CHAPTER 10

Eurozone membership and Foreign Direct Investment#

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Abstract:

Our aim in this chapter is to estimate the effects of European Monetary Union (EMU) membership on foreign direct investment (FDI). Previous literature on the cross-border impact of a common currency have concentrated on international trade effects. Our analysis is based on the gravity model, which has been successfully applied to explain most forms of bilateral cross-border flows. We estimate a structural gravity model using data for 34 OECD countries between 1985 and 2013 for bilateral FDI. We use a variety of econometric techniques to ensure the robustness of our findings including stock as well as flow measures of FDI and addressing selection issues. Our estimates of the impact of EMU underlines the role of FDI as a channel for benefits from deep economic integration between countries. The effect of EMU membership on FDI is estimated to be significant and positive, at around 130%.

Keywords: Foreign direct investment - Gravity model - SCM – European Monetary Union
JEL: F15, F21, F36

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1. Introduction

Policy expectations about the effects of greater economic integration have been interested in both trade (Anderson and Van Wincoop, 2003) and foreign direct investment (FDI henceforth) (Blomstrom and Kokko 2003; Bevan and Estrin, 2004). However, while the determinants and effects of FDI are well established in the economics literature (Helpman. Mellisz, Yeaple, 2004), there is less formal analysis of how FDI inflows have been affected by international integration experience, including the creation of the Economic and Monetary Union (EMU). The question of whether the EMU is improving trade (De Sousa and Lochard, 2011; De Sousa, 2012) and investment between member countries has reinvigorated the debate over the impact of exchange rate volatility (Flam and Norström, 2006; Belke and Spies, 2008). The potential benefits from the EMU are especially important for the new EU member states and for the old members who have not yet adopted the euro (Faruqee, 2004; Berger and Nitsch, 2008). Researchers commonly argue that elimination of exchange rate risk stimulates trade and investment (Micco et al., 2003; Baldwin et al., 2005; Tenreyro, 2007). This effect is argued to be particularly important for countries with underdeveloped forward foreign exchange markets and with no markets for hedging (Klein and Shambough, 2006; Cieslik et al., 2012). Moreover, the reduction of transaction costs that are related to the exchange rate risk is perceived to be an important factor for countries that mostly trade with one country or group of countries that have a single currency (Cieslik et al., 2012). However, the effects of a common currency go beyond the elimination of exchange rate risk; it is a credible commitment to a stable exchange rate and has the benefit of eliminating transaction costs as well as enhancing competition, which may lead to greater investment as well as trade flows. Our aim in this chapter is to use contemporary methods to estimate the effects of EMU membership on FDI. In line with developments in the literature (e.g.

Baier and Bergstrand, 2004; 2007; Egger and Pfaffermayr 2004; Baier, Bergstrand and Feng 2014), we place emphasis on the use of contemporary estimation methods.

Our analysis draws on the gravity equation, which has been successfully applied to explain most forms of bilateral cross-border flows, including trade, migration, and foreign direct investment in terms of the relative size and distance between countries (Head and Mayer, 2014). The gravity model therefore highlights the potential for trade or FDI between relatively large economies; a country's economic size is expected to have a positive effect on bilateral flows while distance is expected to have a (nonlinear) negative effect. Distance may be measured geographically but can also reflect transactional and frictional costs associated with differences in regulations, tariff and non-tariff barriers. The last two decades have witnessed enormous research progress in the empirical application of gravity models including Anderson and van Wincoop (2003); Santos Silva and Tenreyro (2006); and Bergstrand and Egger (2007). The resulting new structural gravity approach (Blonigen and Piger, 2014) provides the necessary theoretical underpinnings as well as strong empirical support for the econometric estimation of the gravity model which we employ.

We use this framework to derive results about the effects of EMU membership using data for 34 OECD countries between 1985 and 2013 for bilateral FDI flows, bilateral distance, GDP and GDP per capita (for sender and target countries). Our data represent more than 70% of global FDI flows and, because the countries are all OECD members, they are collected in a homogenous manner and are of uniform and high quality. We use a variety of econometric techniques and sensitivity analyses to ensure the robustness of our findings, including stock as well as flow measures of FDI, and addressing selection issues. Our estimates of the impact of EMU underlines the role of FDI as a channel for benefits from deep economic integration between countries. The effect of EMU membership on FDI is estimated to be around 133% above the EU premium.

The remainder of this chapter is organized as follows. Section 2 provides a survey of the relevant literature about gravity effects, monetary union and FDI. Section 3 describes the empirical methodology and the dataset. Section 4 reports our main results, while Section 5 concludes.

2 Literature Review

2.1 Theoretical literature

The gravity equation (Anderson 1979) has been widely used in analysing the determinants of international trade and to a lesser extent, investment flows (Baldwin and Taglioni, 2007; Cieslik, 2009). Early work assumed that the volume of trade between two countries is proportional to their economic size and inversely proportional to the distance between them (Rose, 2000) but in later studies, the gravity equation was specified in a more general form (Cieslik, 2009). The gravity equation has been very successful in explaining international trade and investment flows; it provides "some of the clearest and most robust empirical findings in economics" (Levinsonhn and Leamer, 1995; p. 1384).

The gravity model has for many years had strong theoretical underpinnings and convincing empirical tests (Rose, 2000). When considering the theoretical basis of the gravity model in trade, note that the gravity equation can only be derived from a formal model when the homogeneity assumption for the production function, which is typical to the early neoclassical trade literature, was relaxed (Cieslik, 2009). Clear micro-foundations for the gravity equation were provided by Anderson (1979), who exploited the Armington (1969) assumption[1] to derive the gravity equation using the properties of Cobb-Douglas expenditure function (Baldwin and Taglioni, 2007; Cieslik, 2009). More

[1] This postulates that internationally traded products are differentiated by the country of origin.

generally, in the late 1970s and early 1980s the emergence of the new trade theory has led to a variety of theoretical foundations for a trade gravity equation (Baldwin and Taglioni, 2007).[2]

Baldwin (2006) and Baldwin and Taglioni (2007) analysed the gravity model from the expenditure equation lens. Their work provides important insights for the application of the model in the empirical analysis. They derived the basic gravity equation from the expenditure equation as follows:

$$Bilateral\ trade = G\ (Y_1 Y_2/(dist_{12})^{elasticity\text{-}1});\ G \equiv 1/\ (\Omega_o P_d^{\ 1\text{-}elastisity}) \qquad (1)$$

where the Y_s (s=1,2) are the origin and destination nations' GDP. It is assumed that bilateral trade costs depend only on distance and most importantly G is a variable that includes all the bilateral trade costs between the two nations (*o* - origin and *d* - destination), so it will vary for each pair of trading partners.

Exchange rate volatility generates exchange rate risk and has implications for trade and investment flows (Ozturk, 2006). In the early theoretical partial equilibrium literature, models were constructed to support the belief that greater exchange rate variability leads to a decrease in the amount of foreign trade (Sercu and Uppal, 2000; Ozturk, 2006). These papers (e.g. Clark, 1973; Baron, 1976; Hooper and Kohlhagen, 1978; Broll, 1994) argued that greater exchange rate risk decreases the risk-adjusted expected revenue from exports and thus lowers the incentive to trade (Sercu and Uppal, 2000; Ozturk, 2006). However, this conclusion rests on a few simplified assumptions. The majority of papers belonging to this literature assume that exchange rate uncertainty is the only source of risk in the decision maker's portfolio and either does not take into account the option to hedge (forward contracts, or nonlinear hedges as options and portfolios of options) or takes

[2] For example, Helpman (1987) and Helpman and Krugman (1985) argued that the gravity model could be derived from trade models with increasing returns to scale and product differentiation. Within this framework, the number of varieties produced in each country grows with its size and so the number of goods imported from each country is proportional to its GDP. Furthermore, standard in these models is the assumption that trade and investment barriers (as transportation and other transaction costs) increase the relative price of imported goods, and thus reduce trade (Micco et al., 2003).

the prices of the hedge instruments as given (Sercu and Uppal, 2000)[3]. Furthermore, these models also ignore the possibility for firms to alter their production in response to the exchange rate. One reason why international trade might be negatively affected by exchange rate variability arises from the fact that firms cannot adjust factor inputs in the short run. When this assumption is relaxed, greater volatility can lead to profit opportunities (Canzoneri et al., 1984; De Grauwe, 1992). Hence, there is no consensus about the relationship between exchange rate volatility and trade and investment flows.

A general equilibrium framework, where other major macroeconomic variables interact with each other, provides a fuller understanding of the exchange rate variability and trade/FDI nexus. For example, Bacchetta and Van Wincoop (2000) develop a two-country, general equilibrium model in which uncertainty arises from fiscal, monetary, and technology shocks, and by contrasting trade and welfare for fixed and floating exchange rates, conclude that there is no clear link between foreign trade and different types of exchange rate arrangements. Obstfeld and Rogoff (1998) provide an illustrative example whereby lowering exchange rate volatility to zero by fixing the exchange rate could lead to a welfare gain of up to 1% of GDP in the medium run. One must also consider the role of sunk costs, since foreign trade often comprises differentiated-manufactured goods that require sunk investment (Clark et al., 2004; Ozturk, 2006). This is likely to make companies less responsive to short-run exchange rate volatility, as they may choose a 'wait and see' tactics and remain in the export market until they can recoup their variable costs and the exchange rate turns around. Hence, the hypothesis that exchange rate variability negatively affects trade relies on numerous specific assumptions and is ultimately an empirical question (Sercu and Uppal, 2000; Clark et al., 2004; Ozturk, 2006).

[3] For developed countries, which have well-functioning forward markets, specific transactions can be easily hedged, but such markets are largely non-existent for the currencies of most developing countries (Clark et al., 2004; Cieslik et al., 2012).

When we turn to a common currency, this might affect foreign trade and FDI through a variety of channels. Firstly, a currency union eliminates bilateral exchange rate variability, and hence for the reasons above may lower the uncertainty and risk involved in trade and FDI (Frankel and Rose, 2002; Micco et al., 2003). Moreover, a single currency might lower transaction costs and thus foster foreign trade and openness (Mundell, 1961). Frankel and Rose (1998) argue that economies would move closer to matching the Optimal Currency Area criteria when they have a single currency, suggesting several transmission mechanisms in addition to the trade cost reduction including greater price transparency which fosters competition (Flam and Norström, 2006; Belke and Spies, 2008). Therefore, joining a Currency Union such as EMU can have effects on trade and FDI in addition to lowering exchange rate variability; it represents a credible commitment to a stable exchange rate, and implicitly lower inflation, enhances competition and reduces transaction costs ("distance") (see Bevan and Estrin, 2004).

2.2. Empirical Findings in the Literature

Stable exchange rates are usually regarded as important in encouraging trade. This view was based mostly on the correlation between increasing trade and investment flows and adherence to the Gold Standard (Baldwin, 2006). However, economists could not find a robust, evidence-based relationship between exchange rate variability and trade. Some researchers found that the relationship is negative, others claimed that it is positive, but most concluded that there is no statistically significant relationship between the two (Sercu and Uppal, 2000; Ozturk, 2006; Baldwin, 2006). However, Rose (2000) found that a common currency boosts bilateral trade by 200% and exchange rate volatility has a large negative impact on trade and investment flows.[4] Glick and Rose (2002) also concluded that a Currency Union has a large effect on trade and investment flows – "a pair of

[4] Subsequent work, including by Rose himself, found these results were biased (Baldwin, 2006). Rose and Wincoop (2001) addressed the model misspecification and found that common currency increased bilateral trade by 91%.

countries that starts to use a common currency experiences a near doubling in bilateral trade" (p. 1243). Moreover, Frankel and Rose (2002) extended the analysis by including a variable for currency board arrangements and confirmed that "important beneficial effects of Currency Union come through the promotion of trade" (p. 437). Thus, in the pre-Euro literature, the effect of Currency Union membership on trade was found to be large and significant.

There is a substantial empirical literature analysing the trade effects of membership in the Eurozone, which started with the influential paper by Micco et al. (2003). They analysed the early effects of Eurozone membership on trade, using gravity approach and panel data for 22 developed countries from 1992 to 2002, and found a large positive effect on bilateral trade flows of around 25%. Barr et al. (2003) focused on the trade creation between EMU member countries and found the trade effect of the EMU to be positive and significant, around 29%. Faruqee (2004) investigated the effect of EMU on trade within the Eurozone, using a panel data for 22 industrialized countries over the period 1992-2002 and found a positive impact of approximately 10%.[5] Flam and Norström (2006) avoided all the common empirical shortcomings present in some papers of the trade literature and estimated the trade effects of the creation of the EMU using the gravity model. Flam and Norström (2006) found that the EMU increased trade between Eurozone member states in 1998-2002 compared to 1989-1997 by 15% and trade with outside countries by 8%; they also highlighted that the effect is increasing over time[6]. Hence, most of the previous literature on the trade effects of Eurozone membership confirm a positive effect on trade (de Sousa, 2012). There is little work yet on the effects of EMU membership on FDI (but see Petroulas, 2007; Sousa and Louchard, 2011; Sanso-Navarro, 2011); an issue we address in the remainder of the chapter.

[5] Other papers, e.g. Bun and Klaasen (2002), De Nardis and Vicarelli (2003), De Sousa (2012), De Sousa and Lochard (2011) and Baldwin et al. (2005), reported similar results.

[6]However, Berger and Nitsch (2008) found that the impact of euro on trade disappears if one controls for the positive trend in institutional integration.

3 Methodology and Data

Our modelling strategy follows the *structural gravity approach*: a similar specification is used for example by Baier and Bergstrand (2007). The empirical gravity equation model for FDI parallels the specification for equation (1) above in the literature for trade (e.g. Bergstrand and Egger, 2007):

$$E(bilateral\ flow\ of\ FDI_{o,d,t}\,|X) = exp(\alpha_0 + \alpha_1 lnX_{o,t} + \alpha_2 lnX_{d,t} + \mathrm{I}_t + \eta_{o,d} + u_{o,d,t}) \qquad (2)$$

where the dependent variable is the unidirectional FDI flow (or stock) and the $X_{o,t}$ is a vector of characteristics of the origin country, *o*, in year *t*. Similarly, $X_{d,t}$ is a vector of destination nations' characteristics in year *t*. As for trade equations, these include measures of the size of the economy (GDP) of the countries as well as indicators of *time-varying* economic distance. We also include a full set of time dummies to control for global macroeconomic shocks, I_t.

However, many of the key host and home economy variables in a gravity equation, including almost all potential indicators of distance (transportation costs, cultural affinity, geography, etc.), common borders, landlocked countries, ocean harbours, lack of mountains, customs, different language/money, regulation, legal origin, are either invariant or do not change greatly over time for each pair (dyad) of countries. For these reasons, we instead include an *unordered*[7] dyadic fixed effect ($\eta_{o,d}$) as a dummy variable for each pair of countries. In fact, the use of bilateral fixed effects/dyads helps to minimise the consequences of the exclusion of many of the usual suspects in explaining FDI flows. They control for country pair unobserved time-invariant heterogeneity and hence, implicitly, for factors such as cultural distance, bilateral regulatory agreements, etc. Concerns regarding omitted variable bias is mitigated in this way in these types of models. Year fixed effects, I_t, are also important in that they reflect the macro phenomena that are common across all country-pairs. The coefficient of interest, on the variable indicating EMU membership, is identified from the impact of changes in

[7] The use of ordered dyadic dummies would account for asymmetric 'distances'. Following the literature, we use unordered ones.

the relationships *over time* on the change in FDI flows *over time*. Being a member of the EMU will be one of the *time-varying* observable characteristics of a country that enters the $X_{o,t}$ and $X_{d,t}$ vectors (EMU origin and EMU destination, respectively) of characteristics specific to a country and will include things like *time-varying* pair proxy for trade/investment costs and *time-varying* regulatory cultural distance. The $u_{o,d,t}$ is the idiosyncratic error term. The standard errors are clustered by dyadic pair to allow for serial correlation of the errors.

Summing up, in our FDI equations, we estimate a Poisson model (Santos Silva and Tenreyro, 2006) controlling for dyadic fixed effects and time dummies. In the FDI equations, we undertake robustness checks, notably using stock as well as flow measures. Our data are derived from the OECD and cover 34 countries between 1985 and 2013. The dataset includes bilateral FDI flows and stocks and GDP as well as GDP per capita for all sender (origin) and target (destination) countries.

4 Empirical Results

We report results from the Poisson Pseudo-Maximum Likelihood (PPML) model which as noted represents the current stage in the evolution of modelling gravity equations (Santos Silva and Tenreyro, 2006). We therefore do not need to exclude from the data bilateral flows observations of zero because the PPML estimator can deal well with the resulting highly right-skewed nature of the distribution of flows.

We report in Table 1 estimates of the gravity equation (2) with the dependent variable being bilateral FDI flows (column 1) and stocks (column 2). Inflow data is more commonly used as the measure of FDI, but it can be highly variable from year to year, especially in the bilateral data, which points to the use of stocks. However, there are also issues with stock data, because it may indicate the length as well as the level of the bilateral FDI relationship. Hence, we report both; effects are typically more pronounced on flow than stock data.

The independent variables of our gravity equation are GDP of the sender and the recipient economy receiving the foreign direct investment. It is also common in cross country studies to include the sender and recipient GDP per capita to control for levels of development (see Bevan and Estrin, 2004; Bruno, Campos, Estrin and Tian, 2017). We specify the impact of EU membership by a dummy variable, denoted EU and since both sender and recipient economies of FDI may or may not be EU members, we distinguish between them. Furthermore, we distinguish in each case between EU members that are members of the EMU (*EU&Euro(destination)* and *EU&Euro(origin)*) and those that are not (*EU-NOT Euro(destination) and EU-NOT Euro(origin)).* The impact of membership of the EMU for the recipient economy (destination) of FDI – the coefficient of interest in this study- is indicated by the incremental effect of being in the euro on the effect of being an EU member, that is *EU&Euro(destination)* minus *EU-NOT Euro(destination).* Apart from the dummy variables all the independent variables are loaded in logs to address non-normality in the data.

[Table 1 about here]

The coefficients in Table 1 largely conform to theoretical expectations. Thus, the independent variables typically have greater impact on FDI flows than stocks, and the core prediction of the structural gravity model; that FDI is increasing in the GDPs of the sender and recipient, is strongly confirmed. The rising effect of emerging market multinationals and the increasing FDI by developing economies (Estrin, Meyer, Pelletier, 2018) is reflected in the negative signs on the GDP per capita of the sender and recipient countries.

The main variables of interest are the one capturing EU and EMU (called Euro) membership on the recipient side, namely *EU-NOT Euro(destination)* and *EU&Euro(destination).* These are all positive and statistically significant. Thus, we confirm that membership of the EU raises FDI, by around 65%, whether using stock or flow FDI data, but that effect is greatly enhanced when the recipient country is a member of the euro; the latter coefficients are approximately 1.36 (flows) and

1.0 (stocks) respectively, that’s translate in a further increase (above the EU effect) of around 133% and 56%, respectively. These are very large effects on FDI, especially in the context of a structural gravity equation in which most of the other factor usually discussed in the context of determinants of FDI are already controlled for as an independent variable or through the estimation method (PPML panel estimation with dyadic dummies). The integration impact of EU and EMU membership also impacts sender economies; the coefficients on *EU&Euro(origin)* and *EU-NOT Euro(origin)* are also strongly positive and significant.

We undertook several robustness tests, with the detailed results available from the authors on request. Most importantly, the regressions may be biased by the inclusion of ‘positive only’ data of bilateral FDI flows. In our dataset, 41% of the observations are zero but the fact that there are no bilateral trade flows between two countries may be telling us about the sunk costs of doing business between the dyad of countries. We address this issue by applying a Heckman selection model in which we first estimate a selection equation in which the likelihood of non-zero flows is modelled as a function of manufacturing, exports and import shares as well as per capita GDP of the destination country. Even when we apply this procedure, the results concerning the impact of EMU membership remain positive, significant and in fact slightly higher than in the Poisson estimates. We also considered the effects of lags; the impact of EMU membership on FDI may not be felt contemporaneously. We estimated up to fourth lag effects but the sign and significance of summed effect of EMU membership was not greatly affected.

5. Conclusion

The literature has argued on balance for a positive effect from membership of a currency union on a country’s trade and FDI. This is partly driven by the reduction in exchange rate volatility, but also via competition and transactions costs effects. The latter can be interpreted as reducing the impact of distance in a gravity framework. Researchers have tended to focus on the effects of EMU membership on international trade, but we have argued that the same arguments can be applied to FDI through a gravity equation framework (Bevan and Estrin, 2004). While there is considerable empirical work supporting the hypothesis that EMU membership stimulates trade between its members, there is little evidence about the consequences for FDI. This paper has sought to address that deficiency.

We have found that EMU membership has a positive, significant and relatively large effect on the amount of FDI received by a member country, in the order of around 133% for flows and 56% for stock. This finding is derived using state of the art estimation methods for gravity models and is robust to a variety of specifications and models. Our findings indicate that membership of EMU significantly increases FDI inflows. This result will be of great interest to countries that are considering joining the euro because they indicate that there may be benefits in hitherto unexpected areas, FDI, and that these gains may be relatively large. Our analysis therefore suggests that countries joining the euro can hope to see enhanced capital as well as trade flows as a result of membership, consistent with the notion that EMU membership reduces effective distance between economies. It indicates that EMU membership is perhaps more attractive than has hitherto been considered, especially for countries that seek FDI, for example to improve their technological or exporting capabilities (Bruno, Campos, Estrin, 2018). At the same time, countries contemplating leaving the EMU need to be aware that the effects are not only on inflation and trade via exchange rate volatility but may also be significant for the capital account because of a major decline in FDI.

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Table 1

	(1)	(2)
VARIABLES	FDI inflows	FDI in stock
EU&Euro(destination)	1.355***	0.958***
	(0.248)	(0.126)
EU-NOT Euro(destination)	0.507***	0.508***
	(0.163)	(0.104)
EU&Euro(origin)	1.829***	1.630***
	(0.218)	(0.181)
EU-NOT Euro(origin)	1.056***	0.986***
	(0.196)	(0.179)
logGDP(destination)	5.568***	2.599***
	(1.353)	(0.804)
logGDP(origin)	5.670***	2.490***
	(1.380)	(0.791)
logGDPercapita(destination)	-3.849***	-1.161
	(1.387)	(0.843)
logGDPercapita(origin)con	-3.476**	0.918
	(1.482)	(0.865)
Constant	-88.36***	-69.10***
	(15.73)	(10.78)
Observations	30,535	30,399
R-squared	0.450	0.847