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Is Foreign Direct Investment in China Crowding Out the Foreign Direct Investment in other Countries?

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Is Foreign Direct Investment in China Crowding Out the Foreign Direct Investment in other Countries?

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Abstract

We estimate a modified gravity model to analyze the effects of foreign direct investment (FDI) in China on FDI in other countries over the period 1990-2004. Our results suggest that on average, *ceteris paribus*, FDI inflows into China have been complementary to FDI inflows into other recipient countries. However, these complementarities exhibit a decreasing trend over time and vary across countries. Furthermore, our results suggest that countries with high levels of horizontal FDI adjusted better to the competitive pressure exerted by China than countries where vertical FDI dominates.

Keywords: Foreign direct investment, China; Multinational Firms' location choice.

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1. Introduction

In this paper we examine whether and to what extent the surge of the foreign direct investment (FDI) in China in recent years has come about at the expense of FDI inflows into other recipient countries.

China has recently become a leading destination for FDI. In a recent survey on FDI prospects, transnational companies rank China as one of the most attractive global business locations (UNCTAD, 2007). In 2003, China overtook the US as the prime destination for FDI (Prasad and Wei, 2005). Currently, China is the largest recipient of FDI in the developing world (UNCTAD, 2011). The share of China in the world FDI inward stock increased from one percent in 1990 to 3 per cent in 2010. The success of China in attracting FDI has raised concerns that it may have been at the expense of other countries and regions. For example, over the same period, the share of developed economies in FDI inward stock has declined from 75.1 per cent to 65.3 per cent. The European Union countries – which account for the largest share of FDI inward stocks to developed countries experienced a slight decline of their share in the world FDI inward stock from 36.6 per cent in 1990 to 36.0 per cent in 2010.[1] This surge of FDI in China has followed the opening up of its economy to the world economy, and the selective easing of capital controls, while the main motivation driving these inflows of foreign investments is the availability of a large pool of low-cost labour force (Prasad and Wei, 2005). However, in recent years there has been a shift of inward FDI in China towards high-tech industries and services (UNCTAD, 2011).

This paper aims to provide empirical evidence to answer these concerns, focusing on the impact of FDI in China on FDI in other countries, with a special focus on the EU countries. The EU countries account for the largest share of FDI inward stocks to developed countries, 55.1 per cent in 2010.[2] Moreover, in the new EU countries in Central and Eastern Europe (CEE) FDI has played a leading role in their efforts to modernize their economies and still offers a positive contribution to the growth and development of local markets. The research questions addressed in the paper are the following: Is there a *China effect* on FDI inflows into other countries and particularly into EU countries? Is this effect positive or negative? Has it changed over time and, finally, does it differ for horizontal and vertical FDI?

Previous analyses have focused on the effects of FDI in China on developing countries, in particular the Asian countries and the Latin America and Caribbean (LAC) ones (Eichengreen and Tong, 2006a, 2006b; Cravino, Lederman and Olarreaga, 2007). To the best of our knowledge, this is the first in-depth analysis of the effects of FDI in China on the FDI inflows into EU countries.

Our results suggest that on average, *ceteris paribus*, FDI inflows into China have been complementary to FDI inflows into other countries. This complementary effect is less intense in the EU than in the other recipient countries. However, these complementarities exhibit a decreasing trend over time and vary across countries. Furthermore, our results suggest that countries with high levels of horizontal FDI adjusted better to the competitive pressure exerted by China than countries where vertical FDI dominated.

The remainder of this paper is organized as follows. Section 2 discusses the theoretical and empirical background for our analysis. Section 3 explains our empirical strategy and the model specifications. In section 4 we describe the data set that we use. The results of our

[1] Own calculations based on data from UNCTAD (2011)

[2] Own calculations based on data from UNCTAD (2011)

empirical analysis are presented and discussed in Section 5. Finally we summarize our findings and conclude in Section 6.

2. Theoretical and Empirical Background

The theoretical framework of our analysis is the theory of multinational enterprises (MNEs), which has been formalized in several seminal papers by Markusen (1984 and 1995), Helpman (1984), and Markusen and Venables (1997, 1998). The theoretical models of MNEs explain the volume of FDI as a function of characteristics of the parent and host countries such as size, relative endowments, and transaction costs.

The theoretical literature distinguishes between foreign direct investment driven by "horizontal" and "vertical" motivations. Horizontal MNEs or market-seeking FDI produce the same goods and services in multiple locations, while vertical MNEs, or "efficiency-seeking FDI", entail the geographic fragmentation of production into stages. Models of horizontal MNEs (Markusen, 1984; Horstmann and Markusen, 1987, 1992; and Markusen and Venables, 1998, 2000) predict that MNEs will concentrate production in large countries and in countries with similar relative endowments, while models of vertical MNEs (Helpman, 1984; and Helpman and Krugman, 1985) predict that MNEs production will locate in relatively labour-abundant countries. It follows that while horizontal FDI is likely to dominate in bilateral investment flows between industrialized countries, vertical FDI is likely to dominate between developed – where headquarters are localized – and developing countries, which instead host the production activity, as several empirical analyses demonstrated (Brainard, 1993, 1998; Markusen and Maskus, 2002).

An integrated treatment of horizontal and vertical FDI was developed by Markusen et al (1996) and Markusen (1997).[3] This approach was then tested empirically by Carr et al. (2001) who showed that both horizontal and vertical investments are important and related to parent and host country characteristics. In particular, their findings suggest that outward FDI from a parent to a host country increases in the sum of their economic size, the relative skills abundance of the parent country and the interaction between size and relative endowment differences.

In this theoretical framework, competition among host countries for inward investments has never been considered, though the issue seems to be interesting at least from a development perspective. In order to find some conceptual considerations about FDI competition we need to explore the international business approach to FDI (Dunning 1973). This strand of literature is more individual-firm oriented. It details the determinants of the decisions of firms to go abroad, with particular emphasis on the choice of mode of entry and of location. According to this literature, competition may arise when FDI inflows into one country divert FDI inflows from another country. Should this occur, it would not be due to resource constraints, rather because of market reasons as argued by Zhou and Lall (2005)[4].

[3] This integrated approach, known as the knowledge-capital model, is a combination of the horizontal and vertical model. Consequently, the effect of differences in factor endowments – proxied by labour skill differences – becomes ambiguos due to the interaction with country size. Empirical studies provide support to this model (Markusen and Maskus, 2002; Bloningen et al., 2003 and Braconier et al. 2005.

[4] Competition in any resource flow may obviously occur when the resource in question is available in limited amounts. However, this "zero-sum" hypothesis is difficult to justify in the case of FDI. FDI represents only 12.6% of global gross domestic capital formation (UNCTAD, 2007), and additional resources can be easily diverted from domestic resources and other international capital flows should investment opportunities arise. Moreover, although multinational firms' globalisation strategies have recently assumed a regional pattern (Felker, 2003), they do not allocate investible funds on a regional basis in order not to miss profitable

Moreover, the intensity of such a competition is likely to vary considerably according to the motivations of becoming multinational. Horizontal FDI aims at increasing market shares or exploiting specific agglomeration economies. It would therefore flow towards those countries where industrial activity and demand are higher. This implies that inflows of FDI in one country, which offers an attractive large domestic market should not preclude investments in other countries, provided that they also posses large and well developed markets. Since horizontal FDI tends to produce for local markets, country competition does not seem to be likely.

Vertical FDI implies the geographical fragmentation of the production chain into separate stages, according to each country's comparative advantage. This strategy enables multinational firms to exploit cost advantages where they arise. With further integration and cross-border co-operation, MNEs' activity has become more specialized and spatially fragmented, thus implying large investments within production networks. Provided that countries have distinctive advantages in different production stages, they could all benefit from large investment flows.[5] Complementarities among FDI inflows may be due to increases in demand for raw materials and intermediates, while the magnitude of the FDI creation (diversion) depends on the degree of fragmentation of the production chain.[6]

The gravity model represents a very useful empirical framework to explain FDI flows since it allows testing at the same time several theoretical frameworks by combining different explanatory variables (Brenton, et al., 1999; Egger and Pfaffermayr, 2004; Brainard, 1997, Ekholm, 1995, 1997, 1998; Stein and Duade, 2007).

Recent empirical analyses of multinational enterprise activity have identified other factors able to explain patterns of FDI. Thus, scholars have recently focused on the quality of institutions (Wei, 2000; Stein and Duade, 2001; Globerman and Shapiro, 2002; Benassy-Quéré et al, 2007). It has been demonstrated that good quality institutions in the parent and host countries have a positive effect on bilateral FDI flows via productivity growth and reduced uncertainty.

Existing empirical results on the effects of FDI in China on FDI in other countries are mixed. Eichengreen and Tong (2006a, 2006b) show that the emergence of China as a leading FDI destination has encouraged FDI flows to other Asian countries via supply-chain production linkages but diverted those from OECD countries. They explain this diversion effect by the negative effect of distance on supply-chain production linkages. In contrast, Mercereau (2005) shows that, on average, FDI in China has had a negative effect on FDI in other Asian countries. However, it appears that this negative effect has been driven by two countries only, namely Singapore and Myanmar, while the FDI inflows into China have not affected the other Asian countries. Also Chantasasawat et al. (2005), Zhou and Lall (2005) and Wang et al. (2007) find that FDI in China has, on average, fostered rather than diverted

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opportunities. Finally, if one firm is not able to undertake a foreign investment because of resource constraints, there would be several other firms able to do so. See Zhou and Lall (2005) for a detailed discussion on these issues.

[5] To the extent that host countries specialize in the same production stage, they become competitors, and MNEs have to make a choice among competing locations. Competition disappears when production networks are organized on a regional base, as it has progressively occurred in the last two decades (Felker, 2003; Ravenhill, 1998).

[6] The degree of fragmentation of the production chain varies across sectors according to the technological intensity of the production process and the value added-weight ratio of the product. Only simple processes can be relocated to low-wage, low-skill countries, while only light, high-value products can be transported, allowing MNEs to exploit even small differences in production costs. The most fragmentable activities are those that are engineering based, such as machinery, automobiles and chemicals, while the least fragmentable are activities with continuous processes, such as food and paper processing (Zhou and Lall, 2005).

FDI to neighbouring countries. At country level, diversion effects have occurred in Indonesia, the Republic of Korea, Malaysia and the Taiwan Province of China. Finally, Cravino, et al. (2007), by examining the effect of foreign capital stock in China on the Latin American and Caribbean (LAC) countries, do not find any evidence for a FDI diversion from OECD countries, in particular from the US to China at the expense of the LAC countries. While the growth of capital stocks in China originating from the OECD, and especially from the US, was faster than in LAC countries over the period 1990-1997 this relative growth has slowed down since 1997.

Our paper adds to the empirical evidence on the effects of FDI in China on FDI into other countries. In particular we contribute novel empirical evidence on the causal link between FDI in China and FDI in the EU countries including new EU countries in Central and Eastern Europe. In contrast to most existing studies, we estimate a model derived from the theory of multinational enterprise activity. We use panel data which allows us to alleviate possible endogeneity arsing from simultaneity and omitted variable bias.

3. Empirical Methodology

Our baseline model shown below explains bilateral FDI flows as a function of parent and host countries characteristics as suggested by the theory of multinational enterprise:

$$ln(FDI_{ij,t+1}) = a_0 + a_1 ln(MKTSIZE_{ijt}) + a_2 \left| ln GDPCAP_{it} - ln GDPCAP_{jt} \right| + \\ + a_3 INST_{jt} + \alpha_i + \beta_j + \tau_t + \varepsilon_{ijt} \quad (1)$$

All regressors are lagged by one year to account for the fact that the implementation of investment decisions is in practice lagged.[7] Further, lagging the regressors avoids potential endogeneity arising from the effect of FDI on some of the explanatory variables. This issue has been raised by the recent literature on FDI and growth (Borensztein et al., 1998; Rodriguez-Clare, 1996 and Zhang, 2001), according to which FDI and GDP may be simultaneously determined, and this could bias the estimates. However, this literature usually considers aggregate FDI inflows, and not bilateral flows as we do in this paper.[8]

According to Eq. (1), FDI flows from parent country i to host country j at time t+1 are a function of the following explanatory variables:

Market size (MKTSIZE), proxied by the product of home and host countries' GDPs at time t weighted by the distance between parent and host country. The reasoning behind the inclusion of this variable is that larger host countries have greater potential markets, which would attract more foreign firms, while larger parent countries have more firms able to operate profitably abroad. The relation is multiplicative in order to ensure that as country i's (or j's) GDP approaches zero, so do bilateral FDI flows, given that distance is always strictly positive. Thus, this term accounts for the potential to invest, and being based on market size variables, it also captures potential flows of horizontal FDI. We expect to find a positive effect of market size on bilateral FDI flows.

Parent and host countries per capita income differential. Specifically, we include the absolute difference at time t of the GDP per capita in the parent (GDPCAPit) and host country

[7] See also Mercereau (2005).
[8] See also Baier and Bergstrand (2007) on this issue.

(GDPCAPjt)[9]. This variable is a proxy for differentials in factor endowments and other relevant determinants of bilateral FDI flows related to differences in the level of development of the parent and host countries. For example, countries with dissimilar levels of economic development, also show differences in input prices and, mainly, in labour costs (Eichengreen and Tong, 2006b; Mercereau, 2005). Therefore, this variable should capture FDI flows between developed and developing countries, which are very often of vertical type as formalized by Helpman (1984). Should this be the case, we expect to find a positive effect on FDI flows.[10]

The quality of institutions at time t in the host country (INSTjt). It pertains not only to societal and governmental affairs, but also includes all costs associated with the risk involved in an investment. Uncertainty, political instability and their related risks can discourage FDI inflows despite favourable economic conditions (Wei, 2000; Globerman and Shapiro, 2002). We expect a positive effect of the quality of institutions in the host country on bilateral FDI flows.

Home and host country fixed effects, (α_i, β_j) capture unobserved time-invariant factors specific to parent and destination countries which may influence bilateral FDI flows.

Time fixed effects (τ_t) control for time-specific common shocks which may affect bilateral FDI flows (Mátyás, 1997). ε_{ijt} is the error term.

To estimate the effect of FDI flows into China on FDI flows into other host countries, we include in the above model a measure of FDI flows into China at time t+1 from each parent country i (FDICNit+1). Unobserved global shocks can affect the attractiveness of FDI to China and other countries, simultaneously. In order to correct for this potential endogeneity, we instrument FDICNit+1 with a measure for the size of the market potentially available for investors from home country i to China, and the absolute difference between GDP per capita in the home country i and GDP per capita in China at time t.[11]

We estimate the following system of simultaneous equations:

$$\ln(FDI_{ij,\,t+1}) = a_0 + a_1 \ln\left(MKTSIZE_{ijt}\right) + a_2 \left|\ln GDPCAP_{it} - \ln GDPCAP_{jt}\right| + \\ + a_3 INST_{jt} + a_4 \ln FDICN_{it+1} + \alpha_i + \beta_j + \tau_t + \varepsilon_{ijt} \qquad (2)$$

The coefficient of interest is a_4 in the primary equation: $a_4>0$ would suggest that the FDI flows to China and FDI flows to other countries were complementary, while $a_4<0$ would suggest that the FDI flows into China and FDI flows into other countries were substitutes.

$$\ln FDICN_{it+1} = b_0 + b_1 \ln\left(MKTSIZE_{ijt}\right) + b_2\left|\ln GDPCAP_{it} - \ln GDPCAP_{CNt}\right| + \psi_{it}$$

[9] As pointed out by Blonigen et al. (2003) estimating a coefficient on a difference term that takes both positive and negative values in the sample could lead to a sign reversal in the pooled (or restricted) coefficient. In order to avoid this risk, one should specify the variable in absolute values.

[10] However, it is worth noticing that when horizontal FDI dominates, dissimilarity in relative endowments may also be associated with less FDI (Markusen and Venables, 2000; Bloningen et al., 2003).

[11] These variables correspond to those previously defined for FDI flows from parent country *i* to host country *j* with $j \neq$ China.

We first estimate the average effects of FDI flows into China on FDI flows into other countries, and then we allow the coefficient for FDI flows into China to be different for EU15, the new EU member states in Central and Eastern Europe and the rest of the countries included in the sample.[12] In addition, we allow the coefficient of FDI into China to vary also over time.

To test whether the China effect varies with FDI motivations, we interact the instrumented FDI in China with the proxy for horizontal and vertical FDI, i.e. the market size variable and the absolute difference in GDP per capita in the parent and host countries, respectively.[13] The estimated model therefore becomes as follows:

$$\begin{aligned}\ln(FDI_{ijt+1}) = c_0 + c_1 \ln\left(MKTSIZE_{ijt}\right) + c_2 \left|\ln GDPCAP_{it} - \ln GDPCAP_{jt}\right| + c_3 INST_{jt} + \\ + c_4 \ln FDICN_{it+1} + c_5 \ln FDICN_{it+1} * \ln\left(MKTSIZE_{ijt}\right) + \\ + c_6 \ln FDICN_{it+1} * \left|\ln GDPCAP_{it} - \ln GDPCAP_{jt}\right| + \mu_i + \nu_j + \lambda_t + \xi_{ijt} \qquad (3)\end{aligned}$$

$$\ln FDICN_{it+1} = d_0 + d_1 \ln\left(MKTSIZE_{ijt}\right) + d_2 \left|\ln GDPCAP_{it} - \ln GDPCAP_{CN,t}\right| + \psi_{it}$$

Given the introduction of the two interacted terms into the model specification, regression coefficients reflect conditional relationships, and the impact of FDI in China on other host countries is no longer constant, as indicated by the implied derivative:

$$\frac{\delta FDI_{ijt+1}}{\delta FDICN_{it+1}} = c_4 + c_5 * MKTSIZE_{ijt} + c_6 * |GDPCAP_{it} - GDPCAP_{jt}| \qquad (4)$$

We first estimate the average China effect and discuss the implied marginal effects, and then allow the coefficients of the interacted terms to differ for EU15, CEE and the other host countries. We also check whether these effects change over time.

4. The Data

The data on FDI flows is taken from the OECD direct foreign investment statistics and covers the period from 1990 to 2004. This period corresponds to significant market and trade liberalizations which took place in Europe, the world economy and in particular in China.

OECD defines FDI[14] as an international investment by a firm in one country (the parent country) with the objective of establishing a long-lasting interest in an enterprise located in another country (the host country) different from that of the investing firm. Direct investment involves either the initial transaction between the two firms or all subsequent capital transactions between them. Given our specific focus on the dynamics of the impact of FDI in China on FDI in other countries we use annual bilateral FDI flows rather than stocks.[15]

[12] The use of this group-specific dummies should help in dealing with heterogeneity in investment behaviour.

[13] These interacted terms have been suggested in previous studies on bilateral FDI flows: for example, Markusen and Maskus (2002) and Eichengreen and Tong (2006a).

[14] See, for example, OECD (2009), *OECD Benchmark Definition of Foreign Direct Investment*, 4th Edition, Paris, OECD.

[15] As pointed out in the literature, FDI stocks are less volatile than flows, since the re-direction of FDI from one country to another requires a significant amount of time.

We have data for bilateral FDI flows originating in 23 OECD countries disaggregated on 35 OECD and non-OECD host countries.[16] After accounting for missing values in the original OECD data set, we end up with an unbalanced dataset with about 5,000 useful observations

The original FDI data were obtained in current US dollars. We deflated these data by using the US price deflator for investment (2000=100) taken from the AMECO data base of the European Commission. Real GDP and GDP per capita in constant 2000 US dollar were obtained from the World Bank Development Indicators database. The distance between the parent and host countries ($DIST_{ij}$) is measured as the great circle distance between the capital cities in the parent and host countries. The source for these data was the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII). Our proxy for the quality of institutions (INST) is the Political Constraint Index developed by Henisz (2000). This index measures the feasibility of changes in policy, given the structure of the policy institutions and the preferences of the actors operating in those institutions. It takes values from 0 (high instability) to 1 (perfect stability). Further details on the data and variables description are given in Table A1 in the Appendix.

Since we estimate log specifications, we need to deal with the cases of zero and negative values for FDI flows. In the relevant literature, three approaches have been used. A first approach used among others by Rose (2000) is to drop negative and zero values. A second approach proposed by Eichengreen and Irwin (1995) is to use as dependent variable log (1+FDI) instead of log FDI. Third, one can use a Tobit estimator instead of OLS. Stein and Duade (2007) show that results are robust to any of the three alternative techniques used.

We first dropped missing values from the dataset and then estimated the model without zero and negative numbers, and then using $\ln(1+FDI_{ijt+1})$ as dependent variable. Since results do not change significantly, we chose to present results obtained with strictly positive values only.[17]

5. Estimation Results

The effect of FDI in China on FDI in other countries

Table 1 presents the estimates of Equations (1) and (2). Column (1) shows the estimates of the baseline model specification (1). The estimates are consistent with theory predictions and other empirical studies discussed in Section 2. On average, *ceteris paribus*, bilateral FDI flows are positively related to market size, the quality of institutions in the host countries, and similarity of relative endowments. According to these results, bilateral FDI flows as a whole appear to be mainly market- rather than efficiency-seeking.[18]

[Ttable 1 about here]

[16] Countries included in the sample have been chosen for geographical dispersion and relevancy. Source countries are Austria, Belgium, Czech R., Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Luxembourg, Mexico, Netherlands, Poland, Portugal, Slovak R., Spain, Sweden, Switzerland, United Kingdom and the United States. The recipient countries include, besides the 23 OECD countries just mentioned, Brazil, Bulgaria, Cyprus, Estonia, India, Latvia, Lithuania, Malta, Romania, Russia Federation, and Slovenia.

[17] Estimates obtained for equations (1) and (2) using zero and negative values and a Tobit estimator are shown in Table A3 in the Appendix. Additional results are available from the authors upon request.

[18] The negative sign of absolute difference in per capita incomes may be due to the fact that differences in wage levels are not compensated by productivity and skill levels. See Globerman and Shapiro (2002) for discussion of this issue.

Column (2) of Table 1 shows the estimates for model (2). As discussed above, we instrumented FDI inflows to China to account for the potential correlation of FDI inflows to China and the error term due to unobserved factors that might increase simultaneously the attractiveness of China and other countries as FDI destinations.[19]

The significance and magnitude of the coefficients of bilateral FDI flows are similar to those obtained with our baseline regression. The coefficient of the variable of interest in this model ($LnFDI_{i,CN,t+1}$) is positive and significantly different from zero at the one percent significance level. A 10 percent increase in FDI flows to China would raise the level of FDI inflows to other recipient countries by about 5 percent. We may therefore conclude that, on average, inward FDI to China and other recipient countries were complements rather than substitutes, as suggested by the theory.

The main objective of this paper is to examine whether and to what extent FDI inflows into China have affected FDI inflows into other countries, in particular the EU15 and new EU countries in Central and Eastern Europe (CEE). To this end, we re-estimated model (2) allowing the coefficient of the fitted value of Chinese FDI to vary across groups of countries. The estimates are shown in column (3) of Table 1. The results suggest that the setting up of production plants in China has not discouraged additional investment in EU member states. Rather, FDI in China fosters FDI inflows into both EU15 and CEE countries, albeit to a lesser extent in comparison to non-EU recipient countries. A 10 percent increase in FDI flows into China would raise the level of FDI flows into EU15 countries by two percent and to CEE countries by 0.5 percent. [20]

This result may reflect the fact that most of the FDI in CEE countries is efficiency-seeking, and therefore that there is more direct competition with China in these countries in comparison with other EU recipient countries.

The estimated China effect may have varied over the period analysed due to adaptation of foreign investors to changes either in China's investment climate or other countries, in particular in CEE countries. To account for this potential time-specific effect, we estimated the previous model separately for three equal periods: 1990-1994, 1995-1999, and 2000-2004. The estimates are shown in Table 2.

[Table 2 about here]

First of all, it is worth noting that the China effect, though always positive, weakens over time, becoming negligible in the 2000s. FDI inflows into China and into EU countries have become more complementary, and in the 2000s the China effect in EU15 countries is not different from that in other non-EU recipient countries. In contrast, additional FDI inflows into CEE countries due to a 10 percent increase in FDI inflows to China rise from 0.2 percent in the early 1990s to 0.5 percent in the early 2000s. Thus, no estimate suggests that China is diverting FDI from other recipient countries as a whole; rather, there seems to be a FDI-

[19] The results of the first stage regression of FDI inflows into China are shown in Table A2 in the Appendix. The estimated model explains 93 percent of the variation of FDI inflows into China. These estimates indicate that both the capital/labour ratio differential and the market size are positively associated with FDI inflows into China. This is in line with the prediction of either the vertical MNEs models, with their assumed geographic fragmentation of production into stages, or horizontal MNEs models. Hence, we can conclude that China is equally attractive for both market- and efficiency-seeking FDI.

[20] The interpretation of the estimated coefficients in column (3) of Table 1 is as follows: The coefficients of $LnFDICN_{it+1}$ interacted with the EU15 and the CEE dummies indicate how much the slope coefficient of the average effect, that is, the coefficient of $LnFDICN_{it+1}$, differs from the slope coefficient of the FDI flows into the EU15 countries and the CEECs, respectively. The slope coefficient of the FDI effect for EU15 is 0.326-0.113= 0.213 and the effect on FDI in CEE countries is 0.326-0.274 = 0.052.

creating effect, which is however decreasing over time in all recipient countries with the exception of CEE countries.

These trends may reflect important changes in FDI flows into China and other recipient countries. During the 1990s, China's economy expanded rapidly, with an average annual growth rate of over eight percent over the period. This impressive economic growth may have attracted relatively more market-seeking FDI, thus reducing the opportunities to generate complementarities with FDI flows into other recipient countries. This may also explain the reduced competition with FDI flows into CEE countries. Recent changes in global production systems (Felker, 2003; Ravenhill, 1998) have also contributed to weakening competing factors, while strengthening complementary opportunities in countries specialized in similar production stages but belonging to different regional production network.

The China effect on horizontal and vertical FDI

We now turn to the role performed by horizontal and vertical motivations for FDI in driving the previous results.

According to the theory, horizontal FDI usually involves the replication of production facilities in the host countries. Given that their main purpose is to serve local markets, market size is one of the main drivers of this type of FDI. Vertical FDI instead entails fragmentation of the vertical chain of production and the relocation of production stages to low-cost locations stimulated by international differences in input prices.

In order to measure the China effect on vertical and horizontal FDI separately, the fitted FDI flows into China variable were interacted first with the market size variable, and then with our proxy for labour cost differentials (the absolute difference of GDP per capita in the source and in host countries), as shown in model (3). The first interacted variable captures the effect of FDI into China on flows of horizontal FDI, while the latter captures the China effect on flows of vertical FDI. Estimates of this latter model are shown in Table 3.

[Table 3 about here]

Column (1) of Table 3 shows that the direct effect of FDI in China is negative and significant at the one percent level, while the coefficients of the interacted variables are both positive and significant at the conventional levels of significance. In order to obtain the net effect, we substitute the estimated coefficients in Eq. (4):

$$\frac{\delta FDI_{ijt+1}}{\delta FDICN_{it+1}} = \text{-}1.640 + 0.022 * MKTSIZE_{ijt} + 0.093 * | GDPCAP_{it} - GDPCAP_{jt} | \qquad (5)$$

The outcome of Eq. (5) may be negative, positive or equal to zero, according to the values taken by the two conditioning variables. In economic terms, this implies that the net China effect is negative for very small values of market size and similar values of home and host countries' GDPs per capita. Therefore, only FDI flows directed towards less attractive host countries in terms of market size or factor cost advantages are negatively affected by FDI inflows into China. This negative effect, however, diminishes as host countries increase their advantages, as indicated by the coefficients of the two interacted variables, which are both positive and significant at the conventional levels. Therefore, having a large relative investment potential, or being quite dissimilar from home countries may help recipient countries in developing complementarities with FDI inflows to China.

In order to understand what kind of advantage matters most, we need to choose a specific value for at least one of the variables included in Eq. (5). In this regard, it is useful to note that, for countries similar in terms of GDP per capita, the net China effect, as defined by Eq. (5), becomes positive for values of MKTSIZE>74.54. As $max(MKTSIZE_{ijt}) < 74.54$, it follows that market advantages do not suffice to compensate for China's competition in vertical FDI. We therefore assess the marginal effect of FDI in China on FDI inflows in other recipient countries for all values of the per capita income differential variable, while setting the MKTSIZE variable at its maximum, average, and minimum values, respectively. The implied equations are plotted in Figure 1, which also shows China's average value of per capita income differential variable for comparison.

[Figure 1 about here]

Figure 1 shows that the China effect is negative and statistically significant when host and parent countries' GDPs per capita are very similar, which confirms that FDI inflows into China are substitutes for FDI in countries which are attractive for horizontal FDI.[21] As parent and host countries become more dissimilar, the marginal effect of FDI in China becomes first less negative, and then positive, although it is statistically significant only for very high values of the GDP per capita difference variable. Therefore, in order to benefit from FDI inflows into China, other host countries must possess high cost advantages. The latter, however, should not necessarily be higher than those of China. As shown in Figure 1, countries with very attractive domestic markets can exploit synergies with FDI inflows into China even when their cost advantages are below China's average one. The lower the market attractiveness, the higher the level of cost advantages assuring complementarities with FDI inflows into China. In the extreme case, where market potential is at its minimum level, FDI inflows into China complement FDI inflows into other host countries only if the latter are more competitive than China in terms of cost advantages.

Overall, these results suggest that host countries with high levels of horizontal FDI adjusted to the competitive pressure exerted by China better than countries where vertical FDI dominated. An increase in FDI flows into China diverts vertical FDI flows from countries less competitive than China in terms of cost advantages, and creates additional FDI flows in host countries with similar or higher level of cost advantages than China. These results are consistent with the theoretical predictions discussed in section 2.

As far as the European countries are concerned, the impact of FDI in China on FDI inflows into EU15 countries is less (more) intense on horizontal (vertical) FDI than it is in other non-EU host countries, as indicated by the coefficients of the corresponding variables shown in Column (2) of Table 3. The China effect for CEE countries is not statistically different from that of other host countries. These results are consistent over time, as shown in Table 4. Overall, they suggest that European MNEs have integrated China into their global strategies more intensively than MNEs belonging to non-EU countries, without diverting FDI from other more traditional and less distant destinations such as CEE countries. Risk diversification strategies (Lall and Albaladejo, 2004) or the fragmentation of production networks by geographical region may explain this fact. These average effects, however, hide interesting differences across countries, as discussed in the next section.

[21] This result is consistent with the concentration-proximity trade-off theory, according to which horizontal FDI dominates when countries are similar in size and in relative endowments (Helpmann, Melitz and Yeaple, 2004; Markusen, et al. 1996).

[Table 4 about here]

Country specific effects

In order to investigate which source and destination countries are driving the results highlighted above, we allow the market size variable in Eq. (5) to vary across recipient countries.[22] The results are summarised in Table A4 in the Appendix and in Figures 2-4.

As discussed above, FDI inflows into China have been on average complementary with FDI in all other recipient countries. However, negative effects may arise for countries with similar levels of development, proxied by the levels of GDP per capita. Consistently with these results, Figures 2-4 show that diversion effects arise within EU15 countries, within CEE countries, and between CEECs and Latin American countries, with a few marginal exceptions.[23]

In EU15, FDI inflows into China complement FDI inflows into Italy, Spain and Sweden, regardless of the source of FDI inflows, while they substitute FDI flows into Austria, Germany, Belgium, France, The Netherlands, the United Kingdom, and between Greece and Portugal. It appears that geographical and cultural proximity are not sufficient to compensate for the lack of cost advantages. A very similar picture emerges within CEECs, where China's FDI inflows seem to affect negatively mainly the Baltic countries and Poland. An increase in FDI inflows to China has a negative effect on Polish FDI in Hungary and Slovakia. Interestingly, no negative effect is recorded in Bulgaria, while China diverts Mexican FDI flows into Czech Republic.

As far as the other recipient countries are concerned, FDI inflows to China create additional FDI flows into the United States of America, India, and the Russia Federation from whatever source they may come from, and they divert FDI flows originating in Central and Eastern Europe, into Brazil and Mexico. FDI diversion also occurs in Malta and Cyprus, and it concerns only two EU15 countries, i.e. Greece and Portugal.

In conclusion, while substitution effects arise within groups and between pairs of similar countries, complementary effects spread out all around the world. Moreover, while most of the countries included in the sample show both complementary and substitution effects from China, in a small group of heterogeneous countries in terms of income level, FDI inflows are always complementary to FDI inflows to China, regardless of the source countries. This group of countries include four developed countries – the United States of America, Sweden, Italy and Spain – and three developing and/or emerging countries, i.e. Bulgaria, India and the Russian Federation. Possible explanations for this interesting and quite surprising result may be sought either within or outside the empirical model used in this study. While Bulgaria and India are surely among the poorest countries in the sample, thus showing huge dissimilarities with all OECD source countries included in the dataset, the presence of the other countries may be justified by the fact that they attract different kinds of FDI with respect to China. In particular, developed countries may be an interesting location for strategic seeking FDI, i.e. foreign investments looking for advanced technology and skilled labour force, which may help MNEs, mainly those coming from less developed source countries, to strengthen their strategic assets. Finally, the Russian Federation may not

[22] More precisely, this variable varies across recipient countries but not across parent countries and over time.
[23] We refer here to bilateral FDI flows between Luxembourg and Japan and Switzerland, and between Portugal and Slovenia, and Greece and Poland.

compete with China in the attraction of part of its FDI inflows since it attracts mainly resource and market seeking FDI rather than efficiency seeking FDI, which, instead, seems to find an attractive location in China. As discussed in section 2, competition among FDI is likely to be negligible for foreign investments motivated by market reasons, while resource and efficiency seeking FDI may generate complementarities.

Overall, these results suggest that whether and to what extent FDI inflows into China divert FDI inflows into other recipient countries depend on the characteristics of both the source and the recipient countries. These characteristics determine their comparative advantage and, therefore, their relative position in the different segments of the production chain.

6. Concluding Remarks

In this paper we have analysed the effects of FDI in China originating from OECD countries on FDI in European Union and other countries. In particular, we have estimated a modified gravity model using a panel of cross-country annual data over the period 1990-2004. We first examined determinants of bilateral FDI flows and the impact of FDI in China on FDI in other countries. We then investigated whether and to what extent FDI flows into China have occurred at the expense of FDI in the EU. In particular, we distinguished between the EU countries prior to the enlargements of 2004 and 2007 (EU15) and the new EU member states from Central and Eastern Europe. Third, we estimated the China effects on horizontal and vertical FDI in recipient countries as a whole and taken individually.

Our results suggest that FDI outflows from OECD countries take place mainly among countries with similar factor endowments and large markets, and responded positively to high levels of institutional quality in the host countries. These results are in line with the theory of multinational enterprises and consistent with previous empirical studies. Moreover, they suggest that most of the bilateral FDI recorded in our sample responded to market rather than efficiency motivations.

We have provided empirical evidence showing that, *ceteris paribus*, FDI inflows into China raise FDI inflows into other countries. This complementary relationship, however, is not constant across countries, being less strong in Europe than outside Europe. Within Europe, the most negatively affected countries are the new EU member states in Central and Eastern Europe. This result suggests that the advantage of these latter countries related to their proximity to FDI source countries is not sufficient to offset the attractiveness of China as a FDI destination. Our results also indicate that this FDI diversion effect on CEE countries has decreased over the period analysed.

The surge of FDI into China has encouraged both horizontal and vertical FDI in the other countries in our sample. In the case of EU15, the FDI complementarity has been lower in the case of horizontal FDI and higher in the case of vertical FDI in comparison with non-EU host countries.

We have also examined the China effect on a country basis, finding that, while on average the FDI creation effect prevails, there are a number of cases in which FDI to China diverts. This mainly concerns pairs of similar countries within EU15, CEE and other recipient countries. Most interestingly, we have found that FDI inflows to China do not crowd out FDI inflows to four mature and relatively high-income economies – USA, Sweden, Italy and Spain – and three emerging relatively low-income countries, i.e. Bulgaria, Russia and India. Therefore, differences in income levels do not seem to play any role in the emergence of

complementarities with FDI into China. This result is consistent with findings reported by Wang et al. (2007) in the case of Asian economies.

Two important conclusions can be derived from our study. First, China does not seem to have crowded out FDI inflows into other recipient countries. Secondly, whether the China effect is positive or negative depends on the relative position of each economy participating in the global production process. Since this position may evolve over time according to changes in the comparative advantages of the countries involved in global production processes, this implies that FDI substitution effects may arise instead of FDI complementarities, and vice versa.

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Table 1: Bilateral FDI flows and the impact of FDI in China on FDI in other countries

	(1)	(2)	(3)
Ln $MKTSIZE_{ijt}$	1.0912*** (0.042)	1.097*** (0.045)	0.869*** (0.090)
Abs diff GDP per capita i,j	-0.208*** (0.021)	-0.158*** (0.025)	-0.086*** (0.027)
$INST_{jt}$	1.525*** (0.304)	1.772*** (0.480)	1.500*** (0.369)
Ln $FDICN_{it}$		0.461*** (0.090)	0.326*** (0.072)
Ln $FDICN_{it}$*EU15			-0.113*** (0.030)
Ln $FDICN_{it}$*CEECs			-0.274*** (0.036)
EU15			-0.366 (0.354)
CEE			2.213*** (0.300)
Home country fixed effects	F(21, 4863) = 109.58***	$\chi^2(19)$ =1018.06***	F(20, 4241) = 5.79***
Host country fixed effects	F(32,4863)=55.14***	$\chi^2(32)$=1384.82***	F(31,4241)=4.42***
Time specific fixed effects	F(13,4863) = 46.48***	χ^2 (12) = 88.49***	F(13,4241) = 6.12***
Hansen J test		0.910	
H_0= all instr. valid		Prob > χ^2 =0.340	
Obs.	4935	4234	4197
R^2	0.7349	0.7258	0.7141

The dataset set includes FDI values strictly positive, only.
Robust standard errors in parentheses. ***, **, * indicate significance at levels 1%, 5%, and 10%, respectively.
Estimates for constant terms are not shown.

Table 2: The impact of FDI in China on other countries over time

	1990-1994	1995-1999	2000-2004
Ln $MKTSIZE_{ijt}$	0.835*** (0.196)	1.005*** (0.157)	0.842*** (0.226)
Abs diff GDP per capita i,j	0.208*** (0.069)	-0.035 (0.041)	-0.140*** (0.051)
$INST_{jt}$	1.913*** (0.638)	-0.157 (0.660)	0.343 (1.391)
Ln $FDICN_{it}$	0.343*** (0.160)	0.247** (0.127)	0.328* (0.196)
Ln $FDICN_{it}$*EU15	-0.232*** (0.067)	-0.134** (0.049)	-0.076 (0.048)
Ln $FDICN_{it}$*CEE	-0.317*** (0.111)	-0.287*** (0.059)	-0.274*** (0.056)
EU15	-0.669 (0.728)	-0.288 (0.602)	-2.585** (1.019)
CEECs	-0.529 (0.728)	1.214** (0.515)	-0.907 (0.650)
Home country fixed effects	F(14, 844) = 5.67***	F (16, 1488) = 5.59***	F(20, 1436) = 3.88***
Host country fixed effects	F(31,844)=4.48***	F (31, 1488)=3.26***	F(31,1436)=2.56 ***
Time specific fixed effects	F(3,844) = 3.24**	F (4,1488) =5.48***	F(3,1436) = 0.74
Obs.	901	1548	1499
R^2	0.7746	0.7844	0.7412

The dataset set includes FDI values strictly positive, only.
Robust standard errors in parentheses. ***, **, * indicate significance levels at 1%, 5%, and 10%, respectively.
Estimates for constant terms are not shown.

Table 3: The China effect on horizontal and vertical FDI

	all countries	EU countries
Ln $MKTSIZE_{ijt}$	0.831*** (0.094)	0.907*** (0.095)
Abs diff GDP per capita i,j	-0.510*** (0.043)	-0.406*** (0.042)
$INST_{jt}$	1.200*** (0.356)	1.336*** (0.360)
Ln $FDICN_{it}$	-1.640*** (0.260)	-1.017*** (0.313)
FDICN*HOR	0.022*** (0.005)	0.028*** (0.006)
FDICN*VER	0.093*** (0.007)	0.000 (0.011)
FDICN*HOR*EU15		-0.019*** (0.002)
FDICN*VER*EU15		0.095*** (0.010)
FDICN*HOR*CEECs		-0.011 (0.007)
FDICN*VER*CEECs		0.044 (0.032)
EU15		-2.785*** (0.563)
CEE		-1.018** (0.404)
Home country fixed effects	F(20,4241)=7.48***	F(20,4237)=8.38***
Host country fixed effects	F(32,4241)=4.26***	F(31,4237)=5.32***
Time specific fixed effects	F(13,4241)=5.80***	F(13,4237)=5.66***
Obs.	4314	4314
R^2	0.7447	0.7497

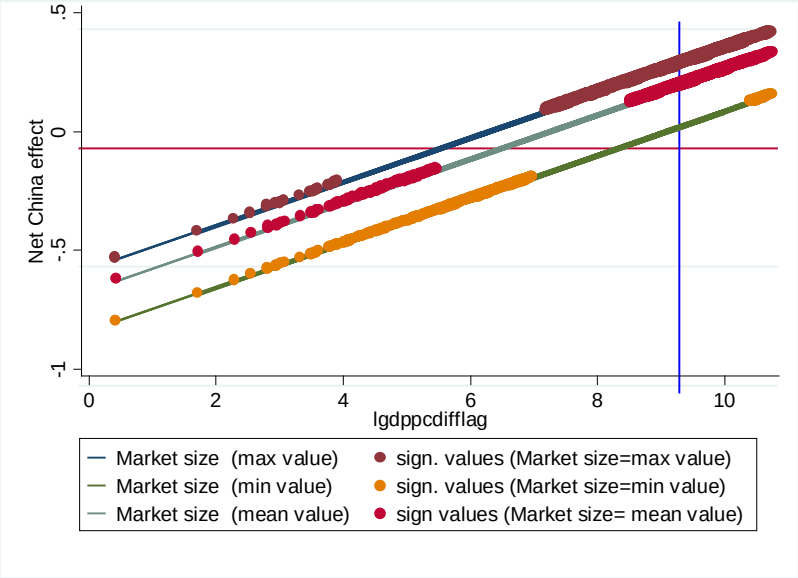
The dataset set includes FDI values strictly positive, only.
Robust standard errors in parentheses. ***, **, * indicate significance levels at 1%, 5%, and 10%, respectively. Estimates for constant terms are not shown.

Table 4: The China effect on horizontal and vertical FDI over time

	1990-1994	1995-1999	2000-2004
Ln $MKTSIZE_{ijt}$	1.009*** (0.213)	1.040*** (0.160)	0.815*** (0.227)
Abs diff GDP per capita i,j	-0.117 (0.192)	-0.469*** (0.061)	-0.305*** (0.068)
$INST_{jt}$	1.916*** (0.639)	-0.270 (0.644)	0.245 (1.390)
Ln $FDICN_{it}$	0.386 (0.946)	-1.752*** (0.456)	-0.635 (0.570)
FDICN*HOR	0.002 (0.016)	0.042*** (0.009)	0.023** (0.011)
FDICN*VER	-0.024 (0.046)	0.000 (0.018)	-0.010 (0.015)
FDICN*HOR*EU15	-0.019*** (0.006)	-0.023*** (0.003)	-0.016*** (0.003)
FDICN*VER*EU15	0.088*** (0.032)	0.116*** (0.018)	0.080*** (0.016)
FDICN*HOR*CEE	-0.001 (0.026)	-0.020 (0.010)	-0.005 (0.010)
FDICN*VER*CEE	-0.018 (0.120)	0.088* (0.046)	0.010 (0.046)
EU15	-1.007 (0.823)	-2.767*** (0.941)	-2.565** (1.027)
CEECs	0.370 (0.756)	-1.265* (0.754)	-1.070* (0.636)
Home country fixed effects	F(14,840)=5.43***	F(16,1484)=7.98***	F(20,1432)=4.26*
Host country fixed effects	F(31,840)=4.35***	F(31,1484)=4.16***	F(31,1432)=3.10***
Time specific fixed effects	F(3,840)=3.44**	F(4,1484)=5.53***	F(3,1432)=0.85
Obs.	901	1548	1499
R^2	0.7792	0.8010	0.7486

The dataset set includes FDI values strictly positive, only.
Robust standard errors in parentheses. ***, **, * indicate significance levels at 1%, 5%, and 10%, respectively.
Estimates for constant terms are not shown.

Figure 1: The impact of FDI inflows to China on other recipient countries: marginal effects

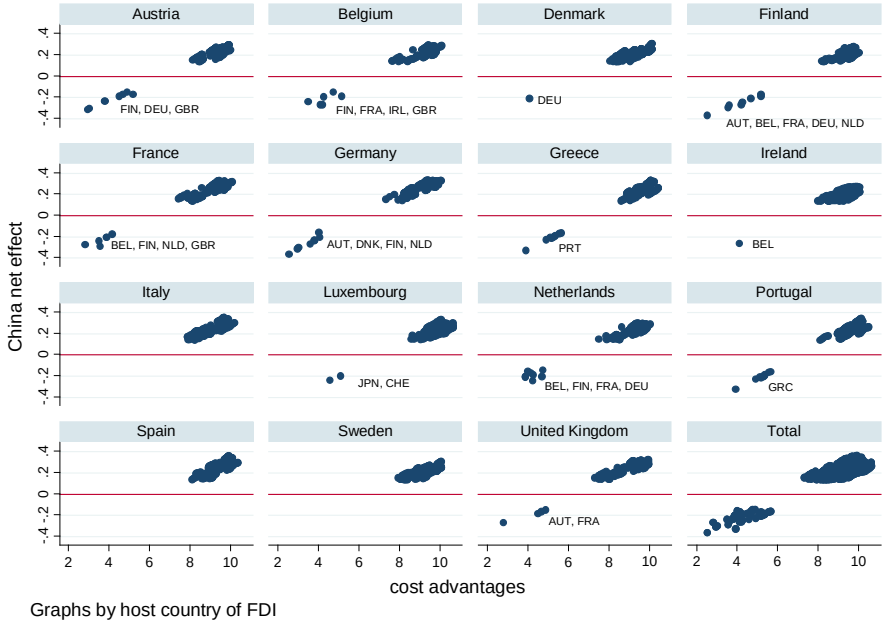


China net effect has been computed as follows:

$$\frac{\delta FDI_{ijt+1}}{\delta FDICN_{it+1}} = -1.640 + 0.022 * MKTSIZE + 0.093 * | GDPCAP_{it} - GDPCAP_{jt} |$$

with MKTSIZE taking its maximum, minimum and mean value.

Figure 2: The China marginal effect in the EU15

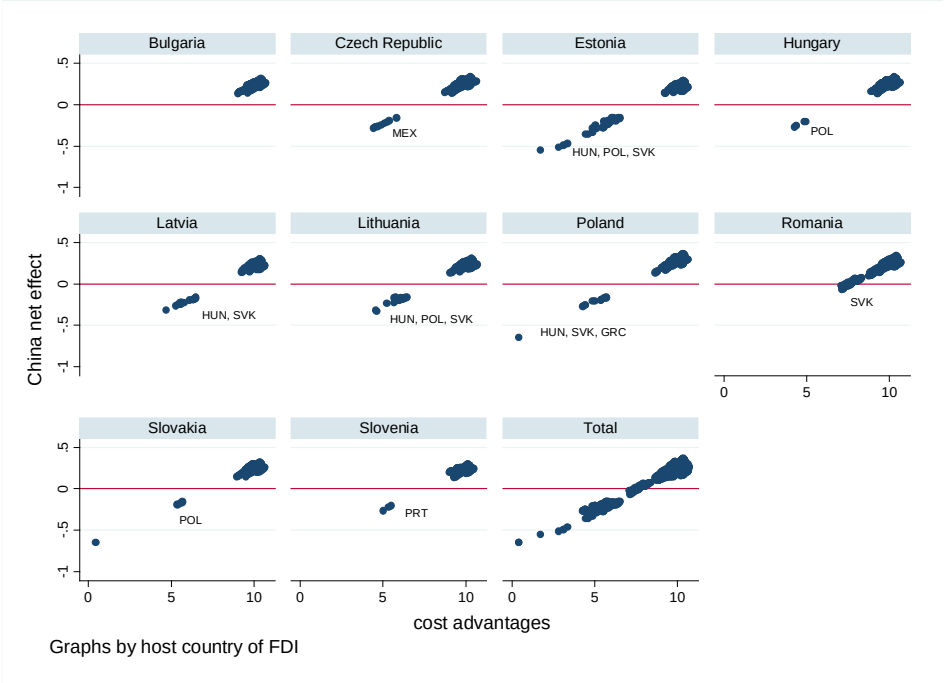


All the included marginal effects are significant at 5% level. Average effects are simple averages of the mean values of each country included in the corresponding groups of recipient countries. China net effect in each recipient country has been computed as follows:

$$\frac{\delta FDI_{ijt+1}}{\delta FDICN_{it+1}} = \alpha_0 + \alpha_1 * \overline{MKTSIZE}_j + \alpha_2 * | GDPCAP_{it} - GDPCAP_{jt} |$$

The corresponding estimated coefficients are those reported in Table 3 column 2.

Figure 3: The China marginal effect in Central and Eastern Europe

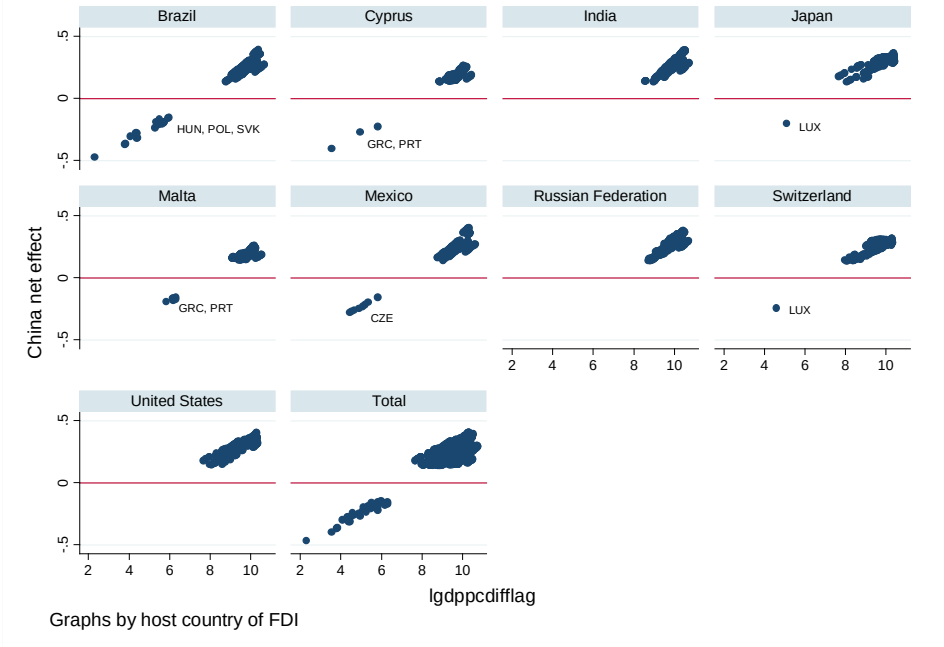


All the included marginal effects are significant at 5% level. Average effects are simple averages of the mean values of each country included in the corresponding groups of recipient countries. China net effect in each recipient country has been computed as follows:

$$\frac{\delta FDI_{ijt+1}}{\delta FDICN_{it+1}} = \alpha_0 + \alpha_1 * \overline{MKTSIZE}_j + \alpha_2 * | GDPCAP_{it} - GDPCAP_{jt} |$$

The corresponding estimated coefficients are those reported in Table 3 column 2.

Figure 4: The China marginal effect in other recipient countries



All the included marginal effects are significant at 5% level. Average effects are simple averages of the mean values of each country included in the corresponding groups of recipient countries.
China net effect in each recipient country has been computed as follows:

$$\frac{\delta FDI_{ijt+1}}{\delta FDICN_{it+1}} = \alpha_0 + \alpha_1 * \overline{MKTSIZE}_j + \alpha_2 * | GDPCAP_{it} - GDPCAP_{jt} |$$

The corresponding estimated coefficients are those reported in Table 3 column 2.

Appendix

Table A1: Definitions and data sources of variables

Variable	Definition and source
FDI_{ijt}	Aggregate foreign direct investment outflows from source country *i* to host country *j* at time *t*. Data from the OECD *International Direct Investment Statistics Yearbook*
$GDP_{i(j)t}$	Gross domestic product in USD in country *i* (*j*) at time *t*, constant 2000 prices. World Bank, *World Development indicators*.
$GDPCAP_{i(j)t}$	Per capita gross domestic product in USD in country *i* (*j*) at time *t*, constant 2000 prices. World Bank, *World Development indicators*.
$INST_{jt}$	Quality of institutions in country *j* at time *t*. Political Constraint Index. This ranges from 0 (instability) to 1 (complete stability). POLCON dataset (http://www-management.wharton.upenn.edu/henisz/polcon/contactinfo.html)
$DIST_{ij}$	Great circle distance between home country *i* and host country *j*. CEPII database
α_i, β_j	Source and host country dummy variables
τ_t	Time dummy variables
$FDICN_{it}$	Aggregate bilateral foreign direct investment outflows from source country *i* to China at time *t*. Data from the OECD *International Direct Investment Statistics Yearbook*
$DISTCN_i$	Great circle distances between source country *i* and China. CEPII database
$GDPCN_t$	Gross domestic product in USD in China at time *t*, constant 2000 prices. World Bank, *World Development indicators*.
$GDPCAPCN_t$	Per capita gross domestic product in USD in China at time *t*, constant 2000 prices. World Bank, *World Development indicators*.

Table A2: **Determinants of FDI in China** (Estimates from first stage IV regression)

	IV regression ($FDI_{ijt}>0$)	IV regression (all data)	IV tobit reg. ($FDI_{ijt}>0$)
Ln $MKTSIZE_{i,CN,t}$	4.330*** (0.428)	3.251*** (0.447)	4.330*** (0.428)
Ln $\|GDPCAP_{it} - GDPCAP_{CN,t}\|$	4.475*** (0.374)	4.994*** (0.397)	4.475*** (0.374)
Ln $MKTSIZE_{ijt}$	0.022 (0.020)	0.028 (0.020)	0.028 (0.020)
Ln $\|GDPCAP_{it} - GDPCAP_{jt}\|$	0.004 (0.010)	0.010 (0.009)	0.010 (0.009)
$INST_{jt}$	-0.002 (0.138)	0.018 (0.141)	0.017 (0.139)
Obs.	4234	4391	4391
Centered R^2	0.9321	0.9341	-
Uncentered R^2	0.9822	0.9810	-
pseudo log likelihood	-	-	-11692.48

Robust standard errors in parentheses.
*** indicates significance at 1% level.
The estimation includes home country, host country and time specific effects and a constant.

Table A3: Determinants of FDI: the marginality of zero and negative values (alternative estimation techniques)

	(with FDI values ≤ 0)			**Tobit (with FDI values ≥ 0)**		
	pooled reg.	**IV (2nd stage)**	**(IV, 2nd stage)**	**pooled reg.**	**IV (2nd stage)**	**(IV, 2nd stage)**
Ln ($MKTSIZE_{ij}$)	1.096*** (0.043)	1.095*** (0.046)	0.825*** (0.093)	1.096*** (0.043)	1.188*** (0.049)	0.981*** (0.091)
Abs diff $GDPCAP_{i,j}$	-0.210*** (0.022)	-0.171*** (0.025)	-0.076*** (0.028)	-0.209*** (0.022)	-0.122*** (0.074)	-0.086*** (0.029)
$INST_{jt}$	1.539*** (0.308)	1.753*** (0.350)	1.484*** (0.373)	1.540*** (0.306)	2.031*** (0.414)	1.726*** (0.428)
Ln $FDICN_{it}$		0.4502*** (0.095)	0.343*** (0.074)		0.542*** (0.107)	0.281*** (0.066)
Ln $FDICN_{it}$ *EU15			-0.084*** (0.030)			-0.115*** (0.032)
Ln $FDICN_{it}$ *CEE			-0.270*** (0.036)			-0.164*** (0.039)
EU15			-2.361*** (0.556)			'-0.399 (0.039)
CEE			-0.781* (0.417)			0.396 (0.338)
Home country fixed effects	$F_{(21, 4966)}$ = 108.41***	$\chi^2(19)$ =1054.98***	$F_{(19, 4318)}$ = 5.39***	$F_{(21, 4967)}$ = 109.75***	$\chi^2(19)$ =1096.50***	$F_{(19, 4319)}$ = 7.48***
Host country fixed effects	$F_{(32,4966)}$=43.33 ***	$\chi^2(32)$=1329.41 ***	$F_{(30,4318)}$=3.93***	$F_{(32,4967)}$=43.91***	$\chi^2(32)$=1346.82 ***	$F_{(30,4319)}$=4.97***
Time specific fixed effects	$F_{(12,4966)}$ = 22.30***	χ^2 (12) = 87.02***	$F_{(12,4318)}$ = 5.36***	$F_{(12,4967)}$ = 26.15***	χ^2 (12) = 86.49***	$F_{(12,4319)}$ = 7.21***
Hansen J test		1.22 (Prob > χ2 =0.269)				
Wald test for exogeneity					19.61 (Prob > χ2 =0.000)	
Log pseudolikelihood				-9008.175	-11692.48	-7535.32
Obs.	5038	4391	4391	5038	4391	4391
R^2 / Pseudo R^2	0.7327	0.7275	0.7375	0.27	0.7275	0.28

Robust standard errors in parenthesis.
*** indicates significance at 1% level.

Table A4: Estimated marginal effects by recipient country

Country	Obs	Mean	St. dev.	Min	Max
Austria (AUT)	203	0.2142	0.0970	-0.3121	0.2979
Belgium (BEL)	209	0.2138	0.0841	-0.2687	0.2933
Denmark (DNK)	281	0.2123	0.0477	-0.2099	0.3065
Finland (FIN)	205	0.1827	0.0960	-0.3681	0.2774
France (FRA)	231	0.2384	0.0905	-0.2925	0.3302
Germany (DEU)	227	0.2489	0.1070	-0.3681	0.3345
Greece (GRC)	219	0.2134	0.1025	-0.3302	0.3308
Ireland (IRL)	195	0.1969	0.0510	-0.2678	0.2720
Italy (ITA)	277	0.2336	0.0493	0.1352	0.3531
Luxembourg (LUX)	277	0.2305	0.0552	-0.2438	0.3309
The Netherlands (NLD)	211	0.2161	0.0899	-0.2471	0.3006
Portugal (PRT)	221	0.2126	0.1027	-0.3302	0.3402
Spain (ESP)	281	0.2302	0.0533	0.1355	0.3586
Sweden (SWE)	229	0.2147	0.0413	0.1356	0.3037
United Kingdom (GBR)	230	0.2441	0.0743	-0.2746	0.3214
Bulgaria (BUL)	224	0.2336	0.0377	0.1400	0.3147
Czech R. (CZE)	230	0.2409	0.0991	-0.2788	0.3379
Estonia (EST)	238	0.1496	0.1691	-0.5520	0.2917
Hungary (HUN)	227	0.2420	0.0825	-0.2670	0.3356
Latvia (LAT)	222	0.1979	0.1060	-0.3176	0.3019
Lithuania (LIT)	232	0.1961	0.1173	-0.3309	0.3101
Poland (POL)	240	0.2532	0.1215	-0.6511	0.3651
Romania (ROM)	322	0.1926	0.1016	-0.0650	0.3387
Slovenia (SLO)	202	0.2137	0.0649	-0.2622	0.2980
Slovakia (SVK)	225	0.2298	0.0937	-0.6511	0.3205
United States (USA)	291	0.2868	0.0531	0.1402	0.4040
Switzerland (CHE)	283	0.2557	0.0550	-0.2438	0.3182
Russian F. (RUS)	251	0.2775	0.0558	0.1363	0.3823
Mexico (MEX)	232	0.2412	0.1043	-0.2788	0.4040
Malta (MAL)	149	0.1694	0.0819	-0.1924	0.2615
Japan (JPN)	292	0.2885	0.0529	-0.1996	0.3664
India (IND)	257	0.2679	0.0587	0.1370	0.3934
Cyprus (CYP)	141	0.1759	0.0802	-0.4006	0.2694
Brazil (BRA)	254	0.2241	0.1472	-0.4685	0.3938
Average effects:					
All countries	7727	0.2278	0.0942	-0.6511	0.4040
EU15	3215	0.2219	0.0817	-0.3681	0.3586
CEECs	2362	0.2140	0.1095	-0.6511	0.3651
others	2150	0.2519	0.0891	-0.4685	0.4040

All the included marginal effects are significant at least at 5% level. Average effects are simple averages of the mean values of each country included in the corresponding groups of recipient countries.

China net effect in each recipient country has been computed as follows:

$$\frac{\delta FDI_{ijt+1}}{\delta FDICN_{it+1}} = \alpha_0 + \alpha_1 * \overline{MKTSIZE}_j + \alpha_2 * | GDPCAP_{it} - GDPCAP_{jt} |$$

The corresponding estimated coefficients are those reported in Table 3 column 2.

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1. Resmini, L., Siedschlag, I., Is Foreign Direct Investment in China Crowding Out the Foreign Direct Investment in other Countries? , Settembre 2012.

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