ISSN 2529-332X

A Fresh Assessment of the Depth of the "Euro Effect" on US FDI

SINGLE MARKET ECONOMICS PAPERS

Working Paper 18

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This paper has been presented at the

Research Conference on the Single Market

organised by

European Commission, Directorate General for Internal Market, Industry, Entrepreneurship and SMEs

Brussels, 7 February 2024

The opinions expressed in this paper are the authors' alone and cannot be attributed to the European Commission.

EUROPEAN COMMISSION

Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs
Directorate A – Strategy & Economic Analysis
Unit A1 – Chief Economist Unit

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European Commission
B-1049 Brussels

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EN PDF	ISBN 978-92-68-12846-6	ISSN 2529-332X	Doi: 10.2873/326776	ET-AF-24-002-EN-N

Manuscript completed in February 2024

1st edition

Luxembourg: Publications Office of the European Union, 2024

A fresh assessment of the depth of the *"euro effect"* on US FDI*

Mariam Camarero† Sergi Moliner‡ and Cecilio Tamarit§

Abstract

This paper analyzes how European monetary integration has affected US outward FDI (OFDI), which we call the "euro effect". To this aim, we consider the determinants of OFDI for a large group of 56 host countries in different continents from 1985-2019, zooming in on the European case, where we analyze different country groupings. To capture the "euro effect" we define a dummy variable that considers Europe's whole monetary integration process. Furthermore, we estimate a benchmark specification of a gravity equation derived from a previous Bayesian Modelling Averaging (BMA) analysis using two estimators, PPML and G-PPML, for robustness. We find that both horizontal and vertical FDI motives explain US FDI in all country groups. As for the euro effect, we find that at a worldwide level, the Single Market had a larger impact on US FDI than the euro. However, once we focus only on the Euro Area (EA), we show that the single currency has prominently promoted US FDI, with effects ranging between 15% and 64%. However, while the euro has favored intra-industry VFDI strategies in the EA core, it has mainly stimulated pure VFDI in the periphery. Our results are robust to different econometric specifications and estimators. Finally, although both PPML and G-PPML estimators perform similarly well, the latter provides room for efficiency gains.

Keywords: FDI determinants; US; European Union; BMA; PPML; G-PPML
JEL classification: F21, F23, C11

*We thank the help and support provided by Y. Yotov as well as the comments and suggestions of C. Alcidi and the attendants to the 23rd Conference on International Economics (UM, Malaga), the XXV Applied Economics Meeting (UCLM, Toledo), the 25th INFER Annual Meeting-XX INTECO Workshop (UV, Valencia), and the II Research Conference on the Single Market (European Commission, Brussels). The authors acknowledge the financial support from the AEI-Spanish Ministry of Economy and Competitiveness (Project PID2020-114646RB-C42 / AEI 10.13039 / 501100011033) and the Valencian regional government (Generalitat Valenciana-PROMETEO CIPROM/2022/50 project). Cecilio Tamarit and Mariam Camarero also acknowledge the funding from the European Commission, projects ERASMUS-JMO-2021-CHAIR 101047088 and ERASMUS-JMO-2022-Chair 101083430, respectively. The European Commission's support does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use that may be made of the information contained therein. All remaining errors are ours.

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1 Introduction and motivation

The European Union (EU) has followed a long and winding road, leading to increasing economic and financial integration among its partners. Its origins date back to the European Economic Community (EEC), created by the Treaty of Rome in 1957 to achieve a common market among its member states based on the free movement of goods, people, capital, and services. Several steps were taken in this regard, including creating a customs union in 1968 and the Single Market in 1993.

In order to achieve a common market, there was a need for intra-area exchange rate stability. Consequently, when the Bretton-Woods exchange rate system collapsed, it was initially replaced by the "snake in the dollar tunnel" in 1972 and, later, by the European Monetary System (EMS) in 1979[1]. Twenty years later, in 1999, the EMS was replaced by the euro[2]. Therefore, the Single Market and the need for increased monetary integration up to a single currency came hand in hand (Commission, 1990).

The adoption of the single currency has provided valuable economic benefits to the Euro Area (EA) members, such as the elimination of intra-area currency risks, the reduction of country-risk premia, improved economic stability and growth, and better integrated and more efficient financial markets. Moreover, all these conditions have created a favorable environment for the increase of foreign direct investment (FDI).

There is ample literature on the impact of monetary integration and the single currency on capital flows. Most empirical literature has identified a positive euro effect on FDI from countries inside and outside the EA[3]. In addition, Baldwin et al. (2008) and Neary (2009) suggest that the euro adoption should encourage intra-EA VFDI due to the pro-trade effects of both the Single Market and the euro, but should discourage intra-EA HFDI, as the common currency and the Single Market reduce trade costs. Finally, regarding FDI stemming from countries outside the monetary union, Baldwin et al. (2008), Neary (2009), and Sondermann and Vansteenkiste (2019) argue that the monetary union might make it more attractive to establish a production platform inside the EA.

In this paper, we analyze the magnitude and determinants of FDI with a particular focus on one extended definition of the so-called *euro effect*[4] from a third-country perspective, namely, the FDI coming from the US, historically the most prominent investor in the EU. We can observe in Figure 1 that US investment in EU countries has progressively grown during the last 35 years. Moreover, this path has accelerated since the beginning of the 20th century. In fact, in 1985, US outward FDI (OFDI) stock in the EU was about 100 billion US dollars; in 2019, around thirty-five times more,

[1] See Van Ypersèle and Koeune (1985)

[2] The countries that adopted the common currency in 1999 were Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal, and Spain.

[3] See Petroulas (2007), De Sousa and Lochard (2011), Brouwer et al. (2008), Carril-Caccia and Pavlova (2018) and Sondermann and Vansteenkiste (2019), among others.

[4] In what follows, we will consider the terms *euro effect* and *monetary integration effect* interchangeably.

close to 3,500 billion US dollars.

The US and the EU (and its predecessors) have had extensive trade and investment ties since World War II. According to Kim (2004), by the early 1960s, most US foreign investment in Europe was horizontal FDI (HFDI). However, since the 1980s, due to the progressive economic integration in Europe, which culminated with the euro's inception, other additional strategies have gained relevance, such as export platform FDI and vertical FDI (VFDI). Therefore, the persistent trade and investment links between both regions and the changing evolution of US FDI in Europe, largely motivated by the launching of the euro, make it especially relevant to ascertain whether the single currency has changed the patterns of US FDI when studying host country FDI determinants of EU members. On the one hand, EA countries may have gained importance as US FDI recipients within the EU. On the other hand, cultural and linguistic links with the United Kingdom, outside the EA, as well as new market opportunities and lower labor costs from new Eastern EU members could be a greater motivation for US foreign investment.

In addition, in our analysis, we not only focus on EU countries but also include a group composed of countries from different regions of the world to assess if the euro's inception has changed the patterns of US FDI at a worldwide level by making the EA a more attractive destination. In particular, our sample contains US OFDI stock in 56 host countries from 1985 to 2019, representing over 70%

In our case, how to measure the effect of the euro is a pivotal question to take into account. Previous literature has frequently used a dummy variable to capture the impact of the single currency[5]. Nonetheless, according to Sondermann and Vansteenkiste (2019), the launching of the euro was not a discrete event but rather an ongoing process that started several years before the introduction of the new currency and continued after that. Indeed, the path to monetary integration in Europe started with the creation of the EMS in 1979, twenty years before the euro's inception. In our work, we try to capture this whole monetary integration process using a variable that can take several values depending on the degree of monetary integration. As this monetary integration process developed parallel to the advances in the Single Market, we also include a dummy EU variable to disentangle both effects.

Furthermore, most researchers have applied the gravity equation approach to study the patterns of FDI, which has proved to be solid concerning the good fit to the data and the underlying theoretical foundations. Traditionally, these FDI gravity models have been estimated by means of the Ordinary Least Squares (OLS) estimator. However, according to Silva and Tenreyro (2006), using the log-linear form could lead to misleading results in the presence of heteroskedasticity and zeros in the

[5]See Petroulas (2007), Schiavo (2007), Flam and Nordstrom (2008), Brouwer et al. (2008), Coeurdacier et al. (2009), De Sousa and Lochard (2011), Barrell et al. (2017), Barrell and Nahhas (2018) and Carril-Caccia and Pavlova (2018), among others.

dependent variable. In order to solve this bias, they suggest using the multiplicative form of the gravity equation, known as the Pseudo Poisson Maximum Likelihood (PPML) estimator. Due to its success in empirical applications, this method has progressively replaced the OLS estimator in gravity models (Fally, 2015). Nevertheless, despite having established itself as the leading technique for gravity regressions, some researchers remain skeptical about its validity. Head and Mayer (2014) states that the relationship between the variance of bilateral exports and its expected value may not be consistent with the assumptions of the PPML estimator. Particularly, the PPML method assumes that the conditional variance of the dependent variable is proportional to its conditional mean. Therefore, Kwon et al. (2022) propose a *Generalized* PPML (G-PPML) estimator, which relies on actual data to estimate the conditional variance of the dependent variable. These authors apply an iterated General Method of Moments (iGMM) estimator to obtain the conditional variance, and subsequently, they weight the PPML moment conditions with the estimated parameter. As shown by Hansen and Lee (2021), the iGMM method is robust to the possible moment misspecification, and the estimator provides stable estimates regardless of the initial guess on parameters. Kwon et al. (2022) claim that the G-PPML inherits all the desirable properties of the conventional PPML estimator. In addition, it allows for more efficient hypothesis testing and it is robust to error term misspecification. They estimate the gravity equation on a standard set of covariates using trade data for 105 sectors and demonstrate that the G-PPML can be more efficient than the conventional PPML when the conditional variance parameter deviates from one[6]. In this paper, we estimate our regressions with both methods and compare the results obtained.

Another common problem in the empirical FDI literature is that previous works have generally focused on a specific regression model and an *ad hoc* gravity setting in studying FDI patterns. This practice could also lead to biased results when the researcher does not know the true model and omits or includes variables arbitrarily depending on the particular theoretical framework they chose to analyze. Bayesian Modelling Averaging (BMA) techniques have emerged as a potential tool to solve this issue. Some examples are the works of Eicher et al. (2012), Blonigen and Piger (2014), Antonakakis and Tondl (2015), and Jordan and Lenkoski (2018), among others. This approach involves attaching probabilities to any possible model specification over the model space. These studies find that many of the FDI determinants considered by the previous literature are not robust. In our work, we start from the variables found robust in Camarero et al. (2021) to study the *euro effect* on US FDI.

Therefore, against this backdrop, our contribution to the empirical literature is threefold. First, to measure the effect of the common currency, instead of using a single dummy variable, we use a covariate that accounts for the steps followed in European monetary integration up to the common

[6]To test the efficiency gain associated with the G-PPML estimator, the authors compare the standard errors and z-statistics of the G-PPML and PPML methods. They find that the G-PPML standard errors are on average over 20% lower than those obtained with PPML across gravity variables and sectors

currency's inception. Second, we apply the PPML estimator of Silva and Tenreyro (2006) and compare it to the G-PMML proposed by Kwon et al. (2022). In addition, we compare the EA countries with other hosts and distinguish between EA core and peripheral countries. Finally, instead of just focusing on a specific regression model and a predetermined set of variables, we start from the variables found robust in Camarero et al. (2021). Our main findings suggest both HFDI and VFDI coexist in all country groups. As for the *euro effect*, we find that compared to FDI decisions at the worldwide level, the Single Market strategy had a larger impact on US FDI than the adoption of the common currency. However, once we focus on the EU groups, we find that the euro has encouraged US FDI in those countries that finally adopted the single currency. This effect ranges between 15% and 64%. Moreover, the common currency has mainly favored intra-industry VFDI in the core, whereas, for the periphery, the adoption of the euro has strengthened pure VFDI. Our results align with those in Camarero et al. (2023), even if they use a different econometric approach based on the Dynamic Common Correlated Effects Pooled Mean Group (DCCEPMG) estimator. Moreover, our results are also robust to different specifications. Finally, both PPML and G-PPML estimators perform similarly well. However, in some cases, the G-PPML is more efficient.

The remainder of the paper is organized as follows: in Section 2 we briefly review the empirical literature of FDI determinants; Section 3 describes the PPML and G-PPML methodology and the data; Section 4 presents the results of our paper and their robustness, and finally, Section 5 concludes.

2 The underlying literature

2.1 Types and decisions of foreign direct investment

The diversity of multinational companies (MNCs) and reasons for investing abroad makes the analysis of FDI determinants a complex task. The literature has traditionally focused on two forms of FDI: horizontal (HFDI), motivated by market access, and vertical or VFDI, driven mainly by comparative advantage.

According to Markusen (1984) and Markusen and Venables (1998, 2000), a firm invests abroad by replicating a part of its activities or production processes in another country to avoid transportation costs, tariffs, and other types of trade costs. This "market access motive" strategy gives rise to HFDI. In HFDI models, exports and FDI are substitutes, and the decision to serve a market via exports or set up an affiliate company abroad constitutes a proximity-concentration trade-off. Therefore, FDI increases when transportation and trade costs are substantially high.

On the other hand, firms engage in vertical or VFDI when they fragment their production processes across countries. The main reason for such disaggregation is the cost considerations in production factors. In this way, firms are encouraged to fragment production and locate a stage in a country where the factor used intensively in that stage is abundant. This strategy is known as the "compara-

tive advantage motive" and was introduced by Helpman (1984) and Helpman and Krugman (1985). Under this scenario, the output of a production stage may necessitate either to be exported to the parent company for the completion of subsequent production stages or to be sold. Consequently, the impact of trade and transportation costs on VFDI is expected to be negative.

Other foreign investment strategies, alternatives to HFDI and VFDI, can be also found in the literature. This is the case of the knowledge capital (KK) model (Markusen et al., 1996; Carr et al., 2001; Markusen and Maskus, 2002), complex integration strategies (Yeaple, 2003), and export-platform FDI (Ekholm et al., 2007; Bergstrand and Egger, 2007). Under the KK model, similarities in market size, factor endowments and transport costs favor HFDI, while differences in relative factor endowments encourage VFDI. In addition, export-platform FDI and complex integration strategies include the role played by the neighboring markets of the host country when analyzing FDI strategies.

Finally, the OLI paradigm, as proposed by Dunning (1980), posits that the FDI choices made by Multinational Corporations (MNCs) result from the intricate interplay of three essential sets of variables: Ownership, Location, and Internalization advantages. Dunning's eclectic paradigm takes into account the economic and political dynamics of both the investing and host countries, as well as industry-specific characteristics and the attributes of individual investing firms (Dunning, 2000). Consequently, this theoretical framework delineates four distinct types of FDI: Market-seeking FDI (HFDI), Resource-seeking FDI (VFDI), Efficiency-seeking FDI, and Strategic Asset-seeking FDI.

2.2 The gravity equation

The estimation of gravity equations, commonly applied in trade, has also been successfully implemented in the FDI empirical literature. The origins of the gravitational model date back to Tinbergen (1962) and Pöyhönen (1963), who modeled bilateral trade flows as being proportional to the product of the economic size of the trading partners (as measured by their gross domestic products or GDPs) and inversely proportional to the geographic distance between the countries. Although early empirical applications of the gravity equation lacked deep theoretical foundations, essential steps were taken in filling this gap, as the contributions of Bergstrand (1989, 1990), Deardorff (1998). and Anderson and Wincoop (2003). They developed a method that consistently and efficiently estimated a theoretical gravity equation and calculated the comparative statics of trade frictions. More recently, other papers have significantly contributed to consolidating the academic foundations in the modelization of trade and investment. This is the case of Bergstrand and Egger (2007), Head and Ries (2008), Kleinert and Toubal (2010), Yotov et al. (2016), and Anderson et al. (2019, 2020).

In our research, in a similar vein as Kox and Rojas (2020), we adapt the trade and investment theoretical model of Anderson et al. (2019, 2020) to construct our FDI gravity model. The model is based on the KK model FDI, where this type of capital assumes proprietary knowledge that can be

used on a non-rival basis in several locations. Flows of knowledge capital between two countries are proxied by the stock of bilateral FDI between countries i and j. However, in our particular case, since we study the US foreign investment determinants and whether the euro has changed these patterns, we use unilateral US OFDI stock to the host country instead of bilateral FDI stocks. Consequently, unlike the models mentioned above, our model is not a structural one.

In this model, absolute and relative FDI frictions hinder the free flow of knowledge capital across national frictions. Absolute FDI frictions include legal and statutory barriers that a country imposes on access to foreign capital. These are total bans, restrictions on the activity of multinationals in specific sectors, or any other access-related policy measures. Relative FDI frictions refer to opportunity costs of operation in a host country j compared to the other potential alternative location choices. These include, among others, operational costs in the host country, such as distance, labor costs, legal system, communications infrastructure, trade and investment openness, macroeconomic instability, and being part of the EA.

Concerning the model specification, the value of FDI stock originated in the US and hosted in country j is represented by FDI_{ij}, where i is the US. It is positively affected by the size of the country of origin (Y_i), in our case, the US, because larger economies tend to invest more in knowledge capital. US OFDI stock is also positively affected by the size of the destination country (Y_j), as larger recipient countries have more consumers and firms that can absorb foreign technology. Therefore, Y_i and Y_j represent the economic mass of the origin and destination country. As mentioned, absolute and relative foreign investment frictions affect the free flow of FDI. The parameter ω_{ij} collects absolute FDI frictions. It goes from 0 to 1, being 0 that no knowledge capital from country i (the US) is admitted, and 1 that country j is fully open to the entry of knowledge capital from country i. In addition, for the origin country i, P_i is the average of inward relative friction costs in all destination countries. On the other hand, Π_j is the average of outward relative friction costs of all countries investing in destination country j. Both parameters represent the inward and outward multilateral resistance terms in our gravity model, respectively. Therefore, we have the following equation:

$$FDI_{ij} = \omega_{ij} \frac{\alpha Y_i}{P_i} \frac{\beta Y_j}{\Pi_j} \tag{1}$$

The parameters α and β represent the reaction of US OFDI stock to the economic masses of the origin country i and the host country j. The size of origin and destination countries are weighted by P_i and Π_j. Consequently, a higher relative FDI friction reduces US OFDI stock to the host country. On the other hand, more openness to foreign capital (ω_{ij}) increases the entry of US FDI to the destination country. This equation is the baseline specification of our theoretical gravity model on which we will build our estimations.

Originally, gravity models have been estimated by OLS. However, the use of the log-linear form could lead to misleading results in the estimation of the parameters of the model. Through the Jensen's inequality[7], Silva and Tenreyro (2006) demonstrate that applying the usual log-linear specification of the gravity equation could produce biased and inconsistent results in the presence of heteroskedasticity. Moreover, observations with zero value in trade and FDI gravity models create an additional problem for using the log-linear form. Several methods have been proposed to deal with this problem, such as dropping the observations whose dependent variable is zero or substituting them with one. However, these procedures also generally induce inconsistent estimators of the parameters of interest. To address the former problems, Silva and Tenreyro (2006) propose the PPML estimator, which is robust to different patterns of heteroskedasticity and, in addition, provides a natural way to deal with zeros in the dependent variable.

Consequently, in the last fifteen years, the estimation of trade and investment gravity models through the PPML estimator has replaced the log-linear estimator as the new standard practice. Some of the major contributions in this regard are the works of Yotov et al. (2016), Anderson et al. (2018), and Anderson et al. (2020), among others. Furthermore, related to our research topic, several papers have applied the PPML estimator to study the effect of the euro or economic integration in Europe on FDI.

First, Coeurdacier et al. (2009) focus on cross-border mergers and acquisitions activities (M&As), which is the main mode of investment from developed countries. Their sample contains 21 source and 31 host countries over the period 1985-2004. Using Poisson-QMLE estimators in a gravity framework, they show that the euro has increased intra-euro area cross-border horizontal M&As activity in manufacturing by 200%, whereas the effect on EA M&A from non-euro to EA countries has amounted to a 70% increase. Moreover, the impact of the euro on vertical mergers in manufacturing sectors from non-euro to euro area countries was about 140%. In addition, they also estimate that joining the EU has raised intra-EU cross-border vertical M&A activities by 300%, and horizontal M&A activities from non-EU to EU countries by 170%. Finally, they do not find a significant impact of the common currency or Single Market in the services sector.

Bruno et al. (2017) study the effect of EU membership on FDI inflows and trade using annual bilateral data from 34 OECD countries over the period 1985-2013. For this aim, they use the multiplicative form of the gravity equation. Their findings indicate that EU membership has increased FDI inflows, on average, by 28%. Furthermore, they also show that the effect of joining the EU on trade is twice the impact on FDI.

Carril-Caccia and Pavlova (2018) review the impact of the common currency and EU membership applying the PPML methodology on a bilateral FDI flows database that covers the period 1985-2012

[7]This implies that the expected value of the logarithm of a random variable is different from the logarithm of its expected value ($E(\ln y) \neq \ln E(y)$).

for 34 host countries and 70 source countries. Their results suggest that, on average, joining the EU has increased inward FDI flows from other EU countries by 43.9%, but did not have a significant impact on FDI from non-EU countries. Moreover, the launching of the euro has raised intra-euro area FDI by 73.7%. Therefore, the additional effect of the common currency could be a 20% increase.

Camarero et al. (2018) apply the PPML estimator to study the effect of the euro on trade flows in a sample of 28 countries within and outside the EA for the period 1990-2013. Moreover, they also analyze how the single currency has affected the relationship between these flows and FDI inward and outward stocks. They find that the common currency positively affects trade, between 27% and 40%, and favors a complementary relationship between trade and FDI.

Sondermann and Vansteenkiste (2019) use the multiplicative form of the gravity equation to analyze the euro's effect on the drivers of FDI inflows in the EU for the period 1985-2016. Their results suggest that the single currency has encouraged FDI inflows into the monetary union. However, the impact on FDI inflows differs significantly across countries. On the one hand, the euro has increased intra-euro area FDI by between 3% and 21% and facilitated intra-euro area VFDI flows but reduced incentives for horizontal or market-seeking FDI. On the other hand, launching the common currency has raised FDI from countries outside the Eurozone by between 2% and 15% and strengthened export platform FDI.

Additionally, Dorakh (2020a) analyses what factors explain FDI inflows across EU member states, with a special focus on the new members. She uses an augmented gravity model, estimated through the PPML estimator, to study FDI determinants in 39 countries for the period 1991-2017. Her findings reveal that EU membership has had a positive and significant effect on FDI, on average, by approximately 23%. Moreover, she shows that, after EU enlargement, more FDI came from EU members to the new EU member countries and less came from non-EU member countries. Similarly, Dorakh (2020b) reviews the FDI determinants of EU countries for the period 2002-2017, also with the multiplicative form of the gravity equation. Her findings reveal that efficiency-seeking and complex FDI strategies are more critical in the new EU member states, whereas market-seeking FDI prevails for the whole EU.

Bruno et al. (2021) analyzes the impact of EU membership on FDI inflows, how the effects of such deep integration differ from other treaties, and what drives these effects. They estimate a structural gravity framework on annual bilateral FDI data for a large group of countries from 1985 to 2018 using the PPML estimator. Their findings indicate that EU membership has led to about 60% higher FDI investments into the host economy from outside the EU and around 50% higher intra-EU FDI.

In the next section, we briefly summarize our empirical strategy based on the conventional PPML estimator and its generalized version. We also describe the data.

3 Econometric methodology and data

3.1 PPML and G-PPML estimators

In our paper, we estimate the gravity model (1) using the PPML and G-PPML estimators. The empirical model can be represented by the following equation:

$$FDI_{ijt} = \exp[\gamma_1 X_{ijt}].\epsilon_{ijt} \tag{2}$$

where FDI_{ijt} is the US OFDI stock from the US (country i) to the host country j. Moreover, X_{ijt} is a vector of gravity variables related to the elements mentioned previously in equation (1): the economic mass of the US and the host country j, and absolute and relative FDI barriers such as distance, common language, labor costs, trade, and investment openness, macroeconomic instability, taxes, institutional quality, national policies, communications infrastructure, and economic integration, among others. Lastly, $\epsilon_{j,it}$ is a white noise error with zero mean and constant variance.

Additionally, we also include individual host country (γ_j) and year (γ_t) fixed effects to control for country and time unobservable factors in our estimation. Consequently, we transform the previous equation into the following empirical specification:

$$FDI_{ijt} = \exp[\gamma_1 X_{ijt} + \gamma_j + \gamma_t].\epsilon_{ijt} \tag{3}$$

It is important to highlight that our econometric specification differs from Kox and Rojas (2020) in several respects. First, they analyze the effect of trade and investment agreements on bilateral FDI stock. Therefore, their work includes country-pair and time-varying origin and destination fixed effects. However, since we focus on unilateral US OFDI stock, we only include individual country and time dummy variables. Secondly, Kox and Rojas (2020) study the sole effect of bilateral policy variables on FDI. Consequently, they do not consider explicitly other time-varying gravity variables in their estimation. Instead, these covariates are collected in the origin-time and destination-time fixed effects. However, in our paper, as we are interested in the US FDI determinants and whether the euro has changed these patterns, we consider time-varying gravity variables related to the economic size of countries i and j and FDI frictions. Therefore, our time dummy variables only capture possible unobservable factors not accounted for by the gravity variables considered explicitly in our specification.

Given a general form of the conditional variance

$$Var(FDI_{ijt}|X_{ijt}, \gamma_j, \gamma_t) = Var(\epsilon_{ijt}, \gamma_j, \gamma_t) = h \cdot \mu_{ijt}^{\lambda} \tag{4}$$

it is important to note that the PPML estimator assumes that λ=1. However, the G-PPML estimator

relies on the actual data used in the estimation to estimate the true value of λ using the iGMM method. According to Hansen and Lee (2021), the iGMM method is robust to the possible moment misspecification and the estimator provides stable estimates regardless of the initial guess on parameters.

3.2 Data

This paper analyzes the potential determinants of US FDI stock for 1985-2019, focusing on the *euro effect*. In addition, we also study whether these determinants change when we consider all the host countries of our sample and different groups, namely the EU, EA, and core and peripheral EA countries. The countries included in each group are enumerated in Table A1 from Appendix A.

As for the gravity variables in our model, we differ from most previous studies. Researchers have generally focused on a predetermined set of variables depending on their adopted theoretical framework. However, this practice could lead to misleading results when estimating a regression model due to including insignificant variables or omitting relevant ones. Particularly, inference regarding the effects of the covariates included in a particular specification can depend critically on the rest of them or even on omitted variables (Blonigen and Piger, 2014). In our case, instead of just focusing on a particular regression model, we start from the variables found to be robust in Camarero et al. (2021). The authors of this paper study the effect of the euro on US FDI for the period 1985-2017, applying a BMA analysis. For this aim, they work with a wide set of 63 different determinants related to country characteristics and study which ones have the highest probability of being part of the true model. The variables found to be robust in the BMA analysis are shown by group of countries in Table 1. Moreover, those selected for our estimations are marked in red and detailed in Table A2. Since Camarero et al. (2021) and us use country fixed effects in the estimations, time-invariant variables are not included[8]. The covariates chosen slightly differ depending on the group of countries analyzed, as the results of the BMA analysis detected different robust determinants for each country group. However, as we will see in Section 4, most of our model specifications pass the Ramsey Regression Equation Specification Error Test or RESET test, developed by Ramsey (1969). This confirms that our models are well-specified.

In some exceptional cases, we add variables to those found to be robust in the BMA analysis. This is the case of *Euro*, *Euro*LogRealGDP* in the EA core, *UrbanPopulation* in the EA group, and *SkillLevel* and *Euro*SkillLevel* in the core and the periphery. However, they were robust in at least one of these groups. We include them for the sake of comparison.

Concerning the effect of the common currency, we follow Sondermann and Vansteenkiste (2019), and instead of just analyzing the launching of the euro as a discrete event, we aim to capture the

[8]For more information about fixed effects estimation in panel data, see Fernández-Val and Weidner (2016, 2018) and Weidner and Zylkin (2019).

whole process of monetary integration in Europe. The variable *Euro* that Camarero et al. (2021) use in their BMA analysis is inspired by the methodology that Baier and Bergstrand (2007) apply in their Economic Integration Agreement (EIA) database, where the variable adopts different values for a country[9] depending on the level of economic integration with its trade and investment partners. Particularly, Camarero et al. (2021) distinguish three levels in the process of monetary integration in Europe: a value of 1 is given if the host country is outside the exchange rate mechanism (ERM) of the EMS, but its currency is pegged *de facto* to either the DMark/the ECU/or the Euro; 2 if its currency is pegged *de iure* to the ECU or the euro via the ERM; 3 if its currency is the euro and 0 otherwise. In order to assess whether the common currency has changed the US FDI patterns, they interact this variable with other robust determinants related to the market size, labor endowments, trade openness, or institutional quality of the host country. As mentioned, selecting these interactions by a group of countries depends on which are robust according to the BMA analysis and whether the specification passes the RESET test.

The variables selected correspond to a wide range of different host country's characteristics. This is the case of **economic and monetary integration**, that contains the variable *Euro*; **market size and population**, including *the logarithm of the real GDP*, *Euro*LogRealGDP*, *the urban population*, *the real GDP difference between the US and the host country*, *the spatial lag* and *the old dependency ratio of the host country*; **labour market conditions**, represented by *the skill level of the destination country's workforce*, *Euro*SkillLevel*, *the population density*, *Euro*LogPopulationDensity*and *the total factor productivity of the host country*; **trade and international openness**, included in our specifications using *trade openness of the host market*, *the revenue from trade taxes*, and the *KOF globalization index de facto*; **investment openness**, that includes the *the Chinn-Ito index of the host country*; **institutional quality**, measured through *the democratic accountability index of the destination country*; and other determinants related with the **government size**, **banking and credit regulations**, **monetary conditions**, **communications infrastructure**, and **exchange rate**, as is the case of *top marginal taxes*, *the ownership bank index*, *the inflation of the host country measured by the CPI*, *cellular and internet subscriptions*, as well as *the nominal exchange rate of the host country*. In addition, as mentioned in section 1, we also include a dummy variable *EU* which takes value 1 if the host country is in the EU, and 0 otherwise, for the whole group and EU countries, in order to study if EU membership has also played a relevant role in the motivations of US FDI[10]. We include this variable in *the economic and monetary integration* group.

We include host country and year fixed effects in each specification to control for unobservable factors.

[9]These values are 0 when there is no existing Economic Integration Agreement, 1 for a One-way Preferential Trade Agreement, 2 for a Two-way Preferential Trade Agreement, 3 for a Free Trade Agreement, 4 for a Custom Union, 5 for a Common Market, and 6 for an Economic Union.

[10]We do not include this dummy variable in the EA, core and peripheral countries. Most of the countries in these groups were already in the EU in 1985, the year where our analysis starts. Therefore, this dummy variable is highly collinear with the country fixed effects included in our specifications and even with our *Euro* variable. Particularly, the correlation between both variables is a 72.5% in the EA group, 79.5% in the EA core, and 69.6% in the EA periphery

In the following Section, we describe the empirical results of our paper based on this selection of robust determinants.

4 Empirical results

In our empirical strategy, we estimate two specifications for each group of countries. The first specification, which we call "Benchmark model specification" and present in Table 2, does not include interactions between the variable *Euro* and other FDI determinants found to be robust in the BMA analysis. The aim of this model is to analyze the sole effect of the common currency on US FDI. The second specification, shown in Table 3, contains the interactions, and we denote it as "Augmented model specification". By including the interactions, we account not only for the *euro effect* on the US outward FDI but also whether the creation of the common currency has changed the pattern and sign of the other determinants in the model. Both tables are organized as follows: The first part of the table, the largest one, shows the coefficients of the variables[11] included in each specification, as well as the country pair clustered standard errors.[12] For each country group there are two columns: the first one includes the results obtained using the PPML estimator and, the second, the G-PPML estimator. The second part contains relevant information for each model regression, such as the inclusion of host country and year fixed effects, the number of observations,[13] and the value of λ. As the G-PPML method estimates the true value of λ, it could differ from one. The third part of the table includes the estimated effect of the EU and the common currency. In the "Augmented model specification", the effect of the common currency is obtained demeaning the interaction variables from the coefficient of *Euro*. Finally, the last part of the table shows the quality of estimators and the goodness-of-fit of each specification in order to compare the performance and bias of the PPML and G-PPML estimators.

4.1 Benchmark model specification

Table 2 presents the results for the specification with no interactions. We describe them and compare the PPML and G-PPML estimators. To ease the interpretation of the results, we have divided the variables into groups that have in common the nature of the effect captured by them.[14]

The first group of variables we analyze is **economic and monetary integration**. The only variable chosen in the BMA selection process is *Euro*. Still, to isolate the effect of the Single Market from the euro effect, we have also included a dummy called *EU* in the models for the larger groups

[11] In our study, the gravity model is exponential and the dependent variable is in levels. Therefore, the interpretation of the coefficients of those variables in logs is as elasticities, (β*100)%. For the variables that are in levels or a dummy variable, the interpretation is as semi-elasticities, ([exp(β)-1]*100)%

[12] Each country pair is formed by the US and the host country that receives the US FDI.

[13] The number of observations is the number N of countries included in each group (see Table A1) times the number T of years (35). As highlighted in Section 2, our dependent variable is unidirectional US OFDI stock.

[14] The particular covariates used in the specifications for each one of the country groups are the result of the BMA analysis.

of countries, that is, the whole and EU groups[15]. Our results suggest that for the whole group, composed of 56 countries from different regions of the world, the *EU dummy* has a positive effect and is significant at 10% for both the PPML and G-PPML estimators. In contrast, our monetary integration covariate is not significant. Therefore, when we consider US FDI worldwide, what attracted US FDI is that the host country is an EU member in the process of creating a Common Market, as our sample starts in 1985. Particularly, according to the PPML estimator, EU membership has increased US FDI by $\exp(0.522)$-1=68.50%, and when we consider the G-PPML method, by $\exp(0.531)$-1=70.10% . This result, which can be found in the lower third of Table 2, is similar to that obtained by Bruno et al. (2021), who estimated that joining the EU has increased FDI from members outside the Single Market by 60%. This effect is not found, as expected, when the only countries in the group are EU members. The euro effect is also non-significant. A possible explanation could be that the creation of the Single Market has stimulated US FDI to those countries that joined the EU in comparison with other investment destinations of the world. However, once we focus only on the EU, this advantage is not so relevant.

As for the EA group, we do find a positive impact of the euro once we isolate the Eurozone from those EU countries that did not adopt the euro. The PPML and G-PPML estimators display a positive and significant effect of our monetary integration variable by 42% (see the bottom part of the table). However, this impact differs in the core and the periphery. In the case of the core, the *euro effect* has been a 15% increase. For the periphery, there are disparities between the PPML and G-PPML estimators. According to the PPML, the launching of the euro is significant at 10% level and would increase US FDI by 23%. As for the G-PPML, this variable is significant at 1% level with a 34% increase. This result implies that, in this particular case, the G-PPML is more efficient than the conventional PPML. The reason is that the G-PPML estimates a λ of 1.491, quite different from one. Therefore, the estimated coefficients and their associated standard errors could differ between both estimators and, as a consequence, the significance of the variables could also be affected in favor of the G-PPML method. In short, the results suggest that the common currency has had a positive impact on US FDI once we focus on the Eurozone. Its magnitude across EA groups, in the range 15%-42%, is consistent with the findings of Petroulas (2007), Coeurdacier et al. (2009) and Sondermann and Vansteenkiste (2019), who estimated a euro effect for FDI coming from outside the EA between 2% and 70%.

A second group of variables is related to **market size and population**. The *real GDP of the host country* is significant at 1% for most of the estimations and has a positive sign for all country groups and the expected magnitude: a 1% increase would rise US OFDI stock between 0.78%-2.9%, depending on the group, with a larger size of the parameter for all the European countries groups. This effect is consistent with HFDI strategies, where market size is an important motivation for FDI. Carr et al. (2001), Markusen and Maskus (2002) and Bergstrand and Egger (2007), among others,

[15]Note that its value is 1 when the host country is an EU member.

obtained similar results. Concerning *UrbanPopulation of the host country*, its coefficient is positive (0.05) and significant for the EA group with the PPML and G-PPML estimators. However, there are important differences when we analyze the core and the periphery. The former has a positive effect (the parameter is 0.05); for the latter, the variable is not significant. Since the level of urban population could be proxying market development, this result implies that HFDI strategies have been more relevant in the core. Finally, the *spatial lag of the host country* is only significant and negative for the core countries(-0.46), which is consistent with pure VFDI cost considerations in the neighboring markets (Blonigen et al., 2007). The probable reason is that the neighbors of our EU group are Eastern European countries and the EA periphery, where VFDI is a predominant strategy for foreign investment.

Concerning **labor market** covariates, *the skill level of the destination country* is not significant for none of the groups using the PPML estimator. The variable is only significant (at 5%) and negative for the EA periphery with the G-PPML estimator. Since the EA periphery is the group where the estimated λ most diverges from one, there is space for efficiency gains. In addition, since *SkillLevel* is proxying labor costs, its negative sign would be consistent with VFDI. Concerning *the population density of the host country*, this variable has a positive effect for the EA periphery, the only group for which it is significant. This is the expected sign, as more population density may attract a concentration of firms looking for abundant and cheaper labor, which can be attributed to vertical strategies. Therefore, the results concerning labor variables suggest that VFDI has been a more important motivation in the peripheral countries of the Eurozone.

Regarding **trade and international openness**, the coefficient of *trade openness of the host country* is positive and significant at 1% for the whole group and the EA core. A one-point increase raises US OFDI stock by between 0.8% (PPML) and 0.9% (G-PPML) for the whole group, and 1.8% in the EA core. This implies complementarity between FDI and trade and probably points towards trade in intermediate goods across subsidiary firms. The same effect was found previously by Brainard (1997), Camarero and Tamarit (2004) and Camarero et al. (2018), among others. The parameter of the variable *globalization index of the host country* is negative for the whole group (first column). In this case, a one-point increase reduces US OFDI stock by between 2.07% and 2.27%. Therefore, trade and FDI would be substitutes, as many of the main hosts of US FDI, such as China, India, and Brazil, are still relatively closed countries compared with other destinations. Due to its relevance in both theoretical and empirical gravity models, we have included in our specification the variable multilateral resistance (despite not being a robust covariate according to the Bayesian selection in Camarero et al. (2021)) defined as in Blonigen and Piger (2014).[16] In addition, we have tested the impact of the depth of Free Trade Agreements (FTAs) between the US and the host country on US

[16]They calculate multilateral resistance using the remoteness of the host country and it is defined as the distance of the host country from all other countries in the world weighted by those other countries' share of world GDP.

FDI for the whole group.[17]. Neither of these two variables nor their interaction were found to be significant.

As for the variables related to **government size**, *top marginal income taxes of the destination country* is a robust determinant for the EA group. In particular, a one-point increase reduces US OFDI stock in the range 2.5%-2.7%. Therefore, American investment is located in countries with lower income taxes. Di Giovanni (2005) and Chiappini (2014), found similar results, as high taxes deter FDI.

Next, we discuss the results for the variables related to **banking and credit regulations**. *OwnershipBanks* is only relevant in the larger group and the PPML estimator and has a negative effect on the US OFDI stock. A priori, this sign may be unexpected, but it could be due to the large degree of heterogeneity in this group in terms of size and income. The coefficient probably points to the relative importance of emerging countries for US FDI, where banking and telecommunications development is meager compared to other fully developed regions.

Finally, the *nominal exchange rate* is only significant for the EA countries, with a relatively small size and negative sign (-0.79% and -0.89%). According to Froot and Stein (1991), a depreciation in the real exchange rate of the recipient country increases FDI through the reduced cost of capital. An increase of *NominalExchange* implies an appreciation of the US dollar (a depreciation of the host country currency). Therefore, the negative sign obtained could be explained by US MNCs investing abroad to serve local markets (market-seeking FDI or HFDI) in the EA countries.

The overall results show that, in the larger group, EU membership of the host country is more relevant than European monetary integration to attract US FDI. The magnitude of this effect is very large, around 70%. When we concentrate on EU countries, neither the euro nor the EU is significant. However, for EA groups, we find that there is a positive *euro effect* on US investment, by between 15%-42%. In addition, the sign and significance of other determinants (such as market size, labor market, and trade and international openness), both HFDI and VFDI strategies coexist in all country groups. Nevertheless, we find that HFDI has been a more important motivation in the EA core, whereas VFDI predominates in the periphery. As observed in the second part of Table 2, most of our specifications pass the RESET test.[18]

From the comparisons of the PPML and G-PPML estimators, they report very similar values of the coefficients and the significance of the variables. This is because the estimated value of λ ranges close to one in most of the cases, between 0.90 and 1.178. This result is consistent with

[17]We have obtained this variable from the DESTA database of Dür et al. (2014). Since there is not a FTA between the US and the host country for EU countries, we only included this variable in the whole group specification. Similarly, we have also checked a refined version of multilateral resistance by interacting it with the depth of FTAs between the US and the host country. Since EU and EA countries are close countries among them, we only estimated the model augmented with this variable for the whole group.

[18]The null hypothesis, which is that the model is well specified, is only rejected for the EU and EA periphery groups with the PPML estimator at 10%, and the EA group with the G-PPML estimator at 10%.

the assumptions of Silva and Tenreyro (2006), suggesting that, in many cases, the PPML estimator should perform quite well. One exception is the EA periphery, where the estimated value of λ is 1.491. In this case, as demonstrated previously, the G-PPML is more efficient than the PPML.

Finally, in the last part of Table 2, we also analyse the quality and the goodness-of-fit of each specification. For the quality of estimators, we estimate the log-pseudolikelihood value, as well as the Akaike (AIC) and Bayesian (BIC) information criteria. A larger value of the log-pseudolikelihood parameter implies that the model fits better, whereas the opposite is true for the AIC and BIC. We find similar values for each of the three indicators when we compare PPML and G-PPML methods. Therefore, both estimators perform similarly well. In order to study the goodness-of-fit, we calculate the mean absolute error (MAE), as well as the mean absolute percentage error (MAPE) of each method. The MAE takes into account the difference between the actual value and the predicted value of the dependent variable in absolute terms, whereas the MAPE expresses this difference as a percentage of the actual value of the dependent variable. The results are similar independently of the error measure adopted. Some exceptions are the EU countries and EA periphery. For EU countries, the G-PPML estimator presents a MAE 12% larger than the PPML. In contrast, the PPML shows a MAPE 92% larger than the G-PPML. Therefore, in this case, the lower bias of the G-PPML more than compensates for the result displayed by the MAE. As for the EA periphery, the G-PPML has a MAE 30% larger than the conventional PPML. Nevertheless, when we focus on the MAPE, the PPML has a value 22% larger than the G-PPML and almost compensates for the result presented by the absolute measure of the error term.

Therefore, both PPML and G-PPML show little differences in the estimation of the coefficients, perform similarly well, and display similar bias. However, the G-PPML has the advantage that could be more efficient when the true value of λ differs from one.

4.2 Augmented model specification

To study whether the common currency has changed the US FDI patterns, we augment our benchmark model specifications with interactions between the variable *Euro* and other robust FDI determinants. The sign and magnitude of the coefficients of the variables not included in the interactions are very similar to those of the benchmark model. Therefore, in this Section, we only focus on the analysis of the interactions and on our variables of interest, that is, the *EU dummy* and our variable *Euro*[19]. The results are shown in Table 3. Also in this case we compare the results obtained using the PPML and the G-PPML estimators.

As for **economic and monetary integration**, we find that both *EU* and *Euro* are positive and significant for the larger group. Particularly, EU membership of the destination country increases US

[19]In this case, the impact of our variable *Euro* on US FDI is the result of demeaning from its coefficient the variables included in the interactions. The effect on our dependent variable is present in the third part of Table 3.

FDI by $\exp(0.462)-$-1=58.70% for both PPML and G-PPML estimators. This effect is very close to the one from the benchmark model (between 68.5% - 70%). As for the common currency, once we demean the interaction variables from the coefficient of the covariate *Euro*, we obtain that the impact of monetary integration on US OFDI stock is 8.20%. This result is different from the previous section, where the effect of the common currency was not significant. Therefore, EU membership is still a more relevant factor than the launching of the euro when we consider US FDI to the larger group. When we study EU countries, as expected, the EU dummy is not significant. Concerning *euro effect*, it is negative and significant when we remove the effect of the interactions from *Euro*. The impact on US FDI, which is also presented at the bottom of the table, is between -0.40% and -2.80%.

Regarding EA countries our results suggest the process of monetary integration has increased US FDI between 37.20% (PPML) and 41.30% (G-PPML). Also, in this case, the impact is different in the core and the periphery. For the core, the euro has raised US OFDI stock by 63.70% (PPML) and 57.10% (G-PPML). For the peripheral countries, the impact is around 20% (17.10% or 21.40%, depending on the estimator). Therefore, with the exception of the EA core[20], the magnitude of the effects obtained is in line with the findings of our benchmark specification. Therefore, our augmented model specification implies that the euro has increased US FDI by between 0% - 64%. Again, as in the benchmark model case, this result is consistent with the previous literature.[21].

As for **market size and population**, the *real GDP of the host country* parameter is positive and significant for all country groups and estimations. Particularly, a 1% rise would increase US FDI by between 1.10%-2.65%, sign compatible with HFDI. The interaction between this variable and the *Euro* is negative and significant for most country groups, except for the EA core (non-significant), and reduces the positive effect of the original variable. Therefore, for those countries participating in the European monetary integration process, the magnitude of the coefficient of real GDP is lower than for those outside it. A possible explanation could be that due to the pro-trade effects of the single currency and the consequent increasing participation in GVCs, the market size becomes less relevant, moving in favor of vertical strategies. This finding is in line with the results obtained by Sondermann and Vansteenkiste (2019). Another interesting result is the impact of *UrbanPopulation* for the EA periphery. According to the PPML estimator, this variable is not significant. However, the coefficient is negative and significant at 10% when we estimate the model using the G-PPML method. Particularly, a one-point increase reduces US FDI by $\exp(-0.051)$-1=-4.97%. This result could suggest that market development is not so important in the periphery, consistent with VFDI. Also in the augmented model, the G-PPML estimates a value of λ quite far from one for the EA

[20] A possible explanation for the magnitude of the coefficient obtained in this group could be that except for Austria, all these countries were members of the ERM since its beginning and have been highly monetary integrated for the whole sample period.

[21] Petroulas (2007), Coeurdacier et al. (2009) and Sondermann and Vansteenkiste (2019) obtained a euro effect for extra-EA FDI between 2% and 70%. In addition, Flam and Nordstrom (2008) and De Sousa and Lochard (2011) found that the launching of the euro had no effect or even a negative one.

periphery (1.658). As in previous examples, the G-PPML estimator would be more efficient.

As for the **labor market** covariates, in contrast to the benchmark specification, the parameter of the *skill level of the host country* is significant for the core countries when we include in the specification its interaction with the euro. Its sign is negative, between -0.053 and -0.047. Since this variable could be a proxy for wages, FDI would be linked to less skilled labor and lower labor costs. Martí et al. (2017) and Chiappini (2014) find similar results. This same variable is not significant for the EA peripheral countries. Once we analyze the interaction of the *skill level of the host country* with the monetary integration variable, its sign turns positive (between 0.016 and 0.014) and reduces the negative effect of the original variable. According to Alfaro and Charlton (2009), many subsidiaries are generally located in high-skill countries and sectors that also produce high-skill inputs involving products at stages close to the parent firm's final stage of production, in an intra-industry VFDI strategy. Consequently, skilled workers can be attractive for VFDI beyond labor cost considerations. Furthermore, the parameter of *population density of the host country* and its interaction with *Euro* are positive and significant at 1% for the EA periphery. As mentioned in the previous section, since the population density of the host country is proxying abundant and cheaper labor, these effects would be consistent with pure VFDI. Therefore, our results suggest that with the common currency, intra-industry VFDI has gained relevance in the core, and pure VFDI in the periphery.

Regarding the analysis of the models, most of our specifications pass the RESET test. In addition, as for the comparison between the PPML and the G-PPML estimators, they provide similar coefficients and significance of the variables. Since the estimated value of λ is between 1.002 and 1.204 in most of the cases, this is not surprising. In contrast, the estimated value of λ is 1.658 in the periphery. In this case, the G-PPML is more efficient than the PPML. Concerning the quality of estimators and goodness-of-fit, as the reader can observe in the lower part of Table 3, both PPML and G-PPML estimators perform similarly well.

The overall results of the benchmark and augmented specifications suggest that EU membership is a more important determinant than the inception of the euro for US FDI when we consider all the countries in our sample. However, once we focus on EA groups, the euro has had an unmistakably positive effect on US investment decisions in the range 15%-64%. Furthermore, both HFDI and VFDI strategies coexist in all country groups. However, HFDI predominates in the EA core and VFDI in the periphery. In addition, the euro has favored US VFDI to the detriment of HFDI. However, the strategies encouraged by the common currency differ across country groups. For the EA core, the main motivation strengthened has been intra-industry VFDI, whereas, for the periphery, the euro has reinforced pure VFDI. [22]

[22]Our results are in line with those in Camarero et al. (2023), who use a different econometric approach, based on the DCCEPMG estimator. These authors find that US FDI has changed after some structural breaks related to the creation of the euro, the enlargement of the EU and North Atlantic Treaty Organization to the East of Europe, and the 2008 economic crisis. Particularly, these changes have mainly encouraged intra-industry VFDI and pure VFDI.

4.3 Robustness check

In this section, we check the robustness of our results. For this aim, we choose a different group of variables from those selected using BMA in Camarero et al. (2021). The selected variables are enumerated in Table B1 from Appendix B and marked in blue. [23] The new variables are included in a larger group and classified following the same criterion (by groups) as in the previous sections. Examples of the new alternatives are the inclusion of *the Human Capital Index of the destination country* instead of *SkillLevel* or *HCI* among the **labor market** variables. In addition, we also add other interactions between the euro and other variables related to **trade and international openness** and **institutional quality**.

As in the previous section, we have obtained the results for both the benchmark (Table B3) and the augmented specification (in Table B4). The overall results show that the main factor explaining US FDI when we consider the larger group is EU membership (Single Market). Particularly, in the two specifications the coefficient is large, between 78% and 100%. However, they are still consistent with previous literature. For instance, Flam and Nordstrom (2008) found that joining the EU has attracted FDI from outside the EU up to 87%. Similarly, Coeurdacier et al. (2009) estimated an impact of EU membership on FDI (M&A) from third countries that ranges between 138% and 163%.

As for the *euro effect*, our robustness check shows that the common currency has increased US FDI in the EA countries between 16%-70%. In addition, the euro has encouraged intra-industry VFDI in the EA core, and pure VFDI in the periphery. These findings are similar to those obtained in our main results. Furthermore, most of our specifications pass the RESET test and with some exceptions, both the PPML and G-PPML estimators provide similar results and perform similarly well. Therefore, our general results are robust to changes in the selected variables in our model specifications.

5 Conclusions

This paper studies the determinants of US OFDI stock for a large sample of hosting destinations for the period 1985-2019. The length of the sample allows us to focus on the EU countries and whether the process of European integration has played a significant role in the pattern of US FDI. The Single Market was launched in 1986, whereas monetary integration developed gradually for two decades until the inception of the euro in 1999, both within our analyzed period. For this aim, we use a sample of 56 host countries (that represent 70% of total US OFDI stock). In addition to the larger group, which includes countries from all regions of the world, we focus on EU and EA countries, and within this last group, we distinguish between the core and the periphery. In our research, we diverge from most of the previous literature on the impact of monetary integration in FDI and create

[23] These covariates are described in Table B2.

a variable that includes the whole process of monetary integration in Europe to proxy the effect of the common currency. Furthermore, in addition to the traditional PPML estimator suggested by Silva and Tenreyro (2006), we compare the results using the G-PPML estimator of Kwon et al. (2022). Moreover, instead of focusing on a predetermined set of variables and a specific regression model, we start from the variables found to be robust from the BMA analysis carried out by Camarero et al. (2021). Finally, we perform an additional robustness check considering alternative covariates from the BMA analysis among each group of variables.

Our results show that various host country characteristics, such as market size, labor market, trade, investment openness, institutional quality, government size, bank and credit regulations, and communications infrastructure explain the behavior of US OFDI stock. This diversity, in line with Camarero et al. (2021), is more evident when we analyze our largest and heterogeneous group. In addition, we find evidence of HFDI and VFDI in all country groups. However, HFDI strategies predominate in EA core countries, whereas VFDI prevails in the EA periphery.

As for the *euro effect*, our results suggest that EU membership (Single Market effect) has had a larger impact on US FDI than the launching of the euro when we consider the larger group of countries. However, within the EU, the monetary integration has generally increased US FDI in those countries that finally adopted the single currency. This effect ranges between 15% and 64%. This finding reinforces the conjecture that real and monetary integration are two sides of the same coin. Moreover, the interactions of our variable *Euro* with other determinants explain essential changes in the patterns of US FDI in Europe. Market size variables indicate that the common currency has increased VFDI. As for the labor market, the euro has favored intra-industry VFDI strategies in the EA core, whereas pure VFDI has predominated in the periphery. Our results are robust to different econometric specifications and similar to those obtained by Camarero et al. (2023), who use the DCCEPMG estimator to analyze the determinants of US FDI.

Furthermore, since the value of the estimated λ is close to one in most of our specifications, we obtain similar results with both the PPML and G-PPML estimators. However, when the estimated λ substantially differs from one, the G-PPML estimator is more efficient. Finally, both estimators perform similarly well.

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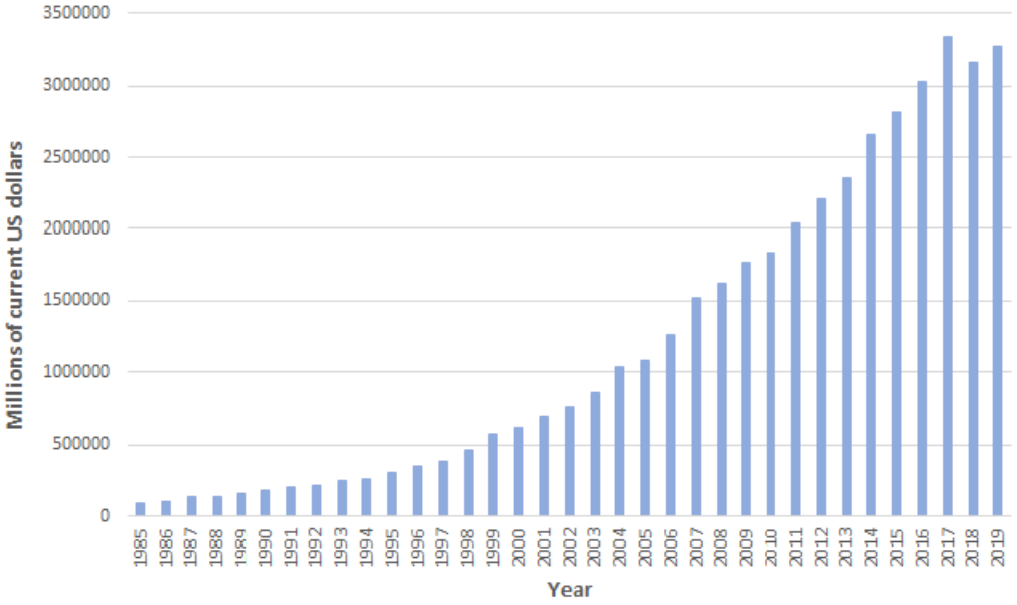
Figure 1: FDI outward stock from the United States in the EU



Source: Own elaboration. Data obtained from the Bureau of Economic Analysis (BEA).

Table 1: Variables selected as robust determinants of US FDI. Results of the BMA analysis in Camarero et al. (2021)

Variables	Whole group	EU countries	EA countries	EA core countries	EA peripheral countries
Economic and monetary integration					
EU	X[a]	X[a]			
Euro	X	X	X	X[b]	X
EconomicIntegration		X	X	X	X
Market size and population					
LogRealGDP	X	X	X	X	X
Euro*LogRealGDP	X	X	X	X[b]	X
UrbanPopulation	X		X[b]	X	X
Euro*UrbanPopulation	X				
LogSumRealGDP	X	X			
LogRealGDPdiff	X				
RealGDPgrowth	X				
LogRealMarketPotential	X				
LogSpatialLag	X	X		X	
LifeExpectancy					
OldDependencyRatio			X		
Labour market					
SkillLevel			X	X[b]	X[b]
Euro*SkillLevel			X	X[b]	X[b]
HCI		X	X		
Euro*HCI					
LogPopulationDensity	X	X	X		X
Euro*LogPopulationDensity	X	X	X		X
EducLevel					
SkillLeveldiff		X			
EducLeveldiff	X				
LogRealGDPdiff*SkillLeveldiff					
LogRealGDPdiff*EducLeveldiff	X				
LabourCompensation			X		
TFP	X	X			
Trade and international openness					
TradeOpenness	X			X	
Euro*TradeOpenness	X				
MeanTariffRate			X		X
Euro*MeanTariffRate			X		X
FTA					
DepthFTA					
RevenueTradeTaxes	X	X			
KOFSoGIdf	X				

Variables	Whole group	EU countries	EA countries	EA core countries	EA peripheral countries
Investment openness					
Chinn-ItoIndex	X				
BlackMarketFreedom		X	X		
BIT	X				
Institutional quality					
Corruption		X			
Euro*Corruption		X			
DemocraticAccountability					X
Euro*DemocraticAccountability					X
LawOrder	X				
BureaucracyQuality					
ProtectionPropertyRights	X				
IntegrityLegalSystem					
CivilLiberties					
PoliticalRights	X				
Government Size					
GovernmentConsumption			X		
GovernmentInvestment	X				
TopMarginal	X	X	X		
StateOwnershipAssets					
Banking and credit regulations					
OwnershipBanks	X				
PrivateSectorCredit					
InterestRateControls	X				
Monetary conditions					
InflationCPI		X			
MoneyGrowth		X			
ForeignCurrencyBankAccounts					
Communications infrastructure					
Telephone					
Cellular	X			X	
Internet	X	X			
Natural resources					
OilRents					
GasRents					
Exchange Rate					
NominalExchange			X	X	

NOTES: The selected variables are market in red. [a] The dummy variable *EU* was not considered in Camarero et al. (2021). However, we include them in our work in order to know how EU membership of the host country has affected US FDI. [b] The variables *Euro* and *Euro*LogRealGDP* in the EA core, *Urban Population* in the EA group, and *SkillLevel* and *Euro*SkillLevel* in the core and the periphery were not robust determinants in Camarero et al. (2021). However, they were in at least one of these groups. We include them to compare the US FDI determinants and the effect of the euro among the EA countries.

Table 2: Benchmark model specification

Variables	Whole group		EU countries		EA countries		EA core		EA periphery	
	PPML	G-PPML	PPML	G-PPML	PPML	G-PPML	PPML	G-PPML	PPML	G-PPML
EU	0.522*	0.531*	0.386	0.363						
	(0.277)	(0.276)	(0.358)	(0.298)						
Euro	0.040	0.028	-0.041	-0.036	0.353*	0.354*	0.139*	0.140**	0.207*	0.293***
	(0.126)	(0.117)	(0.094)	(0.080)	(0.190)	(0.208)	(0.073)	(0.068)	(0.111)	(0.090)
LogRealGDP	0.781**	0.821**	1.878*	2.037**	1.911***	1.829***	2.910***	2.900***	1.320***	1.258***
	(0.389)	(0.385)	(1.076)	(0.953)	(0.426)	(0.406)	(0.659)	(0.651)	(0.324)	(0.359)
UrbanPopulation					0.099***	0.103***	0.050***	0.050***	-0.044	-0.030
					(0.015)	(0.015)	(0.006)	(0.006)	(0.052)	(0.027)
LogRealGDPdiff	-0.935	-0.919								
	(0.610)	(0.623)								
LogSpatialLag	0.080	0.079	-0.303	-0.190			-0.469***	-0.465***		
	(0.071)	(0.061)	(0.202)	(0.158)			(0.093)	(0.088)		
OldDependencyRatio					0.019	0.015				
					(0.031)	(0.033)				
SkillLevel					-0.001	0.001	-0.007	-0.007	-0.003	-0.006**
					(0.010)	(0.010)	(0.005)	(0.005)	(0.005)	(0.003)
LogPopulationDensity	-0.080	-0.336	0.797	0.885	2.857	2.962			8.213***	7.267***
	(0.939)	(0.837)	(2.853)	(2.562)	(1.974)	(1.968)			(1.481)	(1.435)
TFP	0.006	0.005	-0.002	-0.003						
	(0.006)	(0.006)	(0.023)	(0.019)						
TradeOpenness	0.008***	0.009***					0.018***	0.018***		
	(0.002)	(0.002)					(0.002)	(0.002)		
RevenueTradeTaxes			0.053	0.041						
			(0.175)	(0.132)						
KOFSoGIdf	-0.023**	-0.021**								
	(0.012)	(0.011)								
Chinn-ItoIndex	-0.001	-0.001								
	(0.002)	(0.002)								
Demo Accountability									0.003	-0.002
									(0.004)	(0.004)

Variables	Whole group		EU countries		EA countries		EA core		EA periphery	
	PPML	G-PPML	PPML	G-PPML	PPML	G-PPML	PPML	G-PPML	PPML	G-PPML
TopMarginal	-0.005	-0.002	-0.010	-0.007	-0.025***	-0.027***				
	(0.006)	(0.006)	(0.010)	(0.009)	(0.009)	(0.008)				
OwnershipBanks	-0.004*	-0.003								
	(0.003)	(0.003)								
InflationCPI			0.002	-0.001						
			(0.003)	(0.003)						
Cellular	-0.003	-0.003					0.003	0.003		
	(0.002)	(0.002)					(0.003)	(0.003)		
Internet			-0.003	0.001						
			(0.008)	(0.008)						
NominalExchange					-0.009***	-0.008**				
					(0.003)	(0.003)				
Host country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1950	1950	620	620	420	420	175	175	245	245
RESET test p-value	0.439	0.347	0.053	0.294	0.235	0.088	0.886	0.879	0.063	0.385
λ	1	1.178	1	1.183	1	0.891	1	1.055	1	1.491
EU and euro effect										
EU	68.50%	70.10%	0.00%	0.00%	-	-	-	-	-	-
Euro	0.00%	0.00%	0.00%	0.00%	42.30%	42.50%	14.90%	15.00%	23.00%	34.00%
Quality of estimators										
Log pseudolikelihood	-4886.118	-4915.441	-2173.214	-2224.707	-1118.616	-1119.672	-511.949	-512.004	-492.796	-512.733
AIC	9800.236	9858.882	4368.427	4471.414	2255.231	2257.344	1039.897	1040.007	999.591	1039.465
BIC	9878.294	9936.940	4417.154	4520.141	2291.594	2293.706	1065.215	1065.326	1024.100	1063.974
Goodness-of-fit										
MAE	4.726	4.975	8.780	9.828	5.110	5.020	4.649	4.755	2.887	3.781
MAPE	0.877	0.834	14.125	7.336	0.541	0.550	0.113	0.113	0.468	0.384

NOTES: ***, ** and * denote significance at levels 1%, 5% and 10%, respectively. Clustered standard errors are in parenthesis.

Table 3: Augmented model specification

Variables	Whole group		EU countries		EA countries		EA core		EA periphery	
	PPML	G-PPML	PPML	G-PPML	PPML	G-PPML	PPML	G-PPML	PPML	G-PPML
EU	0.462*	0.462*	0.444	0.379						
	(0.257)	(0.257)	(0.382)	(0.306)						
Euro	4.460**	4.453**	4.333**	3.990**	3.414**	2.713*	-3.376*	-3.062*	2.508***	1.965***
	(1.864)	(1.864)	(2.009)	(1.936)	(1.745)	(1.491)	(1.869)	(1.718)	(0.925)	(0.698)
LogRealGDP	1.095***	1.094***	2.513***	2.646***	2.196***	2.248***	2.031***	2.070***	1.631***	1.644***
	(0.359)	(0.360)	(0.935)	(0.949)	(0.512)	(0.493)	(0.502)	(0.522)	(0.296)	(0.364)
Euro*LogRealGDP	-0.234***	-0.234***	-0.262***	-0.237***	-0.126**	-0.108**	0.095	0.088	-0.104***	-0.072***
	(0.084)	(0.084)	(0.083)	(0.088)	(0.062)	(0.054)	(0.068)	(0.066)	(0.035)	(0.022)
UrbanPopulation					0.094***	0.087***	0.038***	0.039***	-0.069	-0.051*
					(0.011)	(0.013)	(0.006)	(0.005)	(0.058)	(0.031)
LogRealGDPdiff	-0.488	-0.488								
	(0.538)	(0.538)								
LogSpatialLag	0.090	0.090	-0.259*	-0.194			-0.548***	-0.533***		
	(0.072)	(0.072)	(0.154)	(0.141)			(0.102)	(0.079)		
OldDependencyRatio					0.037	0.043				
					(0.034)	(0.031)				
SkillLevel					-0.018	-0.023	-0.053***	-0.047***	0.007	0.003
					(0.019)	(0.018)	(0.014)	(0.014)	(0.011)	(0.006)
Euro*SkillLevel					0.007	0.008	0.016***	0.014**	-0.002	-0.003
					(0.008)	(0.008)	(0.006)	(0.006)	(0.003)	(0.003)
LogPopulationDensity	-0.582	-0.584	-0.377	-0.373	2.807	2.705			7.642***	5.594***
	(0.852)	(0.852)	(2.893)	(2.887)	(2.125)	(2.099)			(1.355)	(1.632)
Euro*LogPopulationDensity	0.401**	0.401**	0.556***	0.494***	-0.035	-0.003			0.126***	0.074**
	(0.161)	(0.161)	(0.171)	(0.180)	(0.112)	(0.117)			(0.049)	(0.032)

Variables	Whole group		EU countries		EA countries		EA core		EA periphery	
	PPML	G-PPML	PPML	G-PPML	PPML	G-PPML	PPML	G-PPML	PPML	G-PPML
TFP	0.005	0.005	0.001	-0.002						
	(0.006)	(0.006)	(0.018)	(0.016)						
TradeOpenness	0.009***	0.009***					0.019***	0.019***		
	(0.001)	(0.001)					(0.001)	(0.001)		
RevenueTradeTaxes			-0.001	0.035						
			(0.144)	(0.117)						
KOFSoGIdf	-0.024**	-0.024**								
	(0.010)	(0.010)								
Chinn-ItoIndex	-0.0005	-0.0005								
	(0.002)	(0.002)								
DemocraticAccountability									0.002	-0.007
									(0.004)	(0.005)
TopMarginal	-0.004	-0.004	-0.007	-0.004	-0.025***	-0.021***				
	(0.005)	(0.005)	(0.010)	(0.010)	(0.007)	(0.008)				
OwnershipBanks	-0.003	-0.003								
	(0.002)	(0.002)								
InflationCPI			0.002	0.0002						
			(0.003)	(0.003)						
Cellular	-0.004*	-0.004*					0.001	0.002		
	(0.002)	(0.002)					(0.003)	(0.003)		
Internet			-0.009	-0.006						
			(0.010)	(0.010)						
NominalExchange					-0.007*	-0.006*				
					(0.004)	(0.003)				

	Whole group		EU countries		EA countries		EA core		EA periphery	
	PPML	**G-PPML**	**PPML**	**G-PPML**	**PPML**	**G-PPML**	**PPML**	**G-PPML**	**PPML**	**G-PPML**
Host country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1950	1950	620	620	420	420	175	175	245	245
RESET test p-value	0.826	0.820	0.007	0.014	0.567	0.979	0.994	0.960	0.001	0.142
λ	1	1.002	1	1.130	1	1.161	1	1.204	1	1.658
EU and euro effect										
EU	58.70%	58.70%	0.00%	0.00%	-	-	-	-	-	-
Euro	8.20%	8.20%	-2.80%	-0.40%	37.20%	41.30%	63.70%	57.10%	17.10%	21.40%
Quality of estimators										
Log pseudolikelihood	-4759.017	-4759.019	-1974.037	-1994.135	-1103.045	-1106.150	-507.218	-508.015	-491.109	-531.103
AIC	9550.035	9550.038	3974.075	4014.271	2230.091	2236.299	1034.436	1036.029	1002.218	1082.206
BIC	9639.244	9639.247	4031.661	4071.857	2278.574	2284.783	1066.084	1067.677	1037.230	1117.219
Goodness-of-fit										
MAE	4.491	4.493	7.705	8.370	4.994	5.204	4.353	4.777	2.854	4.231
MAPE	0.718	0.718	8.909	5.905	0.370	0.371	0.110	0.108	0.342	0.322

NOTES: ***, ** and * denote significance at levels 1%, 5% and 10%, respectively. Clustered standard errors are in parenthesis.

Appendix A Groups of countries and selected variables

Table A1: Groups of countries

Groups of countries	Countries included	Number of countries
Whole group	Argentina, Australia, Austria, Belgium, Bolivia, Brazil, Canada, Chile, China, Colombia, Costa Rica, Cyprus, Denmark, Dominican Republic, Ecuador, Egypt, Finland, France, Germany, Greece, Guatemala, Honduras, Hungary, India, Indonesia, Ireland, Israel, Italy, Jamaica, Japan, Kenya, Malaysia, Mexico, Morocco, Netherlands, New Zealand, Nicaragua, Norway, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Republic of Korea, Romania, Senegal, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Thailand, Turkey, United Kingdom, and Uruguay	56
EU countries	Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Netherlands, Poland, Portugal, Romania, Spain, Sweden and the United Kingdom.	18
EA countries	Austria, Belgium, Cyprus, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain.	12
EA core countries	Austria, Belgium, France, Germany and Netherlands.	5
EA peripheral countries	Cyprus, Finland, Greece, Ireland, Italy, Portugal and Spain.	7

NOTES: We exclude from our sample the micro-states where US MNCs invest largely. The reason is that most FDI to these countries does not reflect decisions based on long-run factors. A large proportion of these FDI outflows are flows going in and out of the country on their way to their final destination, with this stop due to the favorable corporate tax conditions of the host country (see Blanchard and Acalin (2016)). These are the cases of Antigua and Barbuda, Bahamas, Barbados, Bermuda, Fiji, Grenada, Hong Kong, Luxembourg, Mauritius, Singapore and Trinidad and Tobago.

Table A2: Selected variables and definitions

Variable	Definition	Source
Dependent variable		
USFDIstock	Outward FDI stock from the United States to the host country at current U.S. dollars.	Bureau of Economic Analysis.
Economic and monetary integration		
EU	Dummy variable which takes value 1 if the host country is in the EU, 0 otherwise.	Own elaboration.
Euro	Variable which takes value 1 if the host country is outside the ERM with a currency pegged to D-Mark/ECU/Euro, 2 if its currency is pegged to the ECU/euro via the ERM, 3 if its currency is the euro, and 0 otherwise.	Own elaboration.
Market size and population		
LogRealGDP	Logarithm of the host country's real GDP at constant 2010 US dollars.	WDI from Wold Bank and WEO from IMF.
Euro*LogRealGDP	Interaction between the variable Euro and the logarithm of the host country's real GDP.	Own elaboration.
UrbanPopulation	Percentage of population of the host country living in urban areas.	WDI from World Bank.
LogRealGDPdiff	Logarithm of the absolute difference between the host country's and US real GDP at constant 2010 US dollars.	WDI from World Bank and WEO from IMF.
LogSpatialLag	Logarithm of the sum of US OFDI stock in the host country neighbours weighted by distance between host and neighbouring capital cities.	Own elaboration.
OldDependencyRatio	Ratio of older dependents, people older than 64, to the working-age population, those ages 15-64 of the host country.	WDI from World Bank.
Labour market		
SkillLevel	Skill level of the host country measured as the percentage of population age 25 + with completed and uncompleted secondary schooling.	Education statistics from World Bank and UNDP.
Euro*SkillLevel	Interaction between the variable Euro and the skill level of the host country.	Own elaboration.
LogPopulationDensity	Logarithm of the population density of the host country.	WDI from World Bank.
Euro*LogPopulationDensity	Interaction between the variable Euro and the logarithm of the population density of the host country.	Own elaboration.
TFP	Total factor productivity of the host country at constant national prices (2011=1).	PWT 9.1.

Variable	Definition	Source
Trade and international openness		
TradeOpenness	Total imports and exports of the host country divided by total GDP at current US dollars.	WDI from World Bank.
RevenueTradeTaxes	Revenue from trade taxes (% of trade sector) of the host country. It measures the amount of tax on international trade as a share of exports and imports.	Fraser Institute.
KOFSoGIdf	KOF de facto social globalization index of the host country	Gygli et al. (2019)
Investment Openness		
Chinn-ItoIndex	Index measuring the degree of capital account openness of the host country. It ranges from 0 to 100, being a higher score a higher degree of capital account openness.	Chinn and Ito (2006)
Institutional quality		
DemocraticAccountability	Index measuring how responsive government is to its people in the host country. It ranges from 0 to 100, being a higher score a higher level of democratic accountability.	International Country Risk Guide.
Government size		
TopMarginal	Top marginal income tax rates of the host country.	Fraser Institute.
Banking and credit regulations		
OwnershipBanks	Index measuring the percentage of bank deposits held in privately owned banks in the host country. It ranges from 0 to 100, being a higher score a higher share of privately held deposits.	Fraser Institute.
Monetary conditions		
InflationCPI	Inflation level of the host country measured by the the annual percentage change of the Consumer Prices Index.	WDI from World Bank and WEO from IMF.
Communications infrastructure		
Cellular	Mobile cellular subscriptions of the host country per 100 people.	WDI from World Bank.
Internet	Individuals using the Internet in the host country per 100 people.	WDI from World Bank.
NominalExchange	Nominal exchange rate between the US and the host country, measured as the value of a US dollar in foreign currency. 2010=100.	WDI from World Bank.

NOTES: WDI=World Development Indicators, WEO=World Economic Outlook, IMF=International Monetary Fund and UNDP=United Nations Development Program.

Appendix B Robustness check

Table B1: Variables selected as robust determinants of US FDI. Results of the BMA analysis in Camarero et al. (2021).Robustness check.

Variables	Whole group	EU countries	EA countries	EA core countries	EA peripheral countries
Economic and monetary integration					
EU	X[a]	X[a]			
Euro	X	X	X	X[b]	X
EconomicIntegration		X	X	X	X
Market size and population					
LogRealGDP	X	X	X	X	X
Euro*LogRealGDP	X	X	X	X[b]	X
UrbanPopulation	X		X[b]	X	X
Euro*UrbanPopulation	X				
LogSumRealGDP	X	X			
LogRealGDPdiff	X				
RealGDPgrowth	X				
LogRealMarketPotential	X				
LogSpatialLag	X	X		X	
LifeExpectancy					
OldDependencyRatio			X		
Labour market					
SkillLevel			X		
Euro*SkillLevel			X		
HCI		X	X	X[b]	X[b]
Euro*HCI		X[b]	X[b]	X[b]	X[b]
LogPopulationDensity	X	X	X		X
Euro*LogPopulationDensity	X	X	X		X
EducLevel					
SkillLeveldiff		X			
EducLeveldiff	X				
LogRealGDPdiff*SkillLeveldiff					
LogRealGDPdiff*EducLeveldiff	X				
LabourCompensation			X		
TFP	X	X			
Trade and international openness					
TradeOpenness	X			X	
Euro*TradeOpenness	X				
MeanTariffRate			X		X
Euro*MeanTariffRate			X		X
FTA					
DepthFTA					
RevenueTradeTaxes	X	X			
KOFSoGIdf	X				

Variables	Whole group	EU countries	EA countries	EA core countries	EA peripheral countries
Investment openness					
Chinn-ItoIndex	X				
BlackMarketFreedom		X	X		
BIT	X				
Institutional quality					
Corruption		X			
Euro*Corruption		X			
DemocraticAccountability					X
Euro*DemocraticAccountability					X
LawOrder	X				
BureaucracyQuality					
ProtectionPropertyRights	X				
IntegrityLegalSystem					
CivilLiberties					
PoliticalRights	X				
Government Size					
GovernmentConsumption			X		
GovernmentInvestment	X				
TopMarginal	X	X	X		
StateOwnershipAssets					
Banking and cblueit regulations					
OwnershipBanks	X				
PrivateSectorCblueit					
InterestRateControls	X				
Monetary conditions					
InflationCPI		X			
MoneyGrowth		X			
ForeignCurrencyBankAccounts					
Communications infrastructure					
Telephone					
Cellular	X			X	
Internet	X	X			
Natural resources					
OilRents					
GasRents					
Exchange Rate					
NominalExchange			X	X	

NOTES: The selected variables are market in blue. [a] The dummy variable *EU* was not considered in Camarero et al. (2021). However, we include them in our work in order to know how EU membership of the host country has affected US FDI. [b] The variables *Euro* and *Euro*LogRealGDP* in the EA core, *Urban Population* in the EA group, and *HCI* in the core and the periphery were not robust determinants in Camarero et al. (2021). However, they were in at least one of these groups. Similarly occurs with *Euro*HCI*, which was not robust in none of the groups analyzed. We include them to compare the US FDI determinants and the effect of the euro among the EA countries.

Table B2: Selected variables and definitions. Robustness check

Variable	Definition	Source
Dependent variable		
USFDIstock	Outward FDI stock from the United States to the host country at current U.S. dollars.	Bureau of Economic Analysis.
Economic and monetary integration		
EU	Dummy variable which takes value 1 if the host country is in the EU, 0 otherwise.	Own elaboration.
Euro	Variable which takes value 1 if the host country is outside the ERM with a currency pegged to D-Mark/ECU/Euro, 2 if its currency is pegged to the ECU/euro via the ERM, 3 if its currency is the euro, and 0 otherwise.	Own elaboration.
Market size and population		
LogRealGDP	Logarithm of the host country's real GDP at constant 2010 US dollars.	WDI from Wold Bank and WEO from IMF.
Euro*LogRealGDP	Interaction between the variable Euro and the logarithm of the host country's real GDP.	Own elaboration.
UrbanPopulation	Percentage of population of the host country living in urban areas.	WDI from World Bank.
Euro*UrbanPopulation	Interaction between the variable Euro and the urban population of the host country.	Own elaboration.
OldDependencyRatio	Ratio of older dependents, people older than 64, to the working-age population, those ages 15-64 of the host country.	WDI from World Bank.
Labour market		
HCI	Human capital index of the host country, based on years of schooling and returns to education.	PWT 9.1.
Euro*HCI	Interaction between the variable *Euro* and the HCI of the host country.	Own elaboration.
LogPopulationDensity	Logarithm of the population density of the host country.	WDI from World Bank.
EducLeveldiff	Absolute difference between the host country's and US education level.	Own elaboration.
Trade and international openness		
TradeOpenness	Total imports and exports of the host country divided by total GDP at current US dollars.	WDI from World Bank.
Euro*TradeOpenness	Interaction between the variable *Euro* and the trade openness of the host country.	Own elaboration.
MeanTariffRate	Mean tariff rate of the host country imposed to product imports	Fraser Institute.
Euro*MeanTariffRate	Interaction between the *euro* dummy and the mean tariff rate of the host country	Own elaboration.
RevenueTradeTaxes	Revenue from trade taxes (% of trade sector) of the host country. It measures the amount of of tax on international trade as a share of exports	Fraser Institute.

Variable	Definition	Source
	and imports.	
KOFSoGIdf	KOF de facto social globalization index of the host country	Gygli et al. (2019)
Investment Openness		
Chinn-ItoIndex	Index measuring the degree of capital account openness of the host country. It ranges from 0 to 100, being a higher score a higher degree of capital account openness.	Chinn and Ito (2006)
BlackMarketFreedom	Index measuring the absence of a black-market exchange rate in the host country. It ranges from 0 to 100, being a higher score a lower existence of a black-market exchange rate. Countries with a rating of 100 do not have a black-market exchange rate, that is, their domestic currency is fully convertible without restrictions.	Fraser Institute.
Institutional quality		
Corruption	Index measuring the absence of corruption in the host country. It ranges from 0 to 100, being a higher score a lower level of corruption.	International Country Risk Guide.
Euro*Corruption	Interaction between the variable Euro and the corruption level of the host country.	Own elaboration.
PoliticalRights	Index measuring the level of political rights of the host country. It ranges from 1 to 7, being a higher score a lower level of political rights.	Freedom House.
Government size		
TopMarginal	Top marginal income tax rates of the host country.	Fraser Institute.
Banking and credit regulations		
OwnershipBanks	Index measuring the percentage of bank deposits held in privately owned banks in the host country. It ranges from 0 to 100, being a higher score a higher share of privately held deposits.	Fraser Institute.
Monetary conditions		
InflationCPI	Inflation level of the host country measured by the the annual percentage change of the Consumer Prices Index.	WDI from World Bank and WEO from IMF.
Communications infrastructure		
Cellular	Mobile cellular subscriptions of the host country per 100 people.	WDI from World Bank.
Internet	Individuals using the Internet in the host country per 100 people.	WDI from World Bank.
NominalExchange	Nominal exchange rate between the US and the host country, measured as the value of a US dollar in foreign currency. 2010=100.	WDI from World Bank.

NOTES: WDI=World Development Indicators, WEO=World Economic Outlook, IMF=International Monetary Fund, UNDP=United Nations Development Program.

Table B3: Benchmark model specification. Robustness check

Variables	Whole group		EU countries		EA countries		EA core		EA periphery	
	PPML	G-PPML	PPML	G-PPML	PPML	G-PPML	PPML	G-PPML	PPML	G-PPML
EU	0.699***	0.694***	0.155	0.438**						
	(0.230)	(0.233)	(0.275)	(0.217)						
Euro	-0.065	-0.060	-0.066	-0.093	0.340*	0.342*	0.526***	0.494***	0.207**	0.220**
	(0.076)	(0.076)	(0.119)	(0.066)	(0.190)	(0.196)	(0.072)	(0.071)	(0.099)	(0.093)
LogRealGDP	0.990***	0.978***	2.398***	2.620***	1.795***	1.772***	4.037***	4.368***	2.680***	2.811***
	(0.208)	(0.216)	(0.458)	(0.306)	(0.306)	(0.300)	(0.638)	(0.771)	(0.727)	(0.310)
UrbanPopulation	0.034**	0.032**			0.100***	0.100***	0.084***	0.080***	-0.082**	-0.070**
	(0.014)	(0.014)			(0.007)	(0.007)	(0.007)	(0.008)	(0.036)	(0.033)
OldDependencyRatio					0.047**	0.046**				
					(0.023)	(0.022)				
HCI			-0.066	-0.072	-0.112**	-0.114**	-0.015	-0.004	-0.176	-0.035
			(0.093)	(0.060)	(0.051)	(0.051)	(0.028)	(0.027)	(0.230)	(0.105)
LogPopulationDensity					4.932***	4.993***				
					(1.671)	(1.649)				
EducLeveldiff	0.079	0.077								
	(0.049)	(0.050)								
TradeOpenness	0.009***	0.009***					0.018***	0.019***		
	(0.001)	(0.002)					(0.003)	(0.003)		
MeanTariffRate					-0.158*	-0.164*			-0.078**	-0.081***
					(0.092)	(0.093)			(0.034)	(0.031)
RevenueTradeTaxes			0.056	0.093						
			(0.137)	(0.077)						

Variables	Whole group		EU countries		EA countries		EA core		EA periphery	
	PPML	G-PPML	PPML	G-PPML	PPML	G-PPML	PPML	G-PPML	PPML	G-PPML
KOFSoGIdf	-0.030***	-0.028***								
	(0.009)	(0.009)								
Chinn-ItoIndex	0.0001	0.0003								
	(0.002)	(0.002)								
BlackMarketFreedom			0.001	0.028***						
			(0.014)	(0.007)						
Corruption			-0.009	-0.004						
			(0.009)	(0.006)						
PoliticalRights	-0.003	0.001								
	(0.074)	(0.073)								
TopMarginal	0.002	0.003	-0.011	-0.001	-0.022***	-0.022***				
	(0.005)	(0.005)	(0.011)	(0.007)	(0.007)	(0.007)				
OwnershipBanks	-0.003*	-0.003								
	(0.002)	(0.002)								
InflationCPI			-0.002	-0.005**						
			(0.006)	(0.002)						
Internet	0.002	0.002								
	(0.003)	(0.003)								
NominalExchange					0.0002	0.0005	0.009**	0.011***		
					(0.004)	(0.004)	(0.004)	(0.004)		
Host country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1950	1950	620	620	420	420	175	175	245	245
RESET test p-value	0.159	0.094	0.236	0.441	0.442	0.333	0.177	0.360	0.043	0.951
λ	1	1.058	1	1.515	1	0.947	1	1.223	1	1.499

	Whole group		EU countries		EA countries		EA core		EA periphery	
	PPML	**G-PPML**	**PPML**	**G-PPML**	**PPML**	**G-PPML**	**PPML**	**G-PPML**	**PPML**	**G-PPML**
EU and euro effect										
EU	101.20%	100.20%	0.00%	55.00%	-	-	-	-	-	-
Euro	0.00%	0.00%	0.00%	0.00%	40.50%	40.80%	69.20%	63.90%	23.00%	24.60%
Quality of estimators										
Log pseudolikelihood	-4787.532	-4790.522	-2210.347	-2452.546	-1092.578	-1092.725	-522.597	-524.102	-517.794	-544.459
AIC	9601.065	9607.044	4440.695	4925.093	2205.155	2205.449	1059.194	1062.204	1047.588	1100.919
BIC	9673.547	9679.527	4484.992	4969.390	2245.558	2245.852	1081.347	1084.357	1068.595	1121.926
Goodness-of-fit										
MAE	4.436	4.508	9.848	11.515	4.726	4.704	5.166	5.698	3.312	4.357
MAPE	1.202	1.190	1.466	0.609	0.461	0.459	0.142	0.136	0.562	0.504

NOTES: ***, ** and * denote significance at levels 1%, 5% and 10%, respectively. Clustered standard errors are in parenthesis.

Table B4: Augmented model specification. Robustness check

Variables	Whole group		EU countries		EA countries		EA core		EA periphery	
	PPML	G-PPML	PPML	G-PPML	PPML	G-PPML	PPML	G-PPML	PPML	G-PPML
EU	0.574**	0.586**	0.012	0.054						
	(0.237)	(0.236)	(0.397)	(0.325)						
Euro	3.247*	2.826*	9.057**	5.554**	3.661**	2.958**	4.760***	3.930**	5.375***	6.067***
	(1.739)	(1.611)	(4.416)	(2.670)	(1.503)	(1.487)	(1.681)	(1.847)	(1.543)	(1.919)
LogRealGDP	1.038***	1.012***	3.258***	2.973***	2.136***	2.096***	3.283***	3.796***	2.890***	2.739***
	(0.235)	(0.249)	(0.669)	(0.490)	(0.379)	(0.384)	(0.961)	(1.106)	(0.743)	(0.280)
Euro*LogRealGDP	-0.167***	-0.154**	-0.406**	-0.256**	-0.158***	-0.131**	-0.187***	-0.160***	-0.120***	-0.151***
	(0.064)	(0.062)	(0.183)	(0.117)	(0.048)	(0.054)	(0.058)	(0.062)	(0.036)	(0.053)
UrbanPopulation	0.005	0.003			0.095***	0.092***	0.087***	0.083***	-0.173***	-0.163***
	(0.011)	(0.012)			(0.007)	(0.008)	(0.009)	(0.010)	(0.048)	(0.041)
Euro*UrbanPopulation	0.016***	0.016***								
	(0.006)	(0.006)								
OldDependencyRatio					0.056*	0.056*				
					(0.032)	(0.031)				
HCI			-0.089	-0.093	-0.143***	-0.134***	-0.057**	-0.047*	-0.129	-0.083
			(0.073)	(0.066)	(0.046)	(0.044)	(0.026)	(0.028)	(0.224)	(0.091)
Euro*HCI			0.032*	0.020	0.015	0.015	0.009**	0.011**	-0.030***	-0.026***
			(0.018)	(0.015)	(0.010)	(0.010)	(0.004)	(0.004)	(0.008)	(0.008)
LogPopulationDensity					4.794***	4.746***				
					(1.739)	(1.810)				
EducationLeveldiff	0.055*	0.051								
	(0.032)	(0.034)								
TradeOpenness	0.006***	0.006***					0.015***	0.016***		
	(0.002)	(0.002)					(0.003)	(0.004)		

Variables	Whole group		EU countries		EA countries		EA core		EA periphery	
	PPML	G-PPML	PPML	G-PPML	PPML	G-PPML	PPML	G-PPML	PPML	G-PPML
Euro*TradeOpenness	0.002*	0.002*								
	(0.001)	(0.001)								
MeanTariffRate					-0.061	-0.043			0.080	0.099
					(0.167)	(0.112)			(0.070)	(0.072)
Euro*MeanTariffRate					-0.007	-0.013			-0.020	-0.043
					(0.055)	(0.044)			(0.049)	(0.030)
RevenueTradeTaxes			0.132	0.118						
			(0.162)	(0.111)						
KOFSoGIdf	-0.016**	-0.013								
	(0.008)	(0.008)								
Chinn-ItoIndex	0.0003	0.0005								
	(0.002)	(0.001)								
BlackMarketFreedom			0.014	0.019*						
			(0.014)	(0.011)						
Corruption			-0.002	-0.005						
			(0.006)	(0.008)						
Euro*Corruption			-0.003	-0.001						
			(0.003)	(0.002)						
PoliticalRights	0.017	0.020								
	(0.055)	(0.053)								
TopMarginal	0.004	0.004	-0.009	-0.008	-0.024***	-0.022***				
	(0.005)	(0.006)	(0.009)	(0.009)	(0.006)	(0.006)				
OwnershipBanks	0.0002	0.001								
	(0.002)	(0.002)								
InflationCPI			-0.003	-0.006						
			(0.007)	(0.006)						

Variables	Whole group		EU countries		EA countries		EA core		EA periphery	
	PPML	G-PPML	PPML	G-PPML	PPML	G-PPML	PPML	G-PPML	PPML	G-PPML
Internet	0.002	0.002								
	(0.003)	(0.003)								
NominalExchange					0.003	0.002	0.026***	0.025***		
					(0.003)	(0.003)	(0.005)	(0.005)		
Host country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1950	1950	620	620	420	420	175	175	245	245
RESET test p-value	0.241	0.157	0.537	0.476	0.492	0.722	0.380	0.174	0.142	0.663
λ	1	1.104	1	1.214	1	1.227	1	1.207	1	1.630
EU and euro effect										
EU	77.50%	79.70%	0.00%	0.00%	-	-	-	-	-	-
Euro	5.30%	3.40%	8.70%	-3.60%	42.90%	38.70%	29.00%	32.20%	16.20%	17.90%
Quality of estimators										
Log pseudolikelihood	-4670.187	-4679.358	-2072.903	-2128.834	-1077.038	-1081.070	-519.113	-520.403	-512.655	-549.701
AIC	9372.374	9390.715	4171.806	4283.668	2180.076	2188.140	1056.226	1058.806	1043.310	1117.402
BIC	9461.583	9479.925	4229.392	4341.255	2232.599	2240.663	1084.709	1087.289	1074.821	1148.914
Goodness-of-fit										
MAE	4.264	4.385	8.661	9.732	4.635	4.886	4.948	5.437	3.270	4.541
MAPE	0.992	0.959	0.812	0.580	0.343	0.360	0.139	0.134	0.311	0.263

NOTES: ***, ** and * denote significance at levels 1%, 5% and 10%, respectively. Clustered standard errors are in parenthesis.

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ET-AF-24-002-EN-N

Publications Office
of the European Union

DOI: 10.2873/326776
ISBN 978-92-68-12846-6