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How EU membership affects foreign direct investment: Differences between EU15 and CEE countries

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Abstract

This paper examines the impact of membership in the European Union on foreign direct investments (FDI). In contrast to previous studies, the overall effect of EU membership is disaggregated by countries that joined the EU before 2004 (EU15) and those that joined after 2004 (CEE). This disaggregation is motivated by differences between the two groups in terms of their historical background, GDP levels, and motives for FDI. Furthermore, the effects of EU membership are estimated at the country level. Using a structural FDI gravity model and applying recent advances in the gravity estimation literature, it is shown that membership of the EU has a substantial positive impact on both inward and outward FDI stocks. In particular, there is considerable heterogeneity in the impact of EU membership, with EU15 countries experiencing mainly an increase in inward FDI, while CEE countries experience a surge in outward FDI.

Keywords: European Union membership, foreign direct investments, structural gravity model
JEL classification: C33, F21, F36, O52

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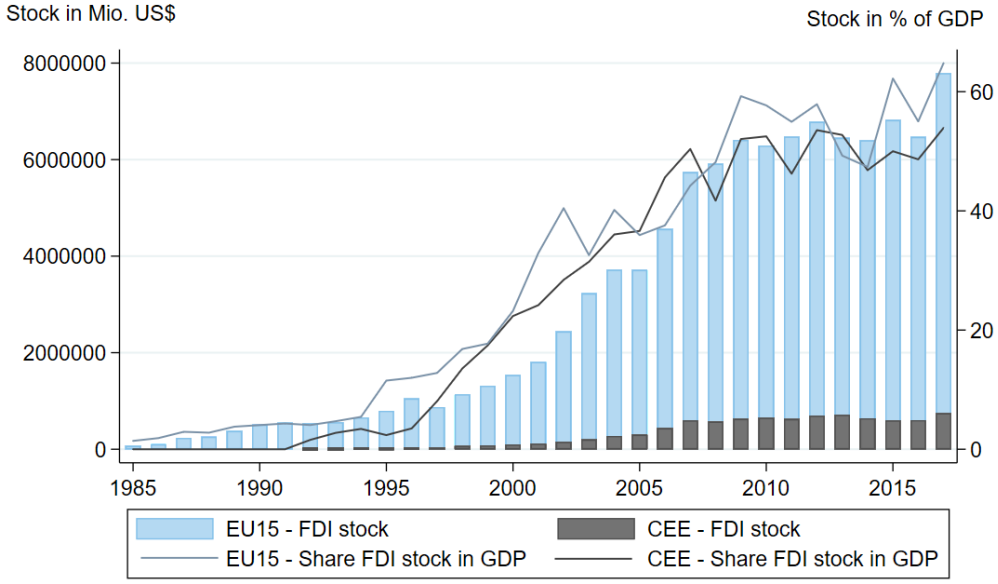
1 Introduction

To what extent does the impact of EU membership on foreign direct investment (FDI) differ between member states? The literature on the determinants of FDI often analyzes the overall effect of EU membership on FDI (Welfens and Baier (2018); Bruno et al. (2020)). However, the EU is not a homogeneous group of countries, especially due to the EU enlargements to the east. EU15 and Central and Eastern European (CEE) countries differ historically, as EU15 countries were market-oriented for a long time, while CEE countries were centrally planned. The two groups of countries also differ in economic terms, as shown in Figure 1 , which displays FDI stocks in millions of US dollars and as a percentage of GDP. Although the absolute FDI stocks of the CEE countries increased enormously between 1992 and 2008, they are rather low compared to the FDI stocks of the EU15 countries. The discrepancy between FDI stocks per GDP is not large, indicating divergent GDP in the two groups.

Figure 1: Inward FDI stocks in the EU



NOTES: Inward FDI stocks into EU15 and CEE countries in Million US Dollar and in Percentage of GDP. The EU members are divided into two groups, regardless of the year of the countries' accession to the EU. *SOURCE*: Own elaboration using OECD and wiiw FDI data and World Bank GDP data.

Due to economic dissimilarities, the motives underlying FDI also differ in these two groups of countries: While strategic asset-seeking reasons are the main motive for FDI in the EU15 countries, market-seeking and efficiency-seeking FDI for cost-saving

reasons predominate in CEE countries (Jones et al. (2020), Estrin et al. (2018)).

As the EU does not consist of a homogeneous group of countries, the main objective of this analysis is to examine the heterogeneous effects of membership of the EU, with a particular focus on the difference between the EU15 and the CEE countries. Thereby, several questions are addressed: (1) What is the overall effect of EU membership on FDI and how does its magnitude compare to that of shallower agreements? (2) To what degree does EU membership influence inward and outward FDI differently between distinct member states? (3) How does EU membership's impact on FDI differ between EU15 and CEE countries? (4) Which countries derive the greatest inward FDI benefits from their EU membership, and do these investments primarily originate from EU15 or CEE countries? (5) What is the impact of membership in the European Monetary Union on FDI?

To answer these questions, new methods from the literature on structural gravity models are applied following the framework of Kox and Rojas-Romagosa (2020). According to their partial equilibrium model, FDI stocks are negatively related to investment frictions. Provisions that reduce these frictions, such as membership in the EU, have a positive effect on bilateral FDI stocks. I construct a dataset combining OECD FDI data with wiiw FDI data. This approach includes not only all CEE countries but also the current EU accession countries (Albania, Northern Macedonia, Montenegro, Serbia, and Turkey).

The paper makes an important contribution to the existing literature in two ways. First, by examining the heterogeneity of EU effects from different perspectives. Second, I contribute in terms of methodology, I am the first to apply recent advances in the gravity estimation literature in the context of foreign direct investments.

The results provide several important insights. I find that EU membership is associated with a higher premium than ratification of less comprehensive agreements such as Preferential Trade Agreements (PTAs) and Bilateral Investment Treaties (BITs). Moreover, EU membership has a positive impact on inward and outward FDI stocks across all EU member states. In particular, there is considerable heterogeneity in the impact of EU membership between countries, with some countries experiencing a stronger impact on inward FDI, while others experience a larger impact on outward FDI. In particular, the EU15 countries, especially those that joined in the last enlargement in 1995, witness a significant positive impact on inward FDI. Conversely, the CEE countries experience mainly an increase in outward FDI. Differentiating between the EU15 and CEE countries, the greatest impact is observed for CEE

FDI stocks in the EU15 countries. A further breakdown by member state shows that Poland and Hungary are the main beneficiaries, gaining FDI from other CEE countries as well as from EU15 countries. This paper provides evidence for the importance of including domestic capital stocks, distinguishing properly between FDI and domestic capital, and accounting for globalization trends to obtain unbiased FDI estimates.

This paper is organized as follows. The next section discusses the relation of EU membership and FDI by reviewing the motives for FDI into different EU states and summarizing the results and methodological approach from empirical FDI gravity studies. In section 3, the framework of the FDI gravity model is discussed. Section 4 describes the used data and discusses the empirical specification, while section 5 presents the main structural gravity analysis. Several robustness checks are shown in section 6 before concluding in section 7.

2 Background - Relation of EU and FDI

2.1 Motives for FDI into EU member states

The well-known framework of Dunning and Lundan (2008) distinguishes four different motives for FDI. (1) If a country offers a low-cost supply of resources, it may attract natural resource-seeking FDI. (2) Market-seeking FDI is usually undertaken by economies wishing to expand their markets. (3) Firms that invest for strategic asset-seeking reasons want to expand their knowledge. (4) Efficiency-seeking FDI is motivated by potential cost savings.

Due to the size of the unified market created by the EU Single Market, the predominant motives for FDI from outside the EU are market-seeking reasons (Kalotay, 2006). A closer look and distinction between the EU15 and CEE countries reveals that the motives differ between the two groups. The EU15 countries are attractive for strategic asset-seeking FDI because the region has a high level of technological competence (Estrin et al., 2018). Furthermore, highly skilled labor is a relevant factor in these countries. In contrast, CEE countries may act as export platforms for the entire EU, indicating market-seeking motives. Low-skilled labor is another important determinant, indicating efficiency-seeking motives for cost-saving reasons (Jones et al., 2020).

2.2 The role of EU membership on FDI

The mere announcement of EU accession proposals has a significant impact on FDI in future member countries, as Bevan and Estrin (2004) show. This result is supported by Festa (2015), who finds that actual membership of the EU is the most important determinant of FDI from the EU15 in CEE countries over the period 1993 and 2013. While Narula and Bellak (2009) also point out the positive effect of EU membership on FDI, they argue that the role of EU membership decreases as more countries participate. In contrast, Medve-Balint (2014) claims that previous studies underestimate the importance of the EU and its active role in shaping FDI in the region. He argues that EU membership was responsible for a liberal shift in FDI policies in CEE countries.

The studies described above focus on the FDI stocks of EU15 in CEE countries and the role of EU membership for the new member states. The only study (Egger and Pfaffermayr, 2004a) that distinguishes between different EU groups was conducted before the last three waves of enlargement. Thus, the scope of their study was limited to evaluating the effect of the Europe Agreements that were signed in the mid-1990s between the EU and the eastern European accession countries and not the actual effects of EU membership on FDI.

As some time has passed since the last wave of EU enlargement to the East, it is now feasible to perform an ex post evaluation of EU integration on FDI. This paper is the first to examine the heterogeneous impact of EU membership on FDI in EU15 and CEE countries simultaneously, although disaggregated. In addition to this thematic contribution, this study also contributes in terms of methodological advancement. Before presenting the empirical specification, I provide an overview of the main results of EU studies that apply a structural FDI gravity model (table 1) and therefore follow to varying degrees the recommendations for the estimation of the gravity model by Yotov et al. (2016). This discussion aims to present the current state of the estimation of the gravity model and to describe the rationale for the estimation approach used.

Welfens and Baier (2018) focus on the case of Brexit and examine the impact of EU membership on FDI flows for 34 OECD countries over the period 1985 to 2012. In their preferred PPML specification, they control nominal exchange rates, openness, corporate tax rates, and share of the foreign capital stock in the target country. Using dyadic and time fixed effects, the authors identify an increase in FDI due to the origin country's EU membership of about 62%, while the target country's EU

Table 1: Previous EU studies on FDI gravity models

	EU variable	Model	Data	PPML Results
Welfens and Baier (2018)	EU-origin, EU-target	time fixed, dyadic fixed	OECD FDI flow (1985-2012)	no effect (if target is EU) +62% (if origin is EU) +83% (if origin is EU-SM)
Bruno et al. (2020)	EU-origin, EU-target, EU-pair	time fixed, dyadic fixed, (country-time)	UNCTAD FDI flow (1985-2018)	+60% (if target is EU) +167% (if origin is EU) +50% (if both are EU) +52% (if both are EU-SM)
Kox, Rojas-Romagosa (2020)	EU-SM pair	country-time, dyadic fixed	UNCTAD FDI stock (2001-2012)	+135% (if both are EU-SM)
Grieveson et al. (2021)	EU-pair	country-time, dyadic fixed	Wiiw FDI stock (1995-2017)	+35% (if both are EU)

membership seems to have no significant effect on FDI stocks.

Bruno et al. (2020) study a longer period from 1985 to 2018 and a larger sample of 142 countries using UNCTAD FDI flow data. In their baseline model, they perform a PPML estimation with dyadic and time fixed effects and find a significant positive impact on FDI flows when the target country is an EU member. To account for multilateral resistance terms, Bruno et al. (2020) additionally control for origin and target country fixed effects and estimate the impact on FDI when both the origin and target countries are EU members. The results of the study indicate that the membership of the EU of both partner countries leads to about 50% higher flows of FDI. This is greater than the impact of participation in other types of agreement, such as NAFTA, EFTA, and Mercosur. The main cause of this increase in FDI is participation in the EU Single Market. In a recent book chapter, Bruno and Estrin (2021) extend the baseline estimates of their earlier work by looking more closely at membership in the European Monetary Union (EMU). They divide the EU effect into EMU and non-EMU members and find a huge increase in FDI flows when countries belong to the Eurozone.

One of the few studies that includes origin-time, target-time, and dyadic fixed effects in the main empirical specification of the structural FDI gravity framework was conducted by Kox and Rojas-Romagosa (2020), who analyze the impact of preferential trade agreements (PTA) on FDI stocks, including a dummy for the EU Single Market as a control variable. Using UNCTAD FDI data, they have a large sample of 203 countries for the period 2001 to 2012. Their results suggest that bilateral FDI between countries that are members of the EU Single Market increases approximately

135%.

Another paper on FDI gravity estimation that considers three-way fixed effects is Grieveson et al. (2021), which examines the impact of stabilization and association agreements, bilateral investment treaties, and free trade agreements on FDI in the western Balkans. Since their research focus is on the eastern countries, the sample includes only 22 target countries (with 11 CEE countries) and 40 origin countries with data from the wiiw database. The PPML estimate accounts for fixed effects in country time and country pair and shows an increase in FDI stocks of about 35% when both economies are EU members.

Though these studies explore the effects of EU integration on FDI, they exhibit variations in research focus, control variables, and data sources. Despite these disparities, the four references summarized in Table 1 share common methodological elements. All four studies use panel data and employ Poisson Pseudo-Maximum Likelihood estimation, which, unlike OLS estimation, effectively handles zeros in the data and accounts for heteroscedasticity (Silva and Tenreyro, 2006). Another common feature is the inclusion of pairwise fixed effects, which have been shown to capture more information about bilateral costs than the standard set of gravity variables (Agnosteva et al. (2019); Egger and Nigai (2015)). Moreover, the integration of dummies for country pairs solves the problem of endogeneity of trade policy variables, aligning with the recommendations of Yotov et al. (2016). However, the divergence among these studies lies in the extent to which they include fixed effects. Only Kox and Rojas-Romagosa (2020) and Grieveson et al. (2021) use origin-time and target-time fixed effects in their main estimation. These control variables capture all time-varying country characteristics such as country sizes, exchange rates, or institutions. It is common in the trade gravity literature to use these fixed effects, since they control for the multilateral resistance terms (Olivero and Yotov, 2012).

Building on the existing studies and following the structural gravity estimation recommendations of Yotov et al. (2016), I use panel data, perform PPML estimation, and include pairwise fixed effects as well as origin- and target-time fixed effects. As Kox and Rojas-Romagosa (2020), I include domestic capital stocks, which is important because, as Kox and Rojas-Romagosa (2020) correctly argue, this approach allows for a theoretically consistent identification of the effects of bilateral policies and corrects for biases in estimating the effects of RTAs.

However, my approach differs from the methodology applied by Kox and Rojas-Romagosa (2020) in a fundamental way. When including domestic capital stocks, it

is crucial to distinguish between FDI and domestic capital stocks, in the same way that it is important to distinguish between international and domestic trade flows when analyzing trade (Borchert et al., 2022). This distinction is relevant because trade and investment policies should, by definition, affect cross-border investment rather than domestic capital. Achieving this distinction involves including an interaction between the border dummy and the relevant international policy variables. The main novelty of the empirical approach in this paper lies in precisely separating FDI and domestic capital stocks and effectively controlling for the globalization trend by including an interaction term between the border dummy and time, which is crucial to obtain unbiased estimates.

3 FDI gravity framework

Although the gravity model has been used primarily to explain international trade, there are also several publications that apply the model to FDI. The numerous applications of the FDI gravity model often follow econometric advances in the trade literature (e.g. Baier and Bergstrand (2007); Head and Ries (2008); Welfens and Baier (2018)), as a solid theoretical foundation such as the model of Anderson and Van Wincoop (2003) is lacking in the FDI literature.

However, a recently developed general trade equilibrium model by Anderson et al. (2019) describes the interactions between international trade, domestic investment in physical capital, and FDI. Part of this model provides a structural FDI gravity framework similar to the trade gravity framework of Anderson and Van Wincoop (2003).[1] Kox and Rojas-Romagosa (2020) adapt the FDI module of Anderson et al. (2019) in a way that it can be analyzed independently of the general equilibrium structure. In this framework, FDI refers to knowledge capital (e.g. patents, management skills) that can be "leased" and used simultaneously in other countries.[2] It has the following structure:

$$FDI_{ijt}^{stock} = w_{ijt} \frac{\alpha Y_{it}}{P_{it}} \frac{\beta Y_{jt}}{\Pi_{jt}} \tag{1}$$

[1] Due to the complexity of the model only calibration exercises are possible. Pearl (2009) points out that falsification of such large integrated models is difficult due to the set of parameters and assumptions that are not directly measurable. To allow empirical testing, the research focus in this paper is solely on the FDI part of the model.

[2] Knowledge capital is an interpretation developed by Markusen (2002) and McGrattan and Prescott (2010).

The value of bilateral FDI is positively affected by the size of the origin country (Y_{it}), as larger economies can invest more in knowledge capital and is positively related to the size of the target country (Y_{jt}), as larger economies can absorb more foreign technology. How sensitive the bilateral FDI stock reacts to economic masses depends on the parameters $\alpha > 0$ and $\beta > 0$, which capture the gravity proportionality factors.

Kox and Rojas-Romagosa (2020) differentiate between two types of friction that impede bilateral FDI: Absolute and relative FDI frictions. Distinguishing these investment barriers allows to shed light on the channels through which EU membership impacts FDI stocks. On the one hand, membership of the EU affects absolute FDI frictions ($\frac{1}{w_{ijt}}$) by reducing legal and regulatory barriers. There is no right to discriminate against foreign firms between two EU member states. Therefore, outright bans on activities of multinational companies, protection of national companies, or other policy measures related to the entry of foreign companies into the market are prohibited. It is expected that a reduction in these absolute restrictions on foreign direct investment as a result of EU membership will lead to an increase in FDI.

On the other hand, EU membership affects relative FDI frictions (z_{ijt}), which are costs related to operations, including distance, communication, legal system, labor costs, corporate tax rate and institutional aspects. When both the origin and destination countries are EU members, the relative distance between the two countries decreases compared to non-EU members. I hypothesize that joint membership in the EU lowers absolute, as well as, restrictive FDI frictions with both effects increasing bilateral FDI.

$$P_{it} = \left[\sum_{j=1}^{N} \left(\frac{z_{ijt}}{\Pi_{jt}} \right)^{(1-\sigma)} \frac{Y_{jt}}{Y_t} \right]^{\frac{1}{1-\sigma}} \tag{2}$$

$$\Pi_{jt} = \left[\sum_{j=1}^{N} \left(\frac{z_{jit}}{P_{it}} \right)^{(1-\sigma)} \frac{Y_{it}}{Y_t} \right]^{\frac{1}{1-\sigma}} \tag{3}$$

In the gravity framework, relative FDI frictions are included in the multilateral resistance terms. The inward multilateral resistance term (P_{it}) in equation (2) consists of two main components, the first part is a measure of the friction costs of FDI (z_{ijt}) that affect FDI coming from the origin country i to the target country j, normalized by the average cost aggregator (Π_{jt}). The second part is the economic

mass of the country j' weighted by world output $\left(\frac{Y_{jt}}{Y_t}\right)$. Therefore, a large economy with relatively low friction $\left(\frac{z_{ijt}}{\Pi_{jt}} < 1\right)$ will be a preferred location for FDI. Equation (3) defines the outward multilateral resistance, which in turn depends on the corresponding factors as the inward multilateral resistance.

4 Data and Empirical Specification

4.1 Data

FDI comprise cross-border investments by a direct investor from the origin country in an enterprise in the target country with the aim of acquiring a lasting interest. Such a "lasting interest" exists if the direct investor holds at least 10% of the voting rights of the direct investment enterprise and exerts a major influence on the management of that entity (UNCTAD, 2022).

The primary data source is the OECD FDI database, which contains information on FDI stocks in OECD countries. Since the focus of this analysis lies on EU member states, most of which are OECD members, this is the preferred dataset. It is collected in a homogeneous manner, resulting in higher data quality than the UNCTAD FDI database, and covers a longer time period from 1985 to 2017. A drawback of the OECD data is that they are limited to OECD member countries. Therefore, no new relevant FDI countries such as China are included. Still, the OECD countries account for about 70% of the world's FDI stocks.

To broaden the coverage and include all CEE countries, the OECD data are merged with FDI data from the Vienna Institute for International Economic Studies (wiiw), which also contains data for recent years. To the best of my knowledge, this is the first attempt to combine these two datasets. Thus, the merging procedure is described in more detail in Appendix B. The reason to focus on inward FDI is the higher quality of data compared to outward FDI, due to tax and subsidy reasons.[3] In the main analysis, the FDI stock data are used because they are less volatile than investment flows. The unbalanced sample covers 33 years from 1985 to 2017 and consists of 50 target states, with FDI data from 34 OECD countries and 16 wiiw

[3]There are frequent data gaps in the inward FDI statistics for some countries. For an analysis at the country level, it is necessary to fill these gaps by mirroring the corresponding outward FDI stocks, even though there are some discrepancies between the inward and outward FDI mirrored.

target (reporter) countries.[4]

Domestic capital stocks are included in addition to inward FDI stocks. This is recommended by Yotov et al. (2016) for conducting gravity estimates of trade. Kox and Rojas-Romagosa (2020) argue that the same reasoning should apply to FDI, because this approach allows for theoretically consistent identification of the impact of bilateral policies and corrects for biases in estimating the impact of PTAs. Moreover, the inclusion of domestic data accounts for the effects of nondiscriminatory domestic policies and domestic and foreign distances. Data are from the IMF's Investment and Capital Stock Dataset (IMF, 2019), in which total investment is divided into public and private capital stocks. The focus is only on private transactions by firms and individuals, which are converted from billions of national currencies to millions of USD by using the exchange rates from the Penn World Tables 10.0. To test whether other integration agreements change the estimated size effect of EU membership, the analysis controls for three additional policy variables: Bilateral investment treaties, regional trade agreements, and Economic and Monetary Union. BITs are intended to promote and protect investments between two economies. Although some strong empirical studies, such as Egger and Pfaffermayr (2004b) give evidence for a positive relationship between BITs and FDI, a recent meta-analysis by Brada et al. (2021) shows that international investment agreements have a negligible effect on FDI, but this may be due to insufficiently precise research methods. BIT information was downloaded from the UNCTAD Investment Navigator.[5]

RTAs are assumed to reduce trade costs and promote international trade; however, due to the relationship between trade and FDI, the latter may also be affected. In general, trade and FDI can be complements or substitutes, depending on the type of investment, i.e. horizontal or vertical FDI (Markusen, 2002). Horizontal FDI - when an enterprise replicates domestic activities in another country - is associated with substituting trade; therefore, RTA is expected to lower FDI. In contrast, vertical FDI - when an enterprise splits the production process among different countries - is associated with complementing trade because intermediate goods must be traded internationally. Hence, one would expect RTA to increase FDI. See Helpman (2006) and Markusen (2002) for a more detailed analysis of the relationship between trade

[4] Appendix A lists the countries included in the sample. A small share of the FDI stocks in the sample are negative. Such negative FDI can occur when equity capital, reinvested earnings, or intra-firm loans are negative. Since negative FDI stock values are theoretically inconsistent and also impractical for estimation, they are set equal to zero (following Welfens and Baier (2018); Bruno et al. (2020); Kox and Rojas-Romagosa (2020)).

[5] https://investmentpolicy.unctad.org/international-investment-agreements, last access 10.12.2021

and FDI. Since the FDI data do not allow for a separation between horizontal and vertical FDI, the expected relationship between RTA and FDI remains an empirical question. Larch's RTA data of the release 2017 (Egger and Larch, 2008), which includes agreements notified to the World Trade Organization from 1950 to 2019, are used to obtain RTA data. This dummy indicator covers all types of agreements (partial scope agreement, free trade agreement, customs union, or economic integration agreement).

4.2 Empirical Specification

Overall EU effect

The baseline model to estimate the effects of EU membership on FDI is inspired by the structural FDI gravity literature (Kox and Rojas-Romagosa (2020); Bruno et al. (2020)) and the structural trade gravity literature (Bergstrand et al. (2015); Oberhofer and Pfaffermayr (2021)). It is the following Poisson Pseudo Maximum Likelihood (PPML) specification:

$$FDI_{ijt} = exp[\beta_1 B_{ij} EU_{ijt} + \beta_2 B_{ij} RTA_{ijt} + \beta_3 B_{ij} BIT_{ijt} + \beta_4 B_{ij} t + \mu_{it} + \mu_{jt} + \mu_{ij}] + \epsilon_{ijt}, \tag{4}$$

where (FDI_{ijt}) is the FDI stock from origin country (i) to target country (j) in year (t). The main variable of interest is the time-varying bilateral EU dummy that equals one if both countries are members of the EU.[6] As controls two additional policy variables are included, namely the dummies (BIT_{ijt}) and (RTA_{ijt}), which equal one when a bilateral investment treaty or a regional trade agreement is in force, respectively.[7] In general, the policy variables may reduce tariffs and possibly also nontariff barriers to FDI but by definition should have no effect on domestic capital stocks. Hence, they are interacted with a border dummy (B_{ij}) that is equal to one if $i \neq j$, and zero otherwise.

The specification comprises an interaction term between the border dummy (B_{ij}) and a time trend (t) to ensure that the border effects can change over time, which captures the overall path of globalization. Origin-time fixed effects (μ_{it}) control for outward multilateral resistance terms, while target-time fixed effects (μ_{jt}) control for inward multilateral resistance terms. These country-time fixed effects absorb

[6] In Appendix A the EU and EMU accession years of all countries are displayed.

[7] The policy variables are set to zero after both partners of a country pair join the EU as is common in the trade literature (e.g. Mayer et al. (2019)).

all country-specific characteristics that are often used in the estimations of gravity models. Bilateral fixed effects (μ_{ij}) absorb all time-invariant determinants of FDI frictions such as distance or common borders, and (ϵ_{ijt}) is the combined error term.

With this specification, domestic capital stocks (when i = j) are clearly distinguished from FDI because domestic capital stocks act as a base and their levels are fully explained by the country-pair fixed effects and resistance terms.[8] This provides a clean measurement of the impact of changing investment barriers on bilateral FDI over time. Thus, the resulting empirical specification identifies the change in EU effects over time rather than level effects, since levels are absorbed by country-pair fixed effects.

The baseline specification assumes that the effect of membership in the EU is homogeneous between all EU countries and that the average is the same for all. Since the focus of this paper is on the heterogeneity of effects of EU membership, I extend the empirical model, analyzing the heterogeneity across EU countries. Specifically, instead of estimating the average EU effect, I estimate one parameter for each country except for one base country. For this purpose, the model includes interaction terms that are equal to one if the respective country is part of a pair of countries investing within the EU. For example, in the case of Austria, the term *B*EU*AT* is included in the gravity model, which is different from zero only if Austria is the origin or destination country of the FDI and the FDI flows within the EU but across countries. Similarly, such a term is included for all other EU countries, excluding one base country.

Italy is the base country because the impact of membership in the EU on Italian FDI stocks is average compared to other EU countries, making Italy a suitable reference country. Similar results are observed when a different base country is chosen. Including interaction terms for all EU countries at the same time, except for the base country, allows a direct comparison of the effect of EU membership on FDI stocks. For the analysis on the country level, I excluded the three tax havens Ireland, the Netherlands, and Luxembourg from the sample. The robustness check shows that these countries only slightly change the average EU effects in the different groups, but due to the large variation over time, these three countries potentially lead to biases in the analysis of individual countries.

EU15 versus CEE

[8] This controls for the issue of different measurements of FDI and domestic capital stock data (Bellak, 1996)

To understand whether the effect of the EU on FDI is different between the EU15 and CEE countries, the EU dummy is disaggregated into four integration variables. The specification is as follows:

$$FDI_{ijt} = exp[\beta_1 B_{ij}(EU15 \rightarrow EU15)_{ijt} + \beta_2 B_{ij}(CEE \rightarrow CEE)_{ijt} + \beta_3 B_{ij}(EU15 \rightarrow CEE)_{ijt} + \beta_4 B_{ij}(CEE \rightarrow EU15)_{ijt} + \beta_5 B_{ij} RTA_{ijt} + \beta_6 B_{ij} BIT_{ijt} + \beta_7 B_{ij} t + \mu_{it} + \mu_{jt} + \mu_{ij}] + \epsilon_{ijt}, \quad (5)$$

where the dummy $(EU15 \rightarrow EU15)$ equals one if origin and target country were EU members before 2004, $(CEE \rightarrow CEE)$ is one if both partners joined the EU after 2004, $(EU15 \rightarrow CEE)$ is one if the origin country is an old member state and the target country a new member state, and $(CEE \rightarrow EU15)$ equals one if the origin country joined after 2004 and the target country joined before.

To deepen the analysis, the impact within the EU15 and CEE countries is examined at the country level. This approach allows the identification of specific countries that may be particularly affected by EU membership and provides insights into the source of FDI stocks. Building on the previous analysis of heterogeneity across EU countries, distinctions are made in terms of the group of countries (EU15 or CEE) from which FDI originates. Therefore, interaction terms between the four EU integration variables and country-specific dummies are introduced. In this analysis, Italy and the Czech Republic serve as reference countries. The main focus remains on inward FDI stocks, as they have a significant impact on economic development. Additionally, tax havens are excluded from the sample to ensure that these countries do not over-influence the results.

EMU versus non-EMU

EMU membership is a deeper form of integration and presumably leads to lower bilateral transaction costs. Therefore, two countries that both use Euros can be expected to have lower transaction costs than two countries that use different currencies. In the third empirical specification, the overall EU effect on FDI is disaggregated according to EMU membership:

$$FDI_{ijt} = exp[\beta_1 B_{ij} EMU_{ijt} + \beta_2 B_{ij} nonEMU_{ijt} + \beta_3 B_{ij}(EMU \leftrightarrow nonEMU)_{ijt} + \beta_4 B_{ij} RTA_{ijt} + \beta_5 B_{ij} BIT_{ijt} + \beta_6 B_{ij} t + \mu_{it} + \mu_{jt} + \mu_{ij}] + \epsilon_{ijt}, \quad (6)$$

with dummy EMU equal to one if both countries in a pair are members of EMU, $nonEMU$ equal to one if both origin and target countries are EMU members, and

($EMU \leftrightarrow nonEMU$) equal to one if the origin country is an EMU member and the target country is not, or vice versa.

5 Estimation results

Overall EU effect

Table 2 presents estimates of the baseline model with bilateral FDI stocks as the dependent variable.[9] The regression estimate in Table 2 column 1 shows that country pairs that are members of the EU experience an increase in bilateral FDI stocks of approximately 90% relative to domestic capital stocks and the remaining countries that are not part of the EU.[10] Relating the results to the FDI gravity framework, I find that the hypothesis of a positive impact of EU membership on FDI stocks by reducing absolute and relative FDI friction costs can be confirmed.

In Table 2, RTA and BIT dummies are added in columns 2 and 3, which is crucial to obtain comparable estimates for EU membership versus shallow economic agreements. The premium of EU membership is larger than in the estimation without additional agreements because the counterfactual consists of countries that are neither members of the EU nor of a RTA or BIT.

Ratifying a RTA or BIT has a positive and significant impact on FDI stocks, with the effect of BIT being greater than that of RTA. The way these agreements relate to the FDI barriers varies. BITs aim to reduce the investment risks of FDI and are designed to insure private investment from one country to another through instruments such as protection against expropriation, non-discriminatory treatment of foreign investors, and, if necessary, the use of investor-state dispute settlement mechanisms. In contrast, RTAs mainly aim to reduce trade costs and promote international trade. Since the effect of RTA on FDI stocks is positive, there appears to be a complementary relationship between international trade and FDI. These results

[9] Standard errors are three-way clustered over country-pairs, origin-time and target-time, as proposed by Egger and Tarlea (2015). The results are similar when country-pair clustering is applied.

[10] To interpret the regression estimates of the EU variables, they are converted into percentage effects. This is often done using $100(exp\{\hat{\beta}_k\} - 1)$. Yet, Kennedy (1981) argues that this conversion leads to a biased estimator for the percentage effect, in part due to the nonlinearity of the transformation. Rather, the percent change in the dependent variable due to the switch of a binary variable from zero to one is appropriately approximated by $100(exp\{\hat{\beta}_k - 0.5\hat{V}_k\} - 1)$, where the approximated unbiased variance estimator following Van Garderen and Shah (2002) is: $\tilde{V}_k = 100^2 exp\{2\hat{\beta}_k\}[exp\{-\hat{V}_k\} - exp\{-2\hat{V}_k\}]$.

of EU, BIT, and RTA are consistent with estimates found in the literature (Bruno et al. (2020); Kox and Rojas-Romagosa (2020); Egger and Pfaffermayr (2004b)).

Table 2: FDI gravity regression: baseline model

	(1)	(2)	(3)
Border * EU28	0.607	0.788	0.924
	(0.099)***	(0.126)***	(0.148)***
Border * RTA		0.176	0.167
		(0.077)**	(0.077)**
Border * BIT			0.334
			(0.113)***
Border * time	0.047	0.047	0.047
	(0.004)***	(0.004)***	(0.004)***
Observations	41148	40914	40914

NOTES: This table shows the effects of EU membership on FDI stocks. The panel comprises 33 years and 50 countries. Standard errors, in parentheses, are clustered over country-pairs, origin-time and target-time. * $p < 0.10$, ** $p < .05$, *** $p < .01$. All regressions include fixed effects for country-pairs, origin-time and target-time.

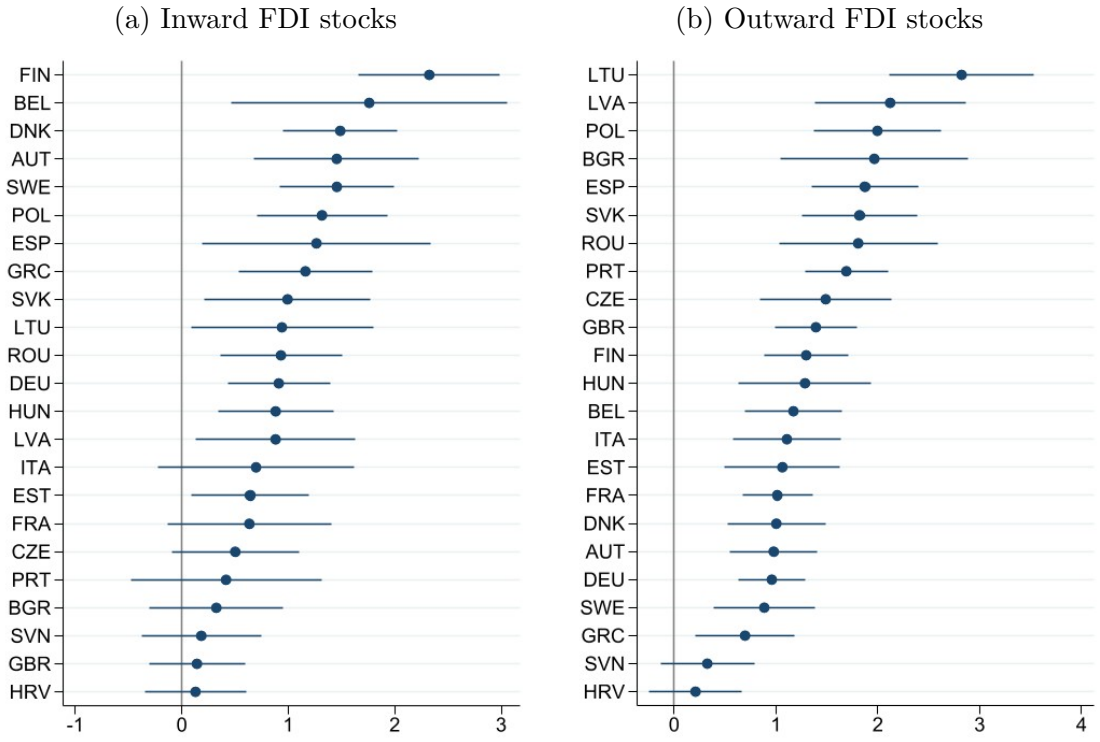
Figure 2 shows the effect of EU membership on FDI stocks by country, differentiating between inward and outward FDI stocks. Italy takes the role of the base category. Consequently, the coefficients show deviations from the EU effect of Italy. Summing this base effect with the country-specific EU effect (*B*EU*ITA* and *B*EU*country*) captures the total EU effect for the respective country. These sums are presented in graphical form.

The results of the analysis clearly confirm the positive and statistically significant impact of EU membership on FDI stocks to and from EU member states. This underscores the central role of EU membership as a promoter of FDI, fostering economic integration, and easing cross-border investment between member countries. However, what is evident from the estimation results is the noticeable heterogeneity in the impact of EU membership between member countries. This important finding complements previous research that focuses predominantly on the average impact of the EU. This analysis shows that for some countries, EU membership has a more pronounced effect on inward FDI, while for others, outward FDI is more profoundly

influenced.

In terms of inward FDI stocks, Finland, Belgium, Denmark, Austria, and Sweden, including the three most recent EU15 accession countries in 1995, show the largest positive impact of EU membership. With Belgium and Denmark benefiting more than average from increased FDI from the CEE countries. Among the CEE countries, Slovakia, Lithuania, Romania, Hungary, and Estonia show a significant and above-average positive effect of EU membership on FDI. In terms of outward FDI, the expected effects of CEE enlargement are evident. CEE countries show a notable increase in their FDI stocks, especially within other CEE countries, primarily in neighboring countries. Furthermore, these CEE countries show increased investments in EU15 countries as a consequence of their EU membership. The countries with the largest increases in their outward FDI due to EU accession are Lithuania, Latvia, Poland, and Bulgaria.

Figure 2: EU membership effects on FDI by country



NOTES: This figure shows the impact of EU membership on FDI stocks for each country separately. The base effect of the reference country is added to the country-specific effect of the EU *(B*EU*ITA and B*EUcountry)*. This sum captures the total effect of the EU for the respective country. Coefficient estimates and confidence intervals are presented in the figure. Panel (a) shows the effect of EU membership on inward FDI stocks, while panel (b) shows the effect on outward FDI stocks.

EU15 versus CEE

The EU does not consist of a homogeneous group of countries, as the EU15 and CEE countries differ in terms of their historical background, GDP and motives for FDI. Moreover, there are large differences in the level of FDI between the EU15 and the CEE countries, as already shown in Figure 1. The focus now is not on the level effects on FDI but on how the effects of EU accession change over time.

Table 3 disaggregates the overall intra-EU effect into different groups and shows the corresponding percentage change of the EU variables and the 95% confidence intervals. The regression estimate for ($EU15 \rightarrow EU15$) shows that country pairs that were EU members prior to 2004 experience an increase in bilateral FDI stocks of about 83% relative to domestic capital stocks and countries that were not both EU members prior to 2004. This effect is due to two shifts in the variable of interest, as Portugal and Spain joined the EU in 1986 and Austria, Sweden, and Finland joined in 1995.

The impact of EU membership on FDI stocks in CEE is about 115%, a rather large magnitude, especially since the effect is only present from 2004 onward. This underscores that EU membership is an important determinant of FDI stocks in CEE countries. Relating this result to the FDI gravity framework, it appears that absolute FDI frictions were reduced by the adoption of EU law (the so-called acquis communautaire) to which the CEE countries committed themselves. This, in turn, had a large positive impact on FDI.

If the origin country belongs to the CEE group and the target country to the EU15 countries or vice versa ($CEE \leftrightarrow EU15$), the impact on bilateral FDI stocks in the host country is estimated to increase by about 103%, [0%, 207%]. When the effect is differentiated by the direction of investment stocks, the underlying pattern becomes clear. The increase in bilateral FDI stocks in CEE countries originating in EU15 countries amounts to about 88%, while the increase in the opposite direction, from CEE to EU15 countries, is much larger at 184%. Note the high uncertainty indicated by the wide confidence interval.

The large latter effect may arise from companies from CEE countries investing in EU15 countries for strategic-asset seeking reasons, which promotes technology transfer and the exchange of know-how, or this effect may arise from EU15 countries that had originally invested in CEE countries reinvesting in their parent companies. This may have less positive effects on the CEE economies. Another aspect explaining this large effect is that the level of FDI in the CEE countries was low (close to zero) be-

Table 3: FDI gravity estimates disaggregating EU effects

	(1)		(2)	
	Coefficient St.error	%-effect CI	Coefficient St.error	%-effect CI
Border * (EU15 → EU15)	0.852 (0.177)***	83 [3;162]	0.852 (0.177)***	83 [3;162]
Border * (CEE → CEE)	1.190 (0.229)***	115 [-26;257]	1.143 (0.226)***	111 [-14;236]
Border * (CEE ↔ EU15)	1.061 (0.188)***	103 [0;207]		
Border * (EU15 → CEE)			0.912 (0.210)***	88 [-11;187]
Border * (CEE → EU15)			1.886 (0.263)***	184 [-139;507]
Border * RTA	0.165 (0.077)**	15 [-3;33]	0.164 (0.077)**	15 [-3;33]
Border * BIT	0.404 (0.142)***	38 [-3;79]	0.401 (0.142)***	38 [-3;79]
Border * time	0.047 (0.004)***	4 [3;5]	0.047 (0.004)***	4 [3;5]
Observations	40914		40914	

NOTES: This table shows the impact of EU membership on FDI stocks, distinguishing between EU15 and CEE countries. Coefficients and resulting percentage effects are given, along with standard errors and confidence intervals. The panel comprises 33 years and 50 countries. Standard errors, in parentheses, are clustered over country-pairs, origin-time and target-time. * $p < 0.10$, ** $p < .05$, *** $p < .01$. All regressions include fixed effects for country-pairs, origin-time and target-time. Percentage effects and confidence intervals are based on Kennedy (1981) and Van Garderen and Shah (2002).

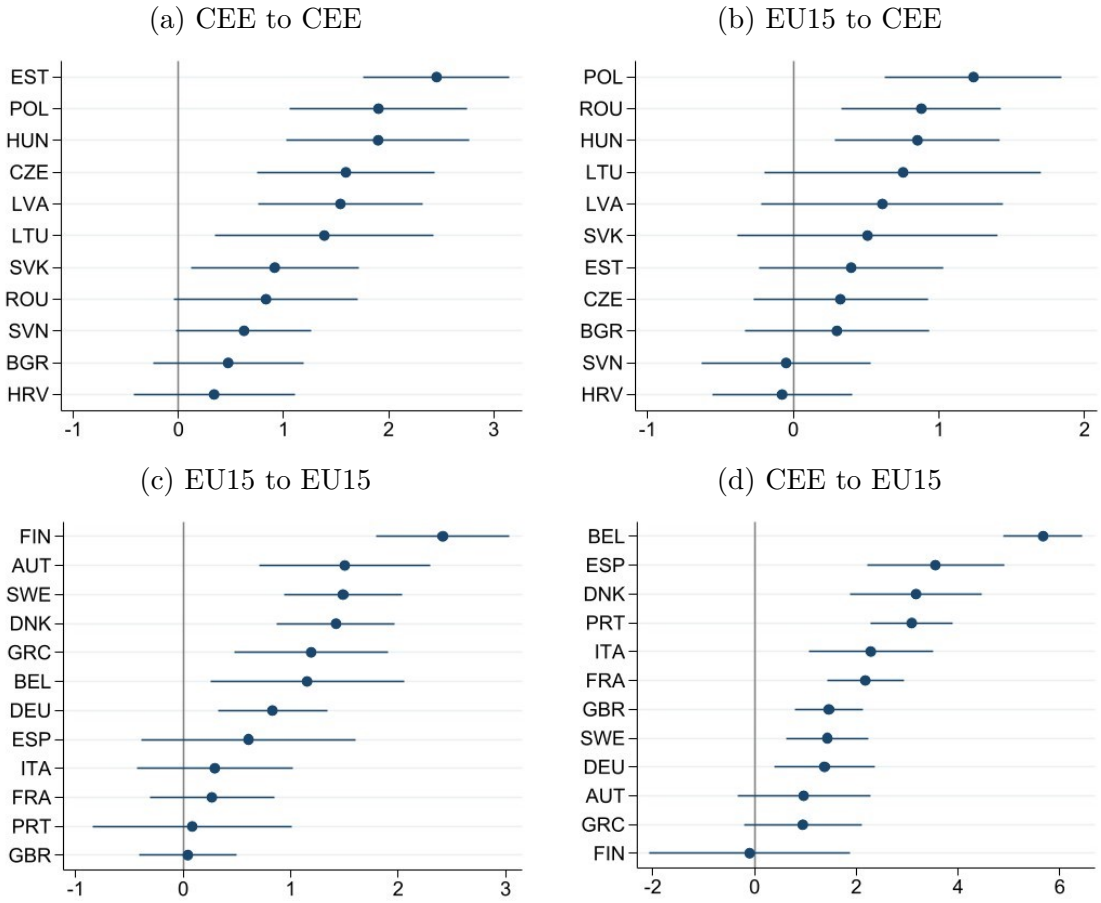
fore the accession of the EU. To better understand the pattern underlying these aggregate effects, further research is needed with data that allows to distinguish between the owner of the investment and the type of investment, and to distinguish between greenfield FDI and cross-border mergers and acquisitions.

Moreover, the relatively small impact of EU membership on investment from EU15 countries in CEE countries may be due to the integration that already took place in the mid-1990s with the signing of the European Economic Agreements.[11] It is also

[11]See Bevan and Estrin (2004); Egger and Pfaffermayr (2004a) for an analysis of the impact of the Europe Agreements on FDI.

possible that the effect is smaller because not only FDI from EU15 countries has increased, but also from the rest of the world, as countries outside the EU invest for market-seeking reasons, with CEE countries serving as export platforms.

Figure 3: EU membership effects on inward FDI stocks by country



NOTES: This figure shows the impact of EU membership on inward FDI stocks for each country separately when differentiating between the four EU integration variables ($EU15 \rightarrow EU15$), ($CEE \rightarrow CEE$), ($EU15 \rightarrow CEE$) and ($CEE \rightarrow EU15$). The base effect of the reference country is added to the country-specific EU effect. This sum captures the total effect of the EU for the respective country. Coefficient estimates and confidence intervals are presented in the figure.

The focus of the analysis in this section is on inward FDI stocks, as high inward FDI stocks have positive implications for economic outcomes. Within this context, it becomes evident that the impact of EU membership on inward FDI stocks varies significantly across countries. The impact is measured by the change in the dummy variable of the EU from 0 to 1, which is mainly determined by the enlargement of the EU to the East in 2004, 2007 and 2013.

When considering the change in FDI stocks in the CEE countries as a result of EU

membership, it is evident that Estonia, Poland, and Hungary are the main recipients of FDI from other CEE countries. FDI from EU15 to CEE countries is most evident in Poland, Romania, and Hungary, where a positive and significant effect is observed. Thus, Poland and Hungary benefit the most in terms of FDI from both the CEE and EU15 countries. Considering FDI stocks in the EU15 countries, it can be seen that FDI stocks within the EU15 were mainly affected in the most recent accession countries, Finland, Austria, and Sweden, which joined the EU in 1995. This is as expected, since the impact on the EU15 countries is determined by shifts in the EU dummy, and the main shift for this group within the sample period starting in 1985 was caused by the last accession of the EU15 countries. Conversely, Great Britain shows very small effects, indicating the impact of BREXIT, which is characterized by a decrease in FDI stocks since 2015. Finally, when looking at FDI from CEE in the EU15 countries, it can be seen that Belgium, Spain, and Denmark show the highest change in FDI stocks.

EMU versus non-EMU

Table 4 divides the overall effect of EU membership into the effects of EU members that are additionally members of the EMU and those that are not. Regression estimates indicate that country pairs that are members of the EMU experience an increase in bilateral FDI stocks of about 113%. As expected, the increase in FDI stocks of EU countries that are not part of the EMU is much smaller, at 67%. Note that the latter group consists only of two countries (Sweden, Great Britain). If the origin country belongs to the EMU group and the target country to the non-EMU countries or vice versa (EMU $\leftrightarrow$ non-EMU), the impact on bilateral FDI stocks in the host country is estimated to increase by approximately 52%.

Compared to De Sousa and Lochard (2011), these effects appear to be quite large. De Sousa and Lochard (2011) find that the creation of the EMU increased intra-EMU FDI stocks by around 30% between 1982 and 2005. However, they consider only 21 OECD countries, implying that their counterfactual group consists of countries that already have high levels of integration, and they do not include country-time fixed effects to control for multilateral resistances. Bruno and Estrin (2021) also find large effects of EMU membership in the order of about 160% for FDI stocks and 290% for FDI flows relative to countries outside the EU. They analyze 35 OECD countries over the period 1985 to 2013. These effects are not directly comparable to the estimation results in this paper because I consider intra-group effects, while they look at FDI target-specific effects.

Table 4: FDI gravity estimates disaggregating EU effects by EMU membership

	Coefficient St.error	% - effect CI
Border * EMU	1.152 (0.159)***	113 [16;210]
Border * non-EMU	0.691 (0.143)***	67 [12;122]
Border * (EMU ↔ non-EMU)	0.537 (0.076)***	52 [27;78]
Border * RTA	0.199 (0.076)***	19 [1;37]
Border * BIT	0.362 (0.113)***	35 [3;66]
Border * time	0.042 (0.004)***	3 [2;4]
Observations	40914	

NOTES: This table shows the impact of EU membership on FDI stocks, disaggregated by EMU membership. The panel comprises 33 years and 50 countries. Standard errors, in parentheses, are clustered over country-pairs, origin-time and target-time. * $p < 0.10$, ** $p < .05$, *** $p < .01$. All regressions include fixed effects for country-pairs, origin-time and target-time. Percentage effects and confidence intervals are based on Kennedy (1981) and Van Garderen and Shah (2002).

6 Robustness checks

The robustness of the results with the preferred specification of Table 3 column 2 is tested by running a series of sensitivity tests, starting with the use of FDI flows instead of FDI stocks, the exclusion of tax haven countries, and ending with the removal of border dummies.

FDI flows

Due to the high volatility of FDI flows, which can fluctuate greatly from year to year, FDI stocks are applied in the main analysis. However, FDI flows are generally more suitable for gravity estimation. Hence, to test the main results, FDI flows are used as the dependent variable.

Table 5 shows that all EU effects remain significant and positive, although somewhat smaller than for FDI stocks. The RTA effect is no longer significant, as also found by Kox and Rojas-Romagosa (2020). The results can be explained by the high

Table 5: FDI gravity estimates using FDI flows

	Coefficient St.error	%-effect CI
Border * (EU15 → EU15)	0.794 (0.220)***	76 [-16;168]
Border * (CEE → CEE)	1.098 (0.266)***	105 [-47;257]
Border * (EU15 → CEE)	1.105 (0.273)***	106 [-47;259]
Border * (CEE → EU15)	1.546 (0.302)***	149 [-110;408]
Border * RTA	0.069 (0.117)	5 [-19;30]
Border * BIT	0.391 (0.115)***	37 [4;70]
Border * time	0.040 (0.005)***	3 [2;4]
Observations	39806	

NOTES: This table shows the impact of EU membership on FDI, differentiating between EU15 and CEE countries. As the dependent variable FDI flows are used. The panel comprises 33 years and 50 countries. Standard errors, in parentheses, are clustered over country-pairs, origin-time and target-time. * $p < 0.10$, ** $p < .05$, *** $p < .01$. All regressions include fixed effects for country-pairs, origin-time and target-time. Percentage effects and confidence intervals are based on Kennedy (1981) and Van Garderen and Shah (2002).

volatility, but also by the increased incidence of negative values for FDI inflows, which are more pronounced than for FDI stocks.

Excluding tax havens

FDI statistics are blurred by tax havens, which are characterized by low corporate tax rates and thus enormous investment stocks.[12] Table 6 tests the robustness of the main results by excluding three tax havens, namely Ireland, Netherlands, and Luxembourg.

The coefficients of (EU15 → CEE), (CEE → EU15), RTA and BIT are lower in the estimation with the restricted sample, while the coefficients of CEE and EU15 are slightly larger compared to the full sample. Overall, the estimates of EU membership

[12]See Damgaard et al. (2019) for a detailed analysis on phantom investments.

Table 6: FDI gravity estimates excluding tax havens

	Coefficient St.error	%-effect CI
Border * (EU15 → EU15)	1.131 (0.165)***	111 [13;209]
Border * (CEE → CEE)	1.058 (0.229)***	102 [-18;223]
Border * (EU15 → CEE)	0.760 (0.222)***	73 [-17;162]
Border * (CEE → EU15)	1.754 (0.283)***	170 [-131:472]
Border * RTA	0.133 (0.083)	12 [-7;30]
Border * BIT	0.275 (0.150)*	25 [-13;63]
Border * time	0.040 (0.002)***	3 [3;3]
Observations	35378	

NOTES: This table shows the impact of EU membership on FDI stocks, setting FDI stocks from IRL, LUX and NLD to missing. The panel comprises 33 years and 50 countries. Standard errors, in parentheses, are clustered over country-pairs, origin-time and target-time. * $p < 0.10$, ** $p < .05$, *** $p < .01$. All regressions include fixed effects for country-pairs, origin-time and target-time. Percentage effects and confidence intervals are based on Kennedy (1981) and Van Garderen and Shah (2002).

remain positive and significant when the three tax havens are excluded from the sample.

Excluding interactions with border dummies

In the data sample, domestic capital stocks are included in addition to FDI stocks, as their inclusion allows for theoretically consistent identification and bias correction of the impact of EU membership. The border dummy is used to clearly distinguish between domestic capital stocks and FDI. In this robustness check, the interaction terms of the policy variables with the border dummy and also the interaction of the border dummy with the time trend is not considered.[13] In Table 7 the results of this estimation are displayed. All variables are much larger with this specification because the globalization effect is now part of the policy variables. This result

[13]By excluding the border dummy, the specification is similar to Kox and Rojas-Romagosa (2020).

indicates the importance of controlling for the trend of globalization.

Table 7: FDI gravity estimates without border dummies

	Coefficient St.error	%-effect CI
EU15 → EU15	1.970 (0.195)***	194 [-72;460]
CEE → CEE	1.994 (0.244)***	195 [-155;545]
EU15 → CEE	1.609 (0.255)**	157 [-81;395]
CEE → EU15	3.129 (0.312)***	307 [-992;1606]
RTA	0.519 (0.094)***	50 [20;81]
BIT	0.504 (0.165)***	48 [-4;100]
Observations	41182	

NOTES: Interactions with border dummies are excluded in this specification. The panel comprises 33 years and 50 countries. Standard errors, in parentheses, are clustered over country-pairs, origin-time and target-time. * $p < 0.10$, ** $p < .05$, *** $p < .01$. All regressions include fixed effects for country-pairs, origin-time and target-time. Percentage effects and confidence intervals are based on Kennedy (1981) and Van Garderen and Shah (2002).

7 Conclusion

This paper examines the impact of EU membership on bilateral FDI by disaggregating the overall effect into countries that joined the EU before 2004 and those that joined after 2004, which is important due to the heterogeneity in the EU. Thereby, the direction of investment is distinguished, yielding four intra-EU effects (EU15 → EU15; CEE → CEE; EU15 → CEE; CEE → EU15). Additionally the effects of EU membership are analyzed on the country level.

The effects are estimated with a structural FDI gravity framework that takes advantage of recent advances in the gravity estimation literature, with two key aspects. First, domestic capital stocks are included to account for the effect of non-discriminatory domestic policies and domestic and foreign distances. Second, a

border-time interaction dummy is included to control for the globalization trend and interactions of the border dummy with the policy variables are introduced, which is essential for a correct estimation of the effect of the EU.

The estimation results show that country pairs belonging to the EU experience an increase in bilateral FDI stocks of about 90%. This effect is quite large and underscores the relevance of applying recent advances of the gravity literature. A disaggregation of the effect of the EU by EU15 and CEE indicates that the effect is heterogeneous between the different EU groups. For each group, a positive and significant effect of EU membership on FDI stocks is evident. It is interesting to note that the increase in bilateral FDI stocks in CEE members originating in EU15 countries is only 88%, while the increase in the opposite direction from CEE to EU15 countries is much greater, 184%. This demonstrates that especially FDI stocks of CEE members to EU15 countries were affected by the last three waves of EU enlargement. It is possible that FDI from EU15 to CEE countries increased less because CEE countries also became attractive to countries outside of the EU for market-seeking reasons where CEE countries can act as an entry door to the large Single Market. A disaggregation of EU effects by EMU and non-EMU shows that EMU membership causes strong additional integration to EU membership. In addition, estimating the EU effects at the country level, the results show heterogeneity across countries, with some countries showing a stronger impact on inward FDI stocks, while others show a stronger impact on outward FDI stocks. In particular, the EU15 countries, especially those that became members at the last enlargement in 1995, have a remarkably positive effect on FDI. Conversely, the CEE countries experience primarily an increase in outward FDI.

As I have noted, the impact of EU membership on FDI varies widely between member states. This underscores the importance of developing tailored policies and strategies to maximize the benefits of EU membership for individual countries. It is not enough to look only at the average effects of the EU, but it is also necessary to know who benefits the least from the accession to the EU in order to possibly compensate for this with other measures.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon request.

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Appendix

A: Country coverage including EU and EMU details

Country	EU accession year	EMU entry year
EU15		
Austria	1995	1999
Belgium	1958	1999
Denmark	1973	1999
Finland	1995	1999
France	1958	1999
Germany	1958	1999
Greece	1981	2001
Ireland	1973	1999
Italy	1958	1999
Luxembourg	1958	1999
Netherlands	1958	1999
Portugal	1986	1999
Spain	1986	1999
Sweden	1995	
United Kingdom	1973	
CEE		
Bulgaria	2007	
Croatia	2013	
Czech Republic	2004	
Estonia	2004	2011
Hungary	2004	
Latvia	2004	2014
Lithuania	2004	2015
Poland	2004	
Romania	2007	
Slovak Republic	2004	2009
Slovenia	2004	2007
ROW		
Albania	Japan	North Macedonia
Australia	Kazakhstan	Norway
Belarus	Korea, Republic	Russian Federation
Bosnia and Herzegovina	Kosovo (€ in 2002)	Serbia
Canada	Mexico	Switzerland
Chile	Moldova	Turkey
Iceland	Montenegro (€ in 2002)	Ukraine
Israel	New Zealand	United States

B: OECD and wiiw FDI data merge

Data on bilateral FDI stock from the origin country to the target country are provided by the OECD FDI database. The OECD FDI database is collected using two different benchmark definitions (BMD). For the period 1985 to 2012, the third BMD is applied, covering 34 reporting countries, while for the period 2013 to 2017, the fourth BMD is used, covering 36 reporting countries including Latvia and Lithuania.[14]

Since the study focuses on comparing EU15 member states with CEE member states, it is necessary to include all 13 CEE countries. Therefore, wiiw bilateral FDI data are included in the sample. This increases the country coverage to 50 countries with 34 OECD reporters (AUS, AUT, BEL, CAN, CHE, CHL, CZE, DEU, DNK, ESP, EST, FIN, FRA, GBR, GRC, HUN, IRL, ISL, ISR, ITA, JPN, KOR, LUX, MEX, NLD, NOR, NZL, POL, PRT, SVK, SVN, SWE, TUR, USA) and 16 wiiw reporters (ALB, BGR, BIH, BLR, HRV, KAZ, LTU, LVA, MDA, MKD, MNE, ROU, RUS, SRB, UKR, XKS).

In contrast to the OECD FDI database, the wiiw FDI data is expressed in euros. Therefore, FDI stocks are multiplied by the corresponding end-of-period exchange rate from Eurostat to convert the wiiw FDI data to US Dollars. Data from both sources are available for nine countries (CZE, EST, HUN, LTU, LVA, POL, SVK, SVN, TUR), allowing me to check whether there are systematic differences between OECD and wiiw FDI data.

Merging and cleaning of the data involves several steps. The first step is to set the negative FDI values to zero, which account for 6,6% of the OECD data and 4,8% of the wiiw data. In a second step, the relative difference is calculated for the observations for which OECD and wiiw FDI data are available and checked whether there are large differences. The relative difference between the OECD and wiiw data is relatively small with one exception, the FDI stock from the United States in Slovakia in 2000. This exception is 85% lower than the wiiw reported value. Further, this value is inconsistent with the underlying time series of US-Sloviakian FDI stocks. To obtain a consistent and reliable series, the OECD FDI stock value was replaced with the corresponding wiiw data.

[14] Country-time fixed effects in the empirical specification control for country-time specific variation, and thus capture any potential influence of the different definition used. Moreover, according to Welfens and Baier (2018) merging the two BMD is not a major problem because the main difference between the two benchmark definitions has not yet been properly implemented by most countries.

In a third step, missing OECD FDI data get replaced with nonmissing wiiw FDI data, filling gaps in the OECD data with the wiiw data for 96 observations. It is checked whether there was a large difference between the replaced OECD values and the surrounding OECD values of the previous and subsequent years. If the new value was either the only one for the entire country pair or surrounded by several missing values before and after, it got deleted. This was the case for 11 observations (ROU-ALB 2017, SRB-BGR 2006, CAN-BIH 2017, NZL-LVA 1996, BIH-MDA 2009, KAZ-MDA 2009, LVA-MKD 2012, ALB-ROU 2017, KAZ-ROU 2005, KAZ-ROU 2016, SVK-ROU 2013). In a fourth step, missing OECD FDI data is replaced with zeros from the wiiw FDI data (261 zeros). In a fifth step, a check whether there are FDI stocks for a country pair in a specific year but missing FDI values in subsequent years follows. This is the case for Denmark in 1991 and 1994 and for Spain in 2000. These values are dropped because they act as outliers in the change in FDI data. For Luxembourg, inward FDI stocks in 2003 are only available for the origin countries Switzerland, United States, and Japan. Since it is not reasonable that there were no investments from other countries in that year, the inward FDI stocks for Luxembourg in 2003 are dropped. In the sixth step, the missing inward FDI statistics get replaced by the corresponding mirrored outward FDI data. This enlarges the sample by 5524 mirrored outward FDI. In total, the sample consists of 50 origin and target countries, with $50 * 49 * 33 = 80850$ observations possible. 43179 inward FDI stock values are available, whereby 19% (8058 observations) of the inward FDI stock values are zeros. The zeros stay in the dataset to distinguish between real zeros and missing values (as in Welfens and Baier (2018); Kox and Rojas-Romagosa (2020)). 75% of the data stem from the OECD database and 25% from the wiiw FDI database.

C: Descriptive statistics of FDI stocks

Year	# Non-missing obs	% Non-missing obs	# Zero obs	% Zero obs
1985	351	14%	120	34%
1986	400	16%	117	29%
1987	439	18%	129	29%
1988	475	19%	142	30%
1989	508	21%	149	29%
1990	561	23%	172	31%
1991	605	25%	165	27%
1992	601	25%	92	15%
1993	684	28%	103	15%
1994	776	32%	104	13%
1995	797	33%	101	13%
1996	868	35%	110	13%
1997	998	41%	119	12%
1998	1100	45%	176	16%
1999	1190	49%	186	16%
2000	1348	55%	249	18%
2001	1374	56%	241	18%
2002	1453	59%	284	20%
2003	1565	64%	288	18%
2004	1628	66%	319	20%
2005	1662	68%	334	20%
2006	1741	71%	359	21%
2007	1825	74%	355	19%
2008	1905	78%	399	21%
2009	1988	81%	396	20%
2010	2020	82%	400	20%
2011	2045	83%	409	20%
2012	2020	82%	354	18%
2013	2041	83%	356	17%
2014	2026	83%	331	16%
2015	2064	84%	357	17%
2016	2066	84%	353	17%
2017	2051	84%	289	14%
Total	43175	53%	8058	19%