the labour-intensive activities in CEECs.

The taxation system influences the attractiveness for FDI and shapes the competitiveness of host countries. We compute the corporate tax differential relative to corporate income tax in source countries (i.e. the average corporate income tax in the euro area 19). The results show a negative and statistically significant coefficient; the higher the corporate tax relative to the average corporate income tax in the euro area, the lower the incentives of foreign investors to commit in the region.

Risk could be an important obstacle to investment, both domestic and foreign. According to our findings, risk premium presents the expected negative and statistically significant coefficient; the larger the long-term interest rate spread, the riskier the investment climate and, as a consequence, less attractive is the region for foreign investors.

Open economies encourage more confidence and foreign investment. Our results indicate a statistically significant and positive effect of trade openness on net inflows of FDI. The larger the share of total trade in GDP, the larger the FDI inflows in CEECs.²⁸ These findings are in line with the literature pointing out the existence of a complementarity between trade flows and FDI flows (Carstensen and Toubal, 2004; Nath, 2009; Sapienza, 2009).

The integration in the EU accession process might affect the attractiveness of CEECs for FDI. Indeed, our results show that FDI inflows were higher in volume in countries that have joined the EU, the coefficient of the dummy variable being positive and statistically significant.

²⁷ The computation of ULC in CEECs relative to those in source countries (euro area for our sample) was suggested by one anonymous referee.

²⁸ In a previous version, the ratio of exports to GDP was used as a proxy for trade openness and the results obtained were broadly the same.



Geographical proximity to Western Europe is expected to ease and favorise more FDI inflows. The coefficient of this variable is negative and statistically significant, as expected; the higher the distance between each country's capital and Vienna, the lower the net FDI inflows.

The euro area business cycle presents a positive and statistically significant effect on FDI inflows: the higher the output gap in the euro area, the higher the average FDI inflows to the EU new member states. Quite intuitively, a positive output gap signals that the euro area economy is running above potential so that domestic demand is expanding, encouraging lenders to increase their cross-border exposure. These results are in line with Ferrucci *et al.* (2004) that underlined the positive effect of economic growth in creditor countries on international capital flows, stronger growth boosting the profitability of firms that increase their investment abroad. Moreover, the strong influence of macroeconomic conditions in the euro area on FDI flows to CEECs is in line with the 2012 EBRD Transition Report, according to which, over the previous decade, FDI flows in the region have been rather affected by the economic conditions in the source country than by the prevailing or past growth rates in the recipient country.

The financial conditions in the euro area are also found to affect FDI inflows in CEECs. The short-term interest rate spread presents the expected negative and statistically significant coefficient; the higher its value, the more expensive is the financing and, thus, less attractive is the region for foreign investors.

In addition to country risk, we examine whether the global risk environment influences the way FDI inflows in CEECs. Quite intuitively, the high global risk is found to be associated with less FDI inflows in the region. In a low global risk environment, funds flow towards investment in higher-returns and riskier catching-up economies (like the EU new member states), whereas during periods of high risk aversion, investors orientate towards safer and more liquid securities.

Moreover, the attractiveness of FDI in CEECs is found to be positively influenced by the favourable prospects of global economic growth.

Finally, FDI inflows in the region are found to have been negatively influenced by the 2007 and 2011 crises.

We further assess the role of institutional and structural reforms (Table 3). The institutional and structural reform indicators are introduced one by one, in order to avoid multicollinearity.²⁹ Inflation and all the classical determinants, except for human capital in column (2)³⁰ and infrastructure are

²⁹ The collinearity diagnostic tests indicate the appropriate separate use of each of these indicators.

³⁰ The correlation of the large-scale privatisation index with human capital is of 0.33.



dropped because of their high correlation with these variables. As underlined by Estrin and Uvalic (2014),³¹ there is not an agreed single measure of institutional quality. In addition, the literature noted the problems arising from collinearity between alternative measures.

None of the institutional reform indicators has been selected by the GETS algorithm. We therefore cannot state whether the measures used to proxy institutional reforms influence FDI inflows in CEECs.

As regards the structural reforms indicators, the EBRD indexes present positive and statistically significant coefficients. The higher the progress in the implementation of policies related to the privatisation process (in line with Estrin and Uvalic, 2014), competition, banking and financial sectors, the larger the attractiveness of foreign investors.

Estimating the Effect of FDI on Economic Growth

We assess the relationship between economic growth and net FDI inflows in the region and consider the occurrence of 2007 and 2011 crises. We estimate a simple growth equation for our sample of countries from Central and Eastern Europe, in which investment is divided in a domestic and a foreign component:

$$\Delta GDP_{i,t} = \beta_0 + \beta_1 FDI_{i,t-1} + \beta_2 H_{i,t-1} + \beta_3 INV_{i,t-1} + \beta_4 Y_0 + \beta_5 A_{i,t-1} + \epsilon_{i,t} \quad (3)$$

where $\Delta GDP_{i,t}$ is the year-on-year real GDP growth rate in country i at time t , $FDI_{i,t-1}$ are the net foreign direct investment inflows (% of GDP) in country i at time $t - 1$ (or the foreign component of investment), $H_{i,t-1}$ the human capital³² in country i at time $t - 1$, proxied by the gross average tertiary school enrollment rate (%), $INV_{i,t-1}$ the gross fixed capital formation (% of GDP) in country i at time t (or the domestic component of investment), $Y_{i,0}$ the initial GDP (“catching-up” effect) in country i , and $A_{i,t-1}$ a set of other variables affecting economic growth in country i at time $t - 1$, such as government consumption, financial development and inflation rate (Barro and Sala-i-Martin, 1995). All the explanatory variables are lagged by one period to mitigate reverse causality problems.

³¹ They use two measures of institutions, namely investment freedom and a quality of property rights protection index, and the EBRD large-scale privatisation index and find no significant results for the impact of institutional factors.

³² The implementation of more advanced technologies, that is related to FDI, requires the presence of a sufficient level of human capital in host economies. Thus, the stock of human capital in host countries limits the absorptive capacity of a developing economy.



We should note that net FDI and gross fixed capital formation are distinct indicators.³³ The latter consist of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories, whilst FDI relates to financing, i.e. the purchase of shares in foreign companies where the buyer has a lasting interest (10 per cent or more of voting stock). FDI can be used to finance fixed capital formation; however, it can also be used to cover a deficit in the company or paying off a loan.

The log of initial GDP and inflation rate are standard proxies for the level of development and macroeconomic stability, respectively. Like in Barro (1995), we have included in our regressions the standard deviation of inflation³⁴ to account for the nonlinear relationship found between inflation and economic growth in a large number of studies. In addition, we use domestic credit to private sector (% of GDP)³⁵ as a proxy for financial deepening.

We choose a semi-log model like in Carstensen and Toubal (2004). The only variable in a logarithmic scale is initial GDP, all the other explicative variables being expressed in percentage points.

In the growth equation above, FDI might be endogenous. According to the Wu-Hausman test, gross fixed capital formation (% of GDP) (*INV*), inflation rate and domestic credit to private sector (% of GDP) are equally endogenous. We control for the endogeneity³⁶ of these variables by using the instrumental variables method and apply the panel data two-step efficient GMM estimator. In addition, in order to mitigate reverse causality problems, all the explicative variables are lagged by one period. The efficiency gains of the GMM estimator relative to the traditional IV/2SLS estimator derive from the use of the optimal weighting matrix, the overidentifying restrictions of the model, and the relaxation of the i.i.d. assumption.³⁷ The instruments used are the following: the second lag of FDI, the second lag of *INV*, the fourth lag of the inflation rate and the fourth lag of

³³ We thank two anonymous referees for emphasizing the importance of this issue.

³⁴ The standard deviation of the inflation rate is measured in relation to the mean inflation rate for each year.

³⁵ This indicator of financial depth has been largely used in the literature on financial development (King and Levine, 1993).

³⁶ Under the null hypothesis that the specified endogenous regressors can actually be treated as exogenous, the test statistic is distributed as chi-squared with degrees of freedom equal to the number of regressors tested.

³⁷ For an exactly identified model, the efficient GMM and traditional IV/2SLS estimators coincide, and under the assumptions of conditional homoskedasticity and independence, the efficient GMM estimator is the traditional IV/2SLS estimator.



domestic credit to private sector (% of GDP).³⁸ The validity of instruments is tested with the use of the Sargan-Hansen test.³⁹

In order to capture the effect of the 2007 and 2011 crises on the existing relationship between FDI inflows and economic growth, we interact the crises dummies with the FDI variable.

The results of the estimations are presented in Table 4. We proceed in two steps: first, we do not distinguish between the two components of investment and consider just the impact of FDI on economic growth (columns 1–3); second, we include both the domestic (INV) and the foreign (FDI) components of investment (columns 4–6).

The variable of interest is represented by net FDI inflows. According to our findings, net FDI inflows (in % of GDP) present a positive and statistically significant coefficient, in line with the findings of the majority of macroeconomic studies using aggregate FDI flows. Accordingly, a 1% increase in net FDI inflows (in terms of GDP) induces average real GDP growth rate to increase by about 0.18–0.23%.

Our results confirm the complementarity of FDI and human capital (Nelson and Phelps, 1966), the measure of human capital presenting a positive and statistically significant coefficient. The higher the gross tertiary school enrolment rate, the higher the economic growth in Emerging Europe. Like in Borensztein *et al.* (1998), we examined whether the flow of advanced technology brought along by FDI can increase the economic growth in the region. The absorptive capacity (proxied by human capital) is susceptible to enhance transfer of technology and, thereby, to strengthen the impact of FDI on economic growth. We include in Equation (3) the interaction term between FDI and human capital ($FDI_{i,t} \times H_{i,t}$). Its coefficient is statistically non-significant in all the specifications, and, as a consequence, we do not report it.

The initial level of GDP presents a positive but statistically non-significant coefficient. Our findings are not illustrating the existence of a catching-up effect (i.e. less developed countries, with a lower initial GDP, are expected to register higher real GDP growth rates) over the period of analysis.

Gross fixed capital formation (% of GDP) presents a statistically significant and positive coefficient. As expected, a high level of domestic investment triggers, on average, higher economic growth in the region. Accordingly, a 1% increase in gross fixed capital formation (in terms of GDP) induces average real GDP growth rate to increase by about 0.25–0.28%.

³⁸ We have estimated different specifications with different instruments and the results were broadly similar.

³⁹ The joint null hypothesis is that the instruments are valid instruments, i.e. uncorrelated with the error term, and that the excluded instruments are correctly excluded from the estimated equation. A rejection casts doubt on the validity of the instruments.



Table 4: FDI inflows in CEECs and economic growth

Independent variable	(1)	(2)	(3)	(4)	(5)	(6)
FDI _{t-1}	0.186 (0.119)	0.228* (0.119)	0.226* (0.121)	0.213 (0.138)	0.232* (0.119)	0.237** (0.118)
Initial GDP (ln)	2.723 (3.110)	3.049 (3.203)	3.169 (3.182)	2.811 (3.282)	3.080 (3.116)	3.086 (3.131)
Human capital _{t-1}	0.031 (0.022)	0.036* (0.022)	0.028 (0.023)	0.054** (0.028)	0.054** (0.022)	0.054** (0.024)
Government consumption _{t-1}	-0.237*** (0.086)	-0.247*** (0.087)	-0.279*** (0.095)	-0.171* (0.103)	-0.146 (0.097)	-0.144 (0.107)
Domestic credit to private sector _{t-1}	-0.109*** (0.017)	-0.113*** (0.017)	-0.112*** (0.017)	-0.111*** (0.020)	-0.110*** (0.016)	-0.110*** (0.016)
St. dev. of dom. credit rate _{t-1}			0.203 (0.139)			0.024 (0.129)
Gross fixed capital formation _{t-1}				0.280** (0.131)	0.257** (0.108)	0.259** (0.112)
Inflation rate _{t-1}	-0.011 (0.011)	-0.010** (0.004)	-0.011** (0.004)	0.007 (0.013)	-0.015** (0.006)	-0.015** (0.006)
St. dev. of inflation rate _{t-1}		0.024*** (0.007)	0.024*** (0.008)		0.037*** (0.012)	0.038*** (0.013)
2007 crisis	-3.200** (1.079)	-3.266*** (1.093)	-3.407*** (1.100)	-6.483*** (1.544)	-6.423*** (1.548)	-6.418*** (1.557)
FDI × 2007 crisis	0.191* (0.112)	0.194* (0.118)	0.187 (0.117)	0.219** (0.103)	0.224** (0.100)	0.221** (0.099)
GFCF × 2007 crisis				0.0003*** (0.0001)	0.0003*** (0.0001)	0.0003*** (0.0001)
2011 crisis	-2.074** (0.871)	-1.903** (0.851)	-1.831** (0.851)	-1.830 (1.334)	-2.090* (1.163)	-2.072* (1.166)
FDI × 2011 crisis	0.060 (0.189)	0.077 (0.187)	0.092 (0.186)	0.113 (0.196)	0.135 (0.189)	0.143 (0.188)
GFCF × 2011 crisis				0.00008 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)
Underidentification ^a	0.015	0.000	0.000	0.024	0.000	0.000
Hansen ^b	0.331	0.295	0.315	0.463	0.569	0.555
Endogeneity ^c	0.043	0.036	0.020	0.014	0.085	0.074
Observations	634	634	634	634	634	634
No. of countries	10	10	10	10	10	10

Panel data two-step efficient generalised method of moments (GMM) estimator. The dependent variable is the year-on-year real GDP growth. Standard errors in parentheses. *, **, *** denotes significance at 10, 5, 1% level. All regressions include a constant, country dummies and an interaction term between FDI and human capital that are not reported.

^a P-value corresponding to the Kleibergen-Paap (2006) rk LM statistic. A rejection of the null indicates that the matrix is full column rank, i.e. the model is identified.

^b The joint null hypothesis is that the instruments are valid instruments and that the excluded instruments are correctly excluded from the estimated equation.

^c We test the endogeneity of FDI, inflation, GFCF and domestic credit. Under the null hypothesis, the specified endogenous regressors can actually be treated as exogenous.



As far as the set of “other” variables affecting economic growth is concerned, government consumption presents a negative and statistically significant coefficient. According to our findings, the higher the government expenditure, the lower the economic growth. The evidence on the effect of government expenditure on economic growth is rather mixed: positive effect, negative effect and/or no relationship. It has been shown that countries with large government expenditure tend to experience higher growth, but the effect varies from one country to another. The general view is that public expenditure (either recurrent or capital expenditure), notably on social and economic infrastructure can be growth enhancing, even though the financing of such expenditure can be growth retarding (for example, the negative effect associated with taxation and excessive debt).

Inflation presents a negative and statistically significant coefficient in columns 2, 3, 5 and 6 and a statistically non-significant coefficient in columns 1 and 4. To consider the potential nonlinear relationship between inflation and economic growth, the standard deviation of inflation was included in columns 2, 3, 5 and 6. This affected the estimated coefficient of inflation, that kept the negative sign but has become statistically significant, in line with expectations, low inflation being a sign of macroeconomic stability. The standard deviation of inflation presents a positive and statistically significant coefficient, indicating that the high variability of inflation triggers a higher economic growth and confirming this way the existence of a nonlinear relationship between inflation and economic growth.

Finally, financial depth presents a negative and statistically significant effect on economic growth, result that is rather counter-intuitive. Like for inflation, we include the standard deviation of domestic credit to private sector⁴⁰ (in columns 3 and 6). It presents a positive and statistically non-significant impact on economic growth, the high fluctuations in domestic credit not being associated with higher economic growth. Thus, the existence of a nonlinear relationship between economic growth and financial depth measure is not confirmed.

The occurrence of the 2007 and 2011 crises is taken into account in all the estimations. Taken separately (i.e. not interacted with the FDI indicator), the crisis dummies present a negative and statistically significant coefficient, illustrating the negative impact of both crises on economic growth, in line with the event study in “[FDI and Growth in Emerging Europe Before, During and After the Onset of the 2007 Crisis](#)” section. The interaction terms between the crisis dummies and FDI inflows allow us to assess whether the existing FDI- economic growth link was affected during the crises. In a similar way, the

⁴⁰ The computation is identical to the one for inflation rate.

**Table 5:** The impact of FDI and *INV* on economic growth during the 2007 and 2011 crises

	(1)	(2)	(3)	(4)	(5)	(6)
<i>2007 crisis</i>						
FDI	0.377*** (0.136)	0.423*** (0.135)	0.413*** (0.136)	0.432*** (0.143)	0.456*** (0.126)	0.459*** (0.125)
GFCF				0.280** (0.131)	0.257** (0.108)	0.259** (0.112)
<i>2011 crisis</i>						
FDI	0.246 (0.248)	0.306 (0.245)	0.318 (0.244)	0.326 (0.273)	0.368 (0.247)	0.381 (0.244)
GFCF				0.280** (0.131)	0.257** (0.108)	0.259** (0.112)

Standard errors in parentheses. *, **, *** denotes significance at 10, 5, 1% level. The combined coefficients are based on the regressions presented in Table 4.

interaction terms between *INV* and crises allow to gauge the impact of crises on the relationship between economic growth and domestic investment.

The effect of FDI on economic growth during the crises is given by a combined coefficient calculated as the sum of the FDI coefficient and the coefficient of the interaction terms (FDI \times 2007 crisis and, respectively, FDI \times 2011 crisis). The same computation can be done for the domestic component of investment, *INV*. The combined coefficients are reported in Table 5 below.

Overall, the decline in real GDP growth during the 2007 crisis is found not to have had a negative impact on the FDI – economic growth link. On the contrary, as illustrated by the positive and statistically significant coefficients in Table 5, the impact of FDI was higher during the 2007 crisis, when a 1% increase in net FDI inflows (in % of GDP) is shown to have triggered an increase in average real GDP growth rate of about 0.37–0.45%. Moreover, our results do not show a statistically significant impact of FDI on economic growth during the 2011 crisis.

In addition, the decline in real GDP growth rates during the 2007 and the 2011 crises is found not to have impacted the relationship between domestic investment and economic growth. The coefficients of the interactions terms are statistically significant and of the same magnitude; a 1% increase in gross fixed capital formation, in % of GDP, is found to determine an increase in average real GDP growth rate of about 0.25–0.28%.

CONCLUSION

Our paper complements the existing empirical literature examining net FDI inflows in CEECs.



First, we analyse their determinants through a panel data general-to-specific approach. We show a strong influence of euro area macroeconomic and financial conditions on the inflows of FDI in the region, in line with the 2012 EBRD Transition Report. Moreover, we show that global risk environment and global macroeconomic conditions are important key drivers. The main domestic determinants revealed by our results are past FDI, human capital, market size, infrastructure, competitiveness, the corporate tax system, risk premium, trade openness, geographical proximity to Western Europe, the EU accession, as well as the progress in implementing structural reforms (related mainly to large-scale privatisations, competition policy, reforms in the banking and financial sectors).

Second, we assess their impact on economic growth through a dynamic panel data model and show a positive and statistically significant contribution of FDI inflows to economic growth over the period 1993:Q1–2014:Q1. In addition, this relationship is explored with a focus on the 2007 and 2011 crises; net FDI inflows' impact on economic growth is found to be amplified during the 2007 crisis and to become non-significant during the 2011 crisis.

According to our findings, the growth potential of CEECs is crucial for attracting FDI inflows and, at the same time, FDI inflows contribute further to enhancing economic growth in these economies. Given the positive impact of net FDI inflows on economic growth, host countries from Central and Eastern Europe could continue to encourage, to a certain extent, the entry of FDI flows. As privatisation has ceased to be the main driver of FDI in the region, economic features attracting non-privatisation-related FDI are becoming increasingly more important (Arratibel *et al.*, 2007). In addition, a stable macroeconomic environment, labour costs that develop in line with productivity, and a sufficiently developed infrastructure, all identified by our results, are preconditions for future FDI inflows.

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REFERENCES

- Arratibel, O, Heinz, FF, Martin, R, Przybyla, M, Rawdanowicz, L, Serafini, R and Zumer, T. 2007: Determinants of Growth in the Central and Eastern European EU Member States – A Production Function Approach. ECB Occasional Paper, 61.
- Barro, R and Sala-i-Martin, X. 1995: *Economic Growth*. McGraw-Hill: Cambridge, MA.
- Barro, R. 1995: Inflation and Economic Growth. NBER Working Paper, 5326, October 1995.
- Bevan, A and Estrin, S. 2004: The Determinants of Foreign Direct Investment in Transition Economies. University of Michigan. *Journal of Comparative Economics*, 32: 775–787.
- Bijsterbosch, M and Kolasa, M. 2009: FDI and Productivity Convergence in Central and Eastern Europe – An Industry-Level Investigation. ECB Working Paper, 992.
- Borensztein, E, De Gregorio, J and Lee, J. 1998: How does foreign direct investment affect economic growth? *Journal of International Economics* 45: 115–135.
- Boyd, JH and Smith, BD. 1992: Intermediation and the equilibrium allocation of investment capital: Implications for economic development. *Journal of Monetary Economics* 30: 409–432.
- Brainard, SL. 1997: An empirical assessment of the proximity-concentration trade-off between multinational sales and trade. *American Economic Review* 87: 520–544.
- Brenton, P, Di Mauro, F and Lücke, M. 1999: Economic integration and FDI: An empirical analysis of foreign investment in the EU and in Central and Eastern Europe. *Empirica* 26: 95–121.
- Broner, F, Didier, T, Erce, A and Schmukler, L. 2013: Gross capital flows: Dynamics and crises. *Journal of Monetary Economics* 60: 113–133.
- Brunnermeier, MK. 2009: Deciphering the liquidity and credit crunch 2007–2008. *Journal of Economic Perspectives* 23(1): 77–100.
- Bruno, RL, Campos, NF and Estrin, S. 2016: Decomposing the Benefits from Foreign Direct Investment: A New Methodological Framework. 2016 AIB Conference, New Orleans, LA, June 27–30.
- Campos, J, Ericsson, NR and Hendry, DF. 2005: General-to-Specific Modeling: An Overview and Selected Bibliography. International Finance Discussion Papers, 838, Board of Governors of the Federal Reserve System (U.S.).
- Campos, J, and Kinoshita, Y. 2008: Foreign Direct Investment and Structural Reforms; Evidence from Eastern Europe and Latin America. IMF Working Paper, 26.
- Carkovic, M and Levine, R. 2005: Does Foreign Direct Investment Accelerate Economic Growth? *Does Foreign Direct Investment Promote Development?*, Institute for International Economics, 195–220.
- Carstensen, K and Toubal, F. 2004: Foreign direct investment in central and eastern European countries: A dynamic panel analysis. *Journal of Comparative Economics* 32: 3–22.
- Castejón, CF and Wörz, J. 2007: Good or Bad? The Influence of FDI on Output Growth: An Industry-Level Analysis. WIIW Working Paper, 38.
- Clarke, D. 2014: General to specific modelling in Stata. *The Stata Journal* 14(4): 895–908.
- Coricelli, F and Ianchovichina, E. 2004: Managing Volatility in Transition Economies: The Experience of the Central and Eastern European Countries. CEPR Discussion Papers, 4413.
- Damijan, JP and Rojec, M. 2007: Foreign direct investment and the catching-up process in new EU member states: Is there a flying geese pattern? *Applied Economics Quarterly* 53(2): 91–118.
- Damijan, JP, Rojec, M, Majcen, B and Knell, M. 2013: Impact of firm heterogeneity on direct and spillover effects of FD: Micro-evidence from ten transition countries, *Journal of Comparative Economics* 41: 895–922.
- De Mello, LR. 1997: Foreign direct investment in developing countries and growth: A selective survey. *The Journal of Development Studies* 34(1): 1–34.



- Djankov, S and Hoekman, BM. 2000: Foreign investment and productivity growth in Czech enterprises. *World Bank Economic Review* 14(1): 49–64.
- Dunning, J. 1981: *International Production and the Multinational Enterprise*. Allen & Unwin: London.
- Ehrmann, M, Osbat, C, Strasky, J and Uusküla, L. 2013: The Euro Exchange Rate During the European Sovereign Debt Crisis. Dancing to Its Own Tune? ECB Working Paper, 1532, April 2013.
- Estrin, S and Uvalic, M. 2014: FDI into transition economies: Are the Balkans different? *Economics of Transition* 22(2): 281–312.
- European Bank for Reconstruction and Development. 1994, 2009, 2010, 2012: Transition Reports.
- Ferrucci, G, Herzberg, V, Soussa, F and Taylor, A. 2004: Understanding capital flows to emerging market economies. *Bank of England Financial Stability Review* 89–96.
- Forbes, K. 2006: Capital Account Liberalization: A Vehicle for Growth? Presented at IMF Conference: How Does Capital Account Liberalization Affect Economic Growth? Washington.
- Fratzscher, M. 2012: Capital flows, push versus pull factors and the global financial crisis. *Journal of International Economics*, 88: 341–356.
- Garibaldi, P, Mora, N, Sahay, R and Zettelmeyer, J. 2001: What Moves Capital to Transition Economies? IMF Staff Papers, 48.
- Giroud, A, Jindra, B and Marek, P. 2012. Heterogeneous FDI in transition economies. a novel approach to assess the developmental impact of backward linkages. *World Development* 40(11): 2206–2220.
- Globerman, S and Shapiro, D. 2002: Global foreign direct investment flows: The role of governance infrastructure. *World Development* 30(11): 1899–1919.
- Görg, H and Greenaway, D. 2004: Much ado about nothing? Do domestic firms really benefit from foreign direct investment? *World Bank Research Observer* 19(2): 171–197.
- Hejazi, W and Safarian, E. 1999: Trade, foreign direct investment, and R&D spillovers. *Journal of International Business Studies* 30: 491–511.
- Helpman, E. 1984: A simple theory of international trade with multinational corporations. *Journal of Political Economy* 92: 451–471.
- Hendry, DF and Krolzig, H-M. 2005: The properties of automatic “GETS” modelling. *Economic Journal* 115(502): C32–C61.
- Holland, D and Pain N. 1998: The Diffusion of Innovations in Central and Eastern Europe: A Study of the Determinants and Impact of Foreign Direct Investment. NIESR Discussion Paper, 137.
- International Monetary Fund (IMF). 2009: Balance of Payments Manual.
- International Monetary Fund (IMF). 2011: International capital flows: Reliable or fickle? *World Economic Outlook “Tensions from the two-speed recovery”*, April 2011, 125–163.
- International Monetary Fund (IMF). 2011, 2014: Statistical Appendix. *World Economic Outlook “Slowing growth, rising risks”*, September 2011; *World Economic Outlook*, April 2014.
- Jevčák, A, Setzer, R and Suardi M. 2010: Determinant of Capital Flows to the New EU Member States Before and During the Financial Crisis. European Commission Economic Papers, 425.
- King, R and Levine, R. 1993: Finance and growth: Schumpeter might be right. *Quarterly Journal of Economics* 108: 717–738.
- Kinoshita, Y and Mody, A. 1997: The Usefulness of Private and Public Information for Foreign Investment Decisions. Policy Research Working Paper, 1733. World Bank: Washington, DC.
- Kleibergen, F and Paap, R. 2006: Generalized reduced rank tests using the singular value decomposition. *Journal of Econometrics* 133: 97–126.
- Kolasa, M. 2008. How does FDI inflow affect productivity of domestic firms? The role of horizontal and vertical spillovers, absorptive capacity and competition. *Journal of International Trade and Economic Development* 17(1): 155-173.



- Krolzig, H-M and Hendry, DF. 2001: Computer automation of general-to-specific model selection procedures. *Journal of Economic Dynamics and Control* 25(6-7): 831-866.
- Lall, S. 1980: Vertical interfirm linkages in LDCs: An empirical study. *Oxford Bulletin of Economics and Statistics* 42: 203-226.
- Lane, PR and Milesi-Ferretti, GM. 2007: Capital flows to Central and Eastern Europe. *Emerging Markets Review* 8: 106-123.
- Lim, E-G. 2001: Determinants of, and the Relations Between Foreign Direct Investment and Growth: A Summary of the Recent Literature. IMF Working Paper, 175.
- Lyroutdi, K, Papanastasiou, J and Vamvakidis, A. 2004: Foreign direct investment and economic growth in transition economies. *South Eastern Europe Journal of Economics* 1: 97-110.
- Mencinger, J. 2003: Does foreign direct investment always enhance economic growth? *Kyklos* 56(4): 491-508.
- Meyer, KE. 1999: *Direct Investment in Economies in Transition*. Edward Elgar: Aldershot.
- Meyer, KE and Sinani, E. 2009: When and where does foreign direct investment generate positive spillovers? A meta-analysis. *Journal of International Business Studies* 40(7): 1075-1094.
- Nath, HK. 2009: Trade, foreign direct investment, and growth: Evidence from transition economies. *Comparative Economic Studies* 51(1): 20-50.
- Nelson, R and Phelps, E. 1966: Investment in humans, technological diffusion, and economic growth. *American Economic Review: Papers and Proceedings* 61: 69-75.
- Noorbakhsh, F, Paloni, A, and Youssef, A. 2001: Human capital and FDI inflows to developing countries: New empirical evidence. *World Development* 29(9): 1593-1610.
- OECD. 1996: *OECD Benchmark Definition of Foreign Direct Investment, Third Edition*.
- OECD. 1998: *Human capital investment: An international comparison*. OECD Centre for Educational Research and Innovation: Paris.
- Resmini, L. 2000: The determinants of foreign direct investment in the CEECs. *Economics of Transition* 8(3): 665-689.
- Root, FR and Ahmed, A.A. 1979: Empirical determinants of manufacturing direct foreign investment in developing countries. *Economic Development and Cultural Change* 27(4): 751-767.
- Romer, P. 1993: Idea gaps and object gaps in economic development. *Journal of Monetary Economics* 32(3): 543-573.
- Sapienza, E. 2009: FDI and Growth in Central and Southern Eastern Europe. DSEMS (Dipartimento di Scienze Economiche, Matematiche e Statistiche) Working Paper, Università degli Studi di Foggia, 12.
- UNCTAD. 1998: *World Investment Report*. UNCTAD: Geneva.
- Weber, E. 2011: Foreign and domestic growth drivers in Eastern Europe. *Economic Systems* 35: 512-522.
- Wheeler, D and Mody, A. 1992: International investment location decisions: The case of U.S. firms. *Journal of International Economics* 33: 57-76.
- Wooldridge, JM. 2002: *Econometric Analysis of Cross Section and Panel Data*. The MIT Press: Cambridge.
- World Bank. 1999: *Knowledge for Development: World Development Report 1998/1999*. Oxford University Press: New York.



APPENDIX

See Tables 6 and 7.

Table 6: Data sources and definition of variables

Variable	Sources	Definition
GDP	Eurostat	GDP in volumes (millions of euros, seasonally adjusted)
FDI	Eurostat	Net foreign direct investment flows in the reporting economy, millions of euros. Used both in levels and in % of GDP
Investment	Eurostat	Gross fixed capital formation, % of GDP
Human capital	WDI, World Bank	Tertiary school enrollment rate, gross, %
Population growth	Eurostat	Total population, thousands of persons. Own computation
Communication infr.	Eurostat	Number of main telephone lines per 100 people.
Transportation infr.	Eurostat	Number of kilometres of highways
Inflation rate	Eurostat	HICP overall index, seasonally adjusted
Government consumption	Eurostat	Government consumption, % of GDP
Domestic credit	National Central Banks	Domestic credit to private sector, % of GDP
Tax system	European Commission ^a	Corporate income tax rates (including surcharges) computed relative to the EA 19 simple average tax rate
Competitiveness	Eurostat	Nominal ULC, Index, 2005=100. ULC differential computed relative to the German nominal ULC (index, 2005=100)
Trade openness	Eurostat	Exports plus imports of goods and services, % of GDP
Risk premium	Eurostat	The spread between the 10 year government bond yields and the German 10 year government bond yields
Euro area business cycle	OECD	Output gap of the economy, euro area 15
Interest rate differential	Eurostat	The spread between the 3 month interest rate and the 3 month EURIBOR
World economic growth	Oxford economics	GDP based on PPP valuation of country GDP
VIX	Datastream	CBOE SPX volatility VIX price index
Large-scale privatisation	EBRD, Transition indicators	Index going from 1 (little private ownership) to 4 (more than 50 per cent of state-owned enterprise and farm assets in private ownership)
Banking reform and interest rate liberalisation	EBRD, Transition indicators	Index going from 1 (little progress beyond establishment of a two-tier system) to 4 (significant movement of banking laws and regulations towards BIS standards)
Competition policy	EBRD, Transition indicators	Index going from 1 (no competition legislation and institutions) to 4 (significant enforcement actions to reduce abuse of market power and to promote a competitive environment)



Table 6: (Continued)

Variable	Sources	Definition
Securities markets and non-bank financial institutions	EBRD, Transition indicators	Index going from 1 (little progress) to 4 (securities laws and regulations approaching IOSCO standards; substantial market liquidity and capitalisation; well-functioning non-bank financial institutions and effective regulation)
Trade freedom	Index of economic freedom ^b	Composite measure of the absence of tariff and non-tariff barriers affecting imports and exports of goods and services; index going from 0 (trade barriers) to 100 (free trade)
Investment freedom	Index of economic freedom	Index going from 0 (restrictions on investments) to 100 (no constraints on the flow of investment capital)
Property rights	Index of economic freedom	Ability to accumulate private property and wealth; index going from 0 (bad) to 100 (good)
Freedom from corruption	Index of economic freedom	Index going from 0 (very corrupt government) to 100 (very little corruption)

WDI World Development Indicators database, *EBRD* European Bank for Reconstruction and Development.

^a DG taxation and customs union.

^b The Heritage Foundation in partnership with the World Street Journal.

Table 7: Descriptive statistics of the main indicators

Variable	N	Mean	SD	Min	Max
FDI (ln)	738	5.549	1.546	0	9.064
Real GDP growth rate	766	3.448	5.078	-26.5	21.9
Initial GDP (ln)	795	.936	1.386	-1.163	3.207
FDI (% GDP)	769	4.598	5.306	-13.748	49.435
GFCF (% GDP)	786	22.692	5.826	6.684	42.011
Population growth	738	-.049	.079	-.355	.219
Human capital	850	50.793	20.007	12.043	89.078
Government consumption (% GDP)	774	18.595	3.604	6.186	31.264
Inflation rate	762	8.178	14.400	-3.98	177.41
Standard deviation of inflation	762	1.269	1.773	0	15.795
Domestic credit (% GDP)	780	47.514	22.719	7.697	110.847
Standard deviation of credit	780	1.993	2.619	0	34.227
Communication infrastructure	850	3.298	.295	2.429	3.937
Transportation infrastructure (ln)	765	5.829	.699	4.127	7.323
Trade openness (% GDP)	786	119.296	32.908	43.215	202.145
Geographical proximity (ln)	850	5.669	.925	3.641	6.736
Corporate tax differential	850	79.441	17.933	38.911	116.279
ULC differential	774	95.533	30.330	2.645	187.815
Risk premium	732	6.781	12.260	-.98	108.72
Euro area output gap	850	-.878	1.799	-4.251	2.763
Interest rate differential	725	6.194	11.928	-1.3	108.01
World economic growth	850	3.554	1.419	-1.526	5.618



Table 7: (Continued)

Variable	N	Mean	SD	Min	Max
VIX (ln)	850	2.943	.347	2.434	3.817
Large-scale privatisations	850	3.505	.585	2	4
Competition policy	850	2.822	.559	1	4
Bank reforms	850	3.301	.503	1	4
Financial reforms	850	2.848	.630	1	4
Trade freedom	850	76.855	10.415	46.8	87.8
Investment freedom	850	67.629	12.707	30	90
Property rights	850	55.376	14.513	30	90
Corruption	850	44.614	11.282	10	70