THE EURO EFFECT ON FDI INFLOWS IN THE ECONOMIC AND MONETARY UNION OF THE EUROPEAN UNION

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Abstract

The euro was created in 1999 and was initially adopted as the single currency by 11 EU countries. The main objective of the following study is to estimate the effect of the euro on FDI inflows in the countries which are part part of the Economic and Monetary Union. The analysis uses a gravity empirical model, which studies the FDI flows between 36 countries in the years 1985 to 2007. The results show that the euro has a significant positive effect on the FDI inflows in EMU member countries of 25% to 40%. Furthermore the study shows that the euro has a significant positive impact on FDI inflows in countries which are not part of the EMU. The results of this study suggest that the euro has acted as a catalyst of FDI inflows for EMU member countries and that there is no FDI diversion from countries which are not part of the union.

Introduction

The euro is the single currency of more than 370 million people, living among 16 European countries[1]. These countries are part of the Economic and Monetary Union (EMU) of the European Union. The EMU was established on the 1st of January 1999 and initially it consisted of 11 members. Consequently, Greece joined in 2001, Slovenia in 2007, Malta and Cyprus in 2008 and the last member to join was Slovakia in 2009.

The main reason for the development of the Economic and Monetary Union has been to increase the process of economic integration among European Union members. The economic integration provides benefits that are derived from the greater size of the union and its higher efficiency (European Commission-EMU, 2010). As a result, members also benefit from better economic stability, increased job opportunities and thus higher economic growth.

[1] Belgium, Germany, Ireland, Spain, France, Italy, Luxembourg, the Netherlands, Austria, Portugal, Finland, Greece, Slovenia, Cyprus, Malta and Slovakia

The overall benefits following the creation of common currency unions such as the EMU have been weighted against the costs by many academics within the past 50 years. One of the most well-known papers describing the effects of common currencies has been written by Robert Mundell in 1961. His work concentrated on defining what the Optimum Currency Area (OCA) is and how it affects its members. The main conclusion drawn from Mundell's work is that the costs for countries, following from giving up their flexible exchange rates are outweighed by the benefits of sharing the same currency (Mundell, 1961).

The debate regarding the benefits which result from the creation of currency unions were initiated with the seminal work of Andrew Rose (2000). He estimated that there is a positive effect on trade which results from sharing a common currency. Therefore Rose's findings supported the idea of the Optimum Currency Areas and suggested that the benefits are achieved only after its implementation.

The majority of previous research on the effects which followed the creation of the euro concentrated on the trade impact. Rose and van Woncoop (2000) estimated that the euro has a positive and significant effect on trade. Their findings were later questioned and re-estimated by many other academics who found that as a result of the EMU trade increased by 15% to 38% (Micco *et. al,* 2003; Flam and Nordstrom (2003). However, not many academics studied the euro effects on Foreign Direct Investment (FDI). The few empirical studies, estimated that the euro also has a significant and positive effect on FDI flows (Aristotelous, 2005 Petroulas, 2007, Schiavo, 2007).

The following paper tries to build on the knowledge of previous research and estimate the effect of the euro on FDI inflows in the countries part of the EMU. The analysis uses a gravity empirical model, which is commonly adopted approach in similar studies and has proven high accuracy of estimates. The data within the analysis includes 36 countries for the period 1985 - 2007.

Foreign Direct Investment is known to be closely related to the economic growth of a country. Such growth results from knowledge and technological spillovers as well as increase in employment rates (Luiz and de Mello, 1999). However, these positive growth effects are found to be highly dependent on the substitution and complementation of domestic investments (Luiz and de Mello, 1999) and the local competition and capabilities within a given country (Blomstrom and Kokko, 1998). Therefore, estimating the euro effect on FDI inflows will indicate whether a country member of the EMU is able to attract more investments and thus achieve higher growth after its adoption of the euro.

Furthermore, considering that the EMU countries can be both recipients and originators of FDI this paper will try to estimate whether the euro has increased or decreased FDI outflows from member countries to non-member countries. Answering this question will provide more information regarding the integration of the countries within the European Union and whether the countries outside the EMU lose from not taking part of it.

The countries which are members of the EMU eliminate the exchange rate volatility and the uncertainty risks associated with it. For many years, the literature has debated the relationship between exchange rate volatility and FDI. The formulation of the gravity model used in this paper will allow for estimation of this relationship and will try to contribute to the knowledge in this field.

The majority of previous academic literature have researched either the euro effect on trade or the euro effect on FDI. Assuming that trade and FDI could be either complements or substitutes, the research below aims to shed more light on their relationship, when all countries in the sample are developed.

The answers to the above-mentioned questions will provide policy makers with some additional insights of the effects following from the creation of the EMU. Furthermore, countries, which have opted-out or are about to join the EMU might also have an interest in these answers, as they might influence the decisions for either earlier adoption of the euro or postponement to a more appropriate stage.

The results obtained from the analysis indicate that the euro has a significant positive effect varying between 25% and 40% on FDI inflows among EMU members. Furthermore, the results indicate that the EMU has not only increased FDI inflows among its members but that it has also induced FDI to other countries. These estimates are robust even after applying additional controls such as membership at the European Union, which suggests that the increase of FDI inflows are not the consequence of the Single European Market (SEM).

Even though, there are problems within the EMU resulting from excessive country deficits and indebtedness in the current year of 2010, the union will most likely manage to stabilise and continue its enlargement. Most recently, Estonia was been given green light to join the EMU in 2011 (European Commission - News - 12 May, 2010). This is a clear signal that the EMU will continue its existence and expansion, regardless of its current disturbances. Trough consistent expansion, the union might be able to create even more benefits for its members and to become more competitive on the global economic arena. There are different ways towards economic growth and progress for the member countries, which is why some of the major objectives of the EMU are to create favourable and secure environment encouraging trade and investment between the Member States (European Commission - Business benefits, 2010).

The rest of the paper is organised in several parts. The following section includes a literature review of most relevant studies and outlines the major factors within them. Secondly, the methodology approach and data collection methods are justified and described. Thirdly, results of the empirical study are presented and analysed. Finally the paper concludes and provides some recommendations for future analysis.

Literature Review

The effect of exchange rate volatility on trade and foreign direct investment

After the fall of the Breton-Woods system in 1973 the majority of industrialised countries shifted from fixed towards flexible exchange rates. Since then many academics have tried to analyse and evaluate the effect of the exchange rate volatility on trade. However, the results they found have been mixed and while some argued that the exchange rate volatility impacts trade negatively, others suggested that it does not have any impact on it, or that the impact is positive.

Some of the empirical studies supporting the argument that exchange rate volatility impacts negatively trade, have been written by Akhtar and Hilton (1984), Thyrsby and Thursby (1987), Cushman (1983), Brada and Mendez (1988), Assery and Peel (1991), Bini-Smaghi (1991), Dell'Aroccia (1999), Hongwei and Zhu (2001). Their analysis approach follows similar patterns by using aggregate trade data on a bilateral basis, between two countries or between a country and the rest of the world (Bahmani-Oskooee and Wang, 2008). This approach for analysis has been referred biased as it cannot account for offsetting impacts among separate industries within the countries, where some trade flows are unaffected by the exchange rate volatility (Bahmani-Oskooee and Wang, 2008).

Other empirical analyses show that exchange rate volatility has no significant effect on trade. Some of the authors providing evidence of these findings are Gotur (1985), Baily et al. (1986), Koray and Lastrapes (1989), Belanger et al. (1992), Bahmani-Oskooee and Payesteh (1993), McKenzie (1998) and Lee (1999). Furthermore, other academics argue that the effects depend on the country, thus in some cases there are positive effects as a result of the exchange rate volatility but in others the effects are negative. In their analysis Ozturk and Kalyoncy (2009) come to the conclusion that the exchange rate uncertainty impacted the trade in South Korea, Pakistan, Poland and South Africa negatively, but it has had a positive effect in Turkey and Hungary in the long-run.

The debate whether there is a significant effect on trade as a result of the exchange rate volatility (uncertainty), is perplexing as the academics are split in their findings. It is most certain that the methodology used in their analyses plays a significant role and thus, different sets of countries can provide different results. However, the general belief is that uncertainty in the form of unexpected shifts of exchange rates carries risks for the profits of trading partners. Moreover, if the traders are risk-averse, the exchange rate volatility is translated into higher costs for hedging this risk, which results in lower volumes of trade between countries (Hooper and Kohlhagen, 1978).

If the exchange rate uncertainty was assumed to have a negative effect on trade, then this issue disappeared in Europe with the introduction of the euro, as it provided a common currency for 16 countries, which are also members of the European Union. In turn, if exchange rate volatility has no effect then it can be expected that countries will have higher trade volumes compared to countries that are not part of the same currency union. This leads to the question whether a currency union increases the trade among its members or if it is the same to be a part of a currency union as it is to simply have a currency peg.

The fluctuation of exchange rates and the uncertainty it creates are suggested to affect not only trading decisions but also investing ones. Since the increasing capital movement liberalisation, companies have the chance to allocate their funds at places which they view as more efficient or cheaper than their home countries. The decision to engage in Foreign Direct Investment is generally associated with longer terms than trade, because it involves sunk costs and investment in intangible assets that are hard to be recovered upon exit of the country. Furthermore, FDI has a long-term impact on future cashflows and thus, multinational corporations are keener on waiting for the right moment to enter a country (Campa, 1992).

Although the argument that exchange rate uncertainty deters investment decisions is backed by the findings of the majority of academics, there is another school of thought suggesting that exchange rate volatility induces FDI. Sung and Lapan (1998), view the exchange rate volatility not only as a problem but also as an opportunity. Their research suggests that a multinational firm, which operates multiple plants in different countries can benefit from switching its production from one plant to another, depending on the more favourable exchange rate that offers lower facility costs. Furthermore, Cushman (1985) argues that in the case of appreciation of the currency of a host country and high currency uncertainty there might not only be a reduction in FDI flows but also an increase. Cushman (1985) reasons the increased levels of FDI flows by assuming that they offset the reduction in trade as they can substitute each other. Goldberg and Kolstad (1995) draw similar conclusions by suggesting that firms locate abroad in order to achieve ex post production flexibility and increased profits in response to shocks. Moreover, the authors find that there is a positive relationship between exchange rate volatility and FDI only when the multinational firms are risk averse.

On the contrary, Kiyota and Urata (2004) argue that increased exchange rate volatility acts as a barrier for FDI. Their study, based on Japanese investors, concludes that FDI is attracted when host currency depreciates and that high exchange rate uncertainty deters FDI. A study by Manuel Campa (1990), based on a sample of industries in the United States also concludes that exchange rate volatility deters investments. It is interesting to note that his findings are also most significant when the companies are Japanese, which could mean that different cultures and nations perceive exchange rate risk in different ways.

An additional perspective to whether fixed or flexible exchange rate regime is more conducive to FDI has been provided by Joshua Aizenman (1992). His analysis shows that under fixed exchange rate regime, FDI has been positively influenced, independent of whether real or nominal shocks occur. However, the results for flexible exchange rate regime showed that there is a positive effect on FDI only when there are real shocks, but if the shocks are nominal then a negative correlation was observed (Aizenman, 1992). Overall, Aizenman's (1992) findings suggest that fixed exchange rates seem more probable to induce FDI flows.

The above mentioned studies indicate that the effect of exchange rate volatility on trade and FDI cannot be estimated precisely. Some of the problems related to the difficulty of this estimation find their roots within the endogeneity of the analysed factors, as the estimation models have not yet reached perfection. Other problems seem to arise due to the aggregation of analysed data that might be offsetting the effect of exchange rate volatility among separate industries within different countries. Overall there is no academic consensus regarding the effect of exchange rate volatility due to the ambiguous results of their studies.

The euro effect on trade

One of the biggest debates regarding the benefits of membership within the Economic and Monetary Union of the EU considered whether the euro influences trade positively or not. The majority of empirical studies on the topic have been developed in line with the work of Andrew Rose (2000). He analysed the effect of currency unions on trade by using a panel gravity model and data for 186 countries for the years 1970 to 1990. Rose's analysis suggested that countries which are part of a currency union can increase their trade with up to 300%. After the official publishing of this estimate, Rose's work has been criticised in numerous of occasions. The major problems seen in his work were that the majority of countries included in the analysis were very small and poor, which meant that the generalised conclusions of his study might not be applicable to wealthier bigger countries (Micco et. al, 2003).

Andrew Rose provides some general conclusions regarding the effect of currency unions. He notes that although the major benefit is increased trade among the members, there are also some drawbacks such as increased number of trade disputes and even layoffs resulting from higher market competition. Furthermore, currency unions might also induce a synchronisation of the members' business cycles, which makes them more resistant to asymmetric shocks, such as an increase in oil prices (Rose, 2000). Another conclusion of Rose's study is that currency unions do not act in the same way as currency pegs do. The main reason for this difference could be that although currency pegs usually last in longer-terms, there is still a chance of moving back to flexible exchange rate, thus the currency peg still bears some exchange rate uncertainty that could cause profits deterioration.

For the purpose of his analysis Andrew Rose uses a gravity model which estimates the bilateral trade flow between two countries as a proportion to their national real Gross Domestic Product (GDP), the distance between both countries, common language, past colonial ties, trade agreements, membership in currency union and currency volatility prior their membership in a currency union. Rose refers to the gravity model as one, which provides robust analysis and is highly regarded by the economists' community (Rose, 2000).

The seminal work of Andrew Rose initiated many following analyses that aimed to estimate the effect of currency unions and in particular, the effect of the euro on trade. Alejandro Micco, Ernesto Stein and Guillermo Ordonez (2003) were among the first to analyse the euro effects on trade, by using a similar approach to the one developed by Rose. After just a few years from the creation of the EMU Micco, Stein and Ordonez managed to estimate whether the effect of the common currency union will be the same as predicted by Rose. Their findings suggest a much lower effect, which raged between 4% and 16%. Another key finding of their analysis showed that although trade among EMU members increased there was no trade diversion from countries which opted out from the union, but instead there was an increase in trade with non-member countries as well (Micco et. al, 2003). Therefore, the euro not only caused beneficial effects for the members of the EMU but also for other countries, which were not part of it.

In their work, Micco *et. al.* (2003) consider the effect of exchange rate volatility, but found it to be insignificant and unable to influence trade negatively. That is why its elimination is also irrelevant and is thought not to be the reason for the increase of intra-union trade. Micco *et. al.* (2003) suggested however, that the reason for increased trade among EMU members is the elimination of transaction costs, which are related to the operation in several currencies. The European Commission reported that in real terms, zero exchange rate volatility saves businesses between €20 and €25 billion annually in exchange rate costs (European Commission-Businesses Benefits, 2010). The estimation of transaction costs related to currency exchange rates amounts to 0.5% of GDP for EU countries and up to 1% for smaller countries. Another benefit resulting from the creation of the euro is that it provides a liquid market for hedging the exchange rate risk when trading with non-EMU members (Micco *et. al*, 2003).

In order to deal with some of the problems associated with the work of Rose, Micco *et. al.* (2003), expand the gravity model by including country-pair dummies that aim to absorb effects from the omitted variables, such as previous strong trade relation. The inclusion of the dummy variables is suggested to tackle the problem of omitted variables and to provide a more realistic result of how the euro impacts trade (Micco et. al, 2003). Another criticism of the work of Rose is that the gravity model he used might suffer from endogeneity bias (Tenreyro, 2001). On the one hand, in order to solve this problem, Micco et. al. proposed the use of business cycles correlation within the gravity model, because literature on Optimum Currency Areas suggests that members should synchronise their business cycles in order to achieve higher efficiency (Micco et. al, 2003). On the other hand, this approach is not an optimal one as business cycles are also closely correlated with the trade intensity (Frankel and Rose, 1997, 1998).

Lastly, in their work, Micco *et. al.* (2003) try to prove that the EMU drives the positive trade effect and that the EMU is not the result of a surging trade among the European countries. In order to do that, the authors excluded one or a group of countries at a time from their analysis. The result they obtained clearly showed that the EMU is the factor which led to increased trade levels and not vice versa (Micco et. al, 2003). As already mentioned above, the euro effect on trade between member countries has been evaluated to range between 4% and 16%, which is an economically significant result, but much lower than the one predicted by Andrew Rose (2000).

Another attempt to estimate the effect of the euro on trade was made by Harry Flam and Hakan Nordstrom in 2003. In their analysis, they also use a gravity model similar to the ones discussed above. However, their model differentiates from the previous ones, as it uses only the export data for the initial 11 euro countries between 1989-2002 instead of using aggregate trade data which usually includes both exports and imports (Flam and Nordstrom, 2003). Another difference in the approach of Flam and Nordstrom is that they try to understand which industries have increased their trade the most. In order to do that, the authors use one-digit Standard International Trade Classification (SITC) sectors, which indicated that the increased trade occurs due to the vertical specialisation of production in separate countries (Flam and Nordstrom, 2003).

Flam and Nordstrom (2003) reach the same conclusion as Micco et. al. (2003), that the positive euro effect did not only increased intra-EMU trade but it also increased the trade between the EMU members and non-EMU members. These findings reconfirm that there is no trade diversion between non-members to members as suggested by Micco et. al. (2003). Flam and Nordstorm undertake another similar approach to Micco et. al. by including country-pair fixed effects dummy in order to deal with the problem of omitted variables. By tackling the problem of omitted variables their findings become more robust.

Flam and Nordstrom's analysis indicates that the positive euro effect has already been evident in 1998 which is one year before the actual adoption of the euro. The 11 countries convergence reports were published in March 1998 and suggested that all countries able to join the euro are seen to be the primary reason for the early positive euro effect on trade (Flam and Nordstrom, 2003). Although Flam and Nordstrom argue that the primary effect of the increased trade among members of the EMU came from the introduction of the euro, they also consider the burst of the 'IT bubble' in the United States in 2000. They believe that this might have contributed to more intense trading among the European countries and some diversion from the US markets, because the US crisis might have been associated with higher exchange rate uncertainty (Flam and Nordstrom, 2003).

The overall conclusion reached from the study of Flam and Nordstrom (2003) is that the euro has a positive effect on the intra-EMU trade of about 15% and about 8% positive effect on the trade between EMU members and non-EMU members. In a later study, which aims to extend the one from 2003, Flam and Nordstorm compare the level of exports in the years between 2002-2005 relative to the trade between 1995-1998 (Flam and Nordstorm, 2006).

In their second study the authors found that the positive effect of the euro on intra-EMU trade has reached 26% relative to ten other countries outside of the Organisation for Economic Co-operation and Development (OECD). When the intra-EMU trade was compared to the trade between three countries part of the EU, but not part of the EMU, the results showed that the intra-EMU countries trade 21% more (Flam and Nordstorm, 2006). Furthermore, the exports from EMU members to non-EMU members increased by 12% compared with the trade between the ten outside OECD countries. Lastly, their research showed that the exports from non-members to EMU members were 13% higher when compared to the exports from non-members countries to three EU countries.

The analysis provided by Flam and Nordstrom (2006) reveals not only that there is a highly significant positive euro effect on trade but also that the euro was one of the catalysts for the exports of bigger variety of products across different member countries. This finding suggests that countries have vertically specialised in different industries. Moreover, the research tries to provide reasoning for the increased exports to the EMU, by proposing that the exporters decrease their costs by setting marketing and sales facilities only in one country member of the EMU rather than in all of them (Flam and Nordstrom, 2006).

A more recent study of the euro effect on trade was written by Maurice Bun and Franc Klaassen in 2007. In their work, Bun and Klaassen adopt a different approach in order to estimate the euro effect on trade. They criticise previous studies, by arguing that some omitted variables have caused the increased levels of the euro effect. Moreover, their paper criticised previous work for using gravity models which were biased when longer data sets were used for estimating the euro effect. This meant that when they tried to estimate the euro effect by including longer periods of time before the adoption of the euro, the effect increased and thus they criticised the models used by Bun and Klaasen (2002), Micco et. al (2003) and Glick and Rose (2002). In order to deal with the upward bias, the authors introduced an additional variable which accounted for country-pair time effects. This additional variable reduced the euro effect on trade to only 3%, which is almost insignificant (Bun and Klaassen, 2007).

The literature which investigates the euro effect on trade has clearly evolved over the years and raised the interest of many academics. The seminal paper of Andrew Rose (2000) estimated for the first time that currency unions increase trade by up to 300%. However, later in the years many of the academics managed to further develop the original gravity model and to estimate the effect of currency unions and particularly the one of the EMU to much lower levels. The major problems regarding the accuracy of the gravity model were found to be omitted variables, which if included, gradually increase the estimation quality of the simple model. The literature regarding the currency union effect managed to shed some light on the effect of the exchange rate volatility by finding that it is insignificant, perhaps due to the developed markets for hedging instruments (Flam and Nordstrom, 2003).

Overall the effect of the euro on trade is found to range between 3% and 21% (Flam and Nordstrom, 2006) (Bun and Klaassen, 2007). Even though some academics found that the euro has only a small impact on trade, the results are significant and allowing a conclusion to be made that the EMU has led to higher intra-trade and higher trade with other non-member countries.

While the literature studying the euro effect on trade gas expanded extensively over the years, there is little discussion regarding the effect of the EMU on Foreign Direct Investment flows. The literature mainly focuses on evaluating the euro effect on trade while ignoring the fact that in some cases FDI could be a substitute for trade. All major academic literature written on the topic of the euro effect and reviewed for the purpose of this paper did not include FDI in their models. This is why little is known about the effect of common currency on FDI flows and in particular on FDI inflows within the EMU.

FDI benefits and costs

One of the most well known theories which explains the rationale and direction of the Foreign Direct Investments is John Dunning's Eclectic Paradigm developed in 1988 and also known as the OLI framework (Ownership, Location and Internalisation). Dunning (1988) describes that one of the major factors driving Foreign Direct Investments are the location-specific advantages which enable a multinational company to benefit from resource endowments that are tied to specific geographical locations. In the case of the EMU, such location specific advantages can be the size of the market or high technologies and knowledge concentrated in the surrounding areas of leading European Universities.

Furthermore, FDI is considered to lead to some specific benefits for the country recipient. The contribution which could follow from a Foreign Direct Investment in many cases comes in the form of technology transfer, managerial know-how and capital which could lead to increase of economic growth of the recipient country (Lipsey, 2002). For example, technological advancements are typically considered to increase productivity of the foreign owned entities (Moden, 1998). Other examples of FDI benefits include the investment of foreign multinationals in Research and Development facilities that increase the intellectual human capital of a country and create new technologies (The Economist, 2000).

Another benefit following the FDI inflows in a country could be translated in increased employment rates. These benefits often occur from the creation of large manufacturing facilities such as automobile factories. A study of the OECD found that foreign firms were creating jobs in a faster way compared to local firms (The Economist, 2000).

FDI has also the ability to positively influence the balance-of-payments accounts of a country and offset some of the negatives from high deficits in the current account. Since FDI can replace imports from other countries it could positively influence the current account by reducing the number of imports compared to the number of exports. In this way, if the country is running in current account deficits there will be less need for selling off assets to foreigners in order to achieve current account surplus (Hill, 2009). FDI could also improve the current account in another way, trough exports, as exports increase the positive effect on the current account and offset the imports.

The competition among industry rivals is an important factor in the country's growth. When FDI creates new companies in a foreign market, this is considered to lead to higher rivalry levels among the incumbents. In turn, this leads to more consumer choice and increased efforts of the competing companies to survive in the market. If companies could achieve this and sustain their market share, they are required to improve their services or products and invest in new technologies or facilities.

Although FDI is commonly associated with benefits, there are some costs related to it as well. An example of some of the FDI costs for a recipient country might be reduced competition in its markets. This effect could occur when, powerful multinational corporations drive the smaller players in a market out of business (Hill, 2009). In this way, there is a risk of monopolisation of the market place which can lead to increased prices for the end consumers and less choice. However, the risk of such negative effects is small in well developed economies such as the countries part of the EMU and the other countries part of the sample studied in this research.

Even tough, FDI can support the current account surplus and improve the balance-of-payments account there is a risk of adverse effects as well. These risks originate from the possibility of profits repatriation which would be recorded as payment in the balance-of-payments account. That is why, in some cases, countries impose regulations which limit excessive repatriation of profits of foreign owned enterprises (Hill, 2009).

The last concern related to FDI is the loss of a country's sovereignty. In other words, a country's economy could be influenced negatively by a big foreign corporation that has local investments.

Overall, FDI is associated with the benefits for the country recipient. These benefits range from technology transfer to balance-of-payments improvements. However, there are also some costs associated with FDI, which might impact the recipient country negatively. Furthermore, as John Dunning's OLI framework suggests, FDI flows direction is highly dependent on the locational advantages offered by the recipient country. Therefore, the analysis, which is carried within this paper will try to illustrate whether the euro increases the locational attractiveness of a country or decreases it.

FDI and Trade substitutes or complements

There is extensive literature that analyses the relationship between Foreign Direct Investment and trade. The main arguments are split between two hypotheses, whether FDI and Trade substitute each other or whether they are complementary. One of the first academics to suggest that FDI and Trade are substitutes was Raymond Vernon in 1966. His 'product life-cycle' theory suggests that over time, exports are substituted by FDI as the product moves from its introduction phase towards its maturity and decline (Vernon, 1966). Some later studies have confirmed that FDI and Trade are substitutes (Gopinath et. al, 1999; Ramster, 1991; Svenson, 1996). However, there are other academics who claim that instead of substitutes FDI and Trade can be complementary (Blomstrom et. al., 1988; Eaton and Tamura, 1994; Pfaffermayr, 1996; Fontagne and Pajor, 1997; Bayoumi and Lipworth, 1997).

The estimation of the euro effect on trade has so far shown that there is a positive impact of 3% to 21%. However, the literature above does not account whether the increase of trade substitutes or complements Foreign Direct Investment. In his work, Nigel Pain (2002) suggests that a country member of the EMU might benefit from increased levels of trade, but suffer from decreased levels of FDI inflows from other EMU members. The main reasons for this effect are suggested to be the lower barriers for trade and lower uncertainty, which encourage more intra-union trade instead of FDI (Pain, 2002). However, Aizenman and Marion (2001) conclude that the impact of uncertainty is dependent on the type of FDI. On the one hand, they proposed that companies might be discouraged to get involved in vertical FDI as the uncertainty of currency exchange rates might influence the cost of the final product negatively. On the other hand, companies might be encouraged to get involved in horizontal FDI where exchange rate uncertainty is high, as they will be producing within the country and selling the products locally; therefore, the cost of the final product will be unaffected by the exchange rate volatility.

Considering the effects of exchange rate volatility on horizontal and vertical FDI, Nigel Pain (2002) suggests that industrialised countries and in particular the UK will experience decreased horizontal FDI inflows if they join the EMU, as companies will prefer to trade with the UK instead of engaging in long-term investments that require sunk costs. However, there are no empirical analyses which have so far suggested that intra-union trade will substitute horizontal FDI inflows between EMU members (Pain, 2002). Moreover, if such substitution occurs it would not be clear whether the benefit of trade increase will not offset the decreased horizontal intra-EMU FDI.

The euro effect on FDI inflows

The following literature review aims to present previous studies evaluating the euro effect on Foreign Direct Investment flows. As already discussed above, the majority of academic interest and studies have been concentrated on evaluating the euro effect on trade and have not evaluated whether FDI flows are influenced in any significant way.

Exchange rate volatility is considered to be one of the major factors influencing the level of trade and FDI. However, the academics have not reached a firm conclusion regarding the impact of exchange rate volatility on either trade or FDI. Taking into account that the exchange rate volatility is equal to zero within the EMU, the following papers estimate whether FDI inflows in member countries increase or decrease after their accession in the EMU.

In his work Kyriacos Aristotelous (2005) investigated the euro effect on US FDI flows to the EMU. An extensive literature review showed that the study provided by the author is the first one to analyse the euro effect on FDI flows. He used cross-sectional time-series data from 15 EU countries for the years 1966-2003. The econometric model used by Aristotelous has a similar formulation to the models used to estimate the euro effect on trade. In order to measure the US FDI flow, which is the dependent variable in his model, Aristotelous included various exogenous variables in his equation. Similar to the gravity models developed to measure the euro effect on trade, discussed above, Aristotelous (2005) includes a dummy variable, EMU_{it}, which is equal to 1 for 1999 for Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain and 0 otherwise. The EMU_{it} dummy variable aims to capture the effect of the euro adoption and to evaluate whether there is any difference between the 12 EMU countries which adopted the euro and Denmark, Sweden and the UK which did not adopt the euro, as they opted-out.

The results of the data analysis presented by Kyriacos Aristotelous (2005) suggest that the euro has a statistically significant positive impact on US FDI flows for the countries part of the EMU. Furthermore, the analysis showed that although the UK, Sweden and Denmark did not suffer from decreased US FDI inflows, they did not benefit from the significant increase in FDI inflows experienced by the other 12 EMU countries. Although the analysis provided by Kyriacos Aristotelous (2005) gives a good example of the euro effects on FDI, it is only limited to reflect the US FDI inflows. On one hand, it manages to provide an insight to the countries that might join the EMU in the future, but on the other hand it does not account for the intra-union FDI flows or FDI flows from other non-EU countries.

In a later empirical study Pavlos Petroulas (2006), also seeks to estimate the EMU effect on Foreign Direct Investment. His analysis uses a panel of unilateral FDI flows between 18 developed countries for the years between 1992 and 2001. As the majority of the studies trying to estimate the EMU effect on trade and FDI, Petroulas (2006) also uses a gravity model. Compared to the approach undertaken by Kyriacos Aristotelous (2005), Petroulas uses a shorter time period for the data analysis, but he includes countries such as USA, Japan and Switzerland as well as the UK, Norway, Sweden and Denmark. This allows him to try and provide a more representative analysis of the euro effect on FDI. Furthermore, the econometric model used in the study includes more independent variables in order to avoid omitted variables bias, which is commonly discussed criticism of similar studies. The major interest of Pavlos Petroulas' research is the dummy variable $EMU_{ij,t}$ which tries to depict the effect of the euro on FDI inflows. When the EMU countries are analysed, $EMU_{ij,t}$ takes the value of 1 after the introduction of the euro in 1999 and zero for the prior period from 1992 to 1999. In contrast, when the FDI inflows are analysed for all other countries, $EMU_{ij,t}$ has a constant value of zero throughout the whole period from 1992-2001.

Pavlos Petroulas (2006) estimated that the inward FDI flows among EMU members have increased by 16%. Moreover, the inward FDI flows from EMU members to non-member countries were estimated to increase by 11% and from non-member countries to the EMU by 8%. The analysis of the results also showed that Belgium-Luxembourg (BeLux) and Germany play a significant role in estimating the euro effect. When the study carried a robustness check and both BeLux and Germany were excluded from the EMU sample, the euro effects disappear. The study also showed that if they are excluded only as FDI receivers or FDI investors, then the euro effect managed to remain significant (Petroulas, 2006). These findings suggest that both BeLux and Germany served as FDI hubs in the EMU. Some additional findings derived from the analysis of Pavlos Petroulas (2006) indicate that larger EMU countries are more probable to receive higher FDI inflows compared to smaller countries, whereas smaller countries seem to increase their exports more than the larger countries in the EMU (Petroulas, 2006). Although the research provides conclusions regarding the effect of the EMU on FDI inflows it does not compare the difference, between the 3 EU countries non-members of the EMU and the 12 EMU countries, in terms of FDI inflows. This analysis would have made a stronger case for the benefits resulting from the EMU membership opposed to opting-out of it.

Although the majority of academic papers researching the EMU effect on FDI flows have concluded that there is a positive impact, Christopher Taylor (2007) provided contradictory results. In his work Taylor (2007) found that the euro effect on FDI was merely zero as it did not cause raise of FDI inflows within the EMU, but it rather coincided with a large global Mergers and Acquisitions (M&A) trend. The data used in the analysis evaluates the FDI flows between the EMU-12, UK and US for the period 1992-2000 and also M&A flows data for the years 1988-2004. The author also discusses the difference between M&A and FDI. He takes into account that M&A occur only between different companies and exclude intra-group investments, whereas any international transaction of an equity stake over 10% is considered FDI (Taylor, 2007).

Christopher Taylor's (2007) key argument is that cross-boarder M&A were the key drivers for increased FDI in the EMU instead of the euro creation. Furthermore, Taylor (2007) discusses the major factors leading to increased M&A levels. The first one is the technological change of the 1990s that enabled electronic communication. This in turn increased the competition among large companies and encouraged them to expand overseas in order to achieve higher efficiencies and economies of scale (UNCTAD, 2000). The second factor is the relaxation of regulations on M&As, which moved from unified restrictions to case-by-case reviews (Taylor, 2007). Furthermore, the creation of the Single European Market (SEM) and North American Free Trade Area (NAFTA) provided further stimuli for increased M&As. The last major reason for increased M&A is suggested to be the widespread domestic deregulation and privatisation of industries such as telecommunication services, financial services, utilities and transportation. Overall, the combination of these factors provided favourable conditions for the boom of M&A around the year of 2000, which coincided with the creation of the Euro in 1999.

Taylor (2006) also reaches to the conclusion that the majority of FDI flows had been going through Belgium and Luxembourg (BeLux) and that if they are excluded from the analysis then in fact the level of FDI flows within the EMU weakens considerably. The same conclusion has been reached by Pavlos Petroulas (2006), which reconfirms that BeLux serves as the FDI hub of the EMU. The analysis provided by Christopher Taylor proposes a different explanation for the increased FDI flows around the year of 2000 and contradicts the idea that the Euro had any significant effect on the FDI. However, Taylor' analysis is purely based on simple FDI and M&A trends, which lack the robustness of the more sophisticated econometric analysis discussed above.

In 2008, another research evaluating the Euro effect on FDI flows has been done by Stefano Schiavo. His study aims to reveal not only whether there is a positive effect on FDI flows within the EMU after the creation of the Euro but also whether the Euro encourages financial markets integration (Schiavo, 2007). The main FDI data used in the analysis covers 25 countries for the period between 1980 and 2001. Schiavo (2007) uses a gravity model in order to estimate the effect of the EMU on FDI. Although his gravity model has similar characteristics to the models discussed above, Schiavo includes additional controls in order to avoid omitted variables bias. An example of these additional exogenous variables is the information flows between two countries. The information flows are suggested to have an important role in building commercial links and business networks, which are some of the preconditions for increased FDI flows between countries (Schiavo, 2007).

The results provided by Stefano Schiavo (2007) suggest that the EMU has a significant positive effect on FDI flows in the member countries of between 70% and 250%. Furthermore, the analysis shows that there is no FDI diversion from non-EMU members which suggests that the Euro might be encouraging deeper financial markets integration (Schiavo, 2007). The study also tries to analyse whether there will be any negative effect resulting from opting-out of the EMU for UK, Denmark and Sweden. These results of the study suggest that only Sweden suffered from decreased levels of FDI inflows as a consequence of its opt-out from the EMU. However, the UK and Denmark did not suffer from any FDI inflows diversion as a result of their opt-out (Schiavo, 2007).

Even though, Stefano Schiavo (2007) has applied extensive controls in his gravity model with the aim to provide robust results of whether the EMU has any effects on FDI flows, the data used in the analysis studies only 2 years since the creation of the Euro. That is why his study might not be testing enough representative sample, which could have provided more sound evidence for the euro effect on FDI in the long-run.

Methodology and data

The following section presents the conceptual framework and methodology that were developed for the purpose of the empirical analysis within this paper. The main element studied below is the FDI inflow from country i to country j. As defined by the OECD, Foreign Direct Investment is the aim of a resident entity in one economy to obtain a long-term interest in another entity residing in economy different than the one of the investor (OECD, 1999). The FDI inflows represent the total value of FDI which a country receives within one year.

The main question posed within this paper is whether the adoption of the euro impacts the FDI inflows to country “j” from country “i”. In order that this question is answered a log-linear gravity model has been developed. The use of gravity models for the prediction of trade and FDI flows has already proven to be very accurate and commonly used approach among the academics researching within this area.

The following gravity model will try to estimate the euro effect on FDI inflows by taking into account some additional explanatory variables, which increase the model accuracy and control for omitted variables bias. The baseline model is similar to the ones developed by Stefano Schiavo (2007) and Pavlos Petroulas (2006), as it includes some of the explanatory variables used in their research.

$$\ln FDI_{ijt} = \alpha_{ij} + \tau_t + \ln \beta_1 GDP_{it} + \ln \beta_2 GDP_{jt} + \delta EMU_{ijt} + \varepsilon_{ijt} \quad (1)$$

On the left-hand side of the equation, the dependent variable $\ln FDI_{ijt}$ represents the natural logarithm of a Foreign Direct Investment flow from country i to country j in a specific year t. On the right-hand side of the equation the first explanatory variable represents a dummy variable α_{ij}, which controls for country-pair fixed effects. The second variable is a set of time dummy variables, which control for time-specific effects. Both fixed-effects and time-fixed effects are explanatory variables used very commonly in order to avoid omitted variables bias. On the one hand, the country-pair fixed effects dummies manage to control for all normal factors that could influence international transactions and are constant between two countries throughout the whole period of time (Micco *et. al.,* 2003). On the other hand, time-fixed effects control for all country-pair invariant determinants occurring in a given year, which could influence their FDI flows, such as 'the state of world economy' (Bun and Klaassen, 2007).

$\ln GDP_{it}$ and $\ln GDP_{jt}$ represent the natural logarithms of the real Gross Domestic Products of country i and country j in a specific year t. The real GDP has been obtained by using each country's national GDP deflator. The key explanatory variable within this gravity model is the EMU_{ijt} which is a dummy that equals 1 when both countries are a part of the EMU and zero otherwise. The aim of EMU_{ijt} is to try and estimate whether countries that join the EMU receive increased levels of FDI inflows as a result.

As discussed above, it is unclear whether the exchange rate volatility has any significant impact on FDI flows. In his work Stefano Schiavo (2007) reflects upon the finding of Andrew Rose (2000) that exchange rate volatility does not impact the trade flows between two countries. That is why Schiavo (2007) introduced two different controls for exchange rate volatility, of which one accounted for the short term volatility and the second adopted from Kenen and Rodrick (1986) accounted for the long term volatility. Since, only the short-term control for exchange rate volatility managed to capture significant impact on FDI flows, it is the one which has been selected for inclusion in the gravity model tested at this paper. The explanatory variable ERV_{ijt} is the natural logarithm of the 3 year coefficient of variation of bilateral exchange rate. In order that the natural logarithm could be computed 1 is added to all final estimates of exchange rate volatility. In this way, the real year-on-year relationship of the exchange rate volatility is unaffected and the estimation of its natural logarithm is possible. Furthermore, when both countries are part of the EMU the exchange rate volatility is equal to zero and thus ERV_{ijt} is set to 0.

Stefano Schiavo (2007) has build on the findings provided by Brainard (1997), which reveal that horizontal FDI increases relative to exports when transportation costs and entry barriers increase. In order that this argument could be tested, Schiavo (2007) introduced an additional dummy variable that he set to 1 when only one of the countries has been part of the EMU and 0 otherwise. In this way the hypothesis that non-members of the EMU will be attracted to invest in countries part of the EMU is tested. The reasoning behind this idea is that countries which are not part of the EMU will be attracted to invest in production facilities in a EMU member and gain access to the markets of all other EMU members (Schiavo,2007). Although, the control of one EMU member is a useful one, it aggregates the effect of investor and recipient of investment. In this way it is left unclear whether the euro increases FDI flows when the country member of the EMU is the source of the investment or recipient of the investment. This issue has been tackled in the research of Pavlos Petroulas (2006) as he includes three separate dummy variables to account for the investor and recipient membership in the EMU. In his research Petroulas (2006) introduced EMU11, which takes the value of 1 for investment flows from EMU country to EMU country, EMU12 equals 1 when the investment flows originate from non-EMU countries and go to EMU countries and EMU21 when the investment flows originate from EMU countries to non-EMU countries. These dummy variables will be borrowed from Pavlos Petroulas' research and used in order to determine the separate effects originating from the euro. Within this paper the dummy variables will be EMU_{it} is equal to 1 otherwise 0 when the country source of the FDI is part of the EMU, EMU_{jt} is equal to 1 otherwise 0 when the country recipient of the investment is part of the EMU. The inclusion of these variables should be able to explain whether an increase of FDI flows within the EMU is only possible at the expense of commercial links deterioration as suggested by Micco *et. al.* (2003).

In order to reduce omitted variables bias another dummy variable is included, which accounts for the creation of the European Union. EU_{ijt} is set to equal 1 when both countries are part of the European Union and 0 otherwise. By introducing this dummy variable the model should be able to distinguish the effect of the euro as the introduction of the Euro is always preceded by the membership within the EU. In this way if there is any significant effect such as an increase or decrease of FDI inflows within the EMU members at the year of their entry the EMU_{ijt} will be able to capture it more accurately as all previous effects following from the membership within the European Union will already be accounted for. Therefore, the EU_{ijt} is going to indicate the effect on FDI inflows when a country joins the European Union.

As it was mentioned above, the majority of academics researching the euro effect did not account for both FDI flows and trade in their gravity model formulations. That is why an explanatory variable for trade will be included here in order to estimate whether FDI and trade substitute or complement each other. $TRADE_{ijt}$ stands for the net exports between country i and j from the perspective of country i. The relationship between FDI and trade will also try to shed some light on the long debated impact of the euro on trade.

$$\ln FDI_{ijt} = \alpha_{ij} + \tau_t + \ln \beta_1 GDP_{it} + \ln \beta_2 GDP_{jt} + \delta_0 EMU_{ijt} + \delta_1 EMU_{it} + \delta_2 EMU_{jt} + \gamma EU_{ijt} + $$
$$+ \zeta ERV_{ijt} + \phi TRADE_{ijt} + \varepsilon_{ijt} \quad (2)$$

In the euro effect on trade literature it is common to include some additional controls that could be used for robustness checks of the gravity model. Such controls are distance between the capitals of country i and country j and common language. Both controls are going to be included in the gravity model developed in this paper. Within the gravity model distance will be represented by $DIST_{ij}$ and the language will be represented by $LANG_{ij}$. The use of $DIST_{ij}$ aims to reveal whether two countries tend to have higher FDI flows or lower ones with increasing distance between them. $LANG_{ij}$ captures the effect of common language between two countries, which might act as an incentive for higher trade (Rose, 2000) or FDI flows, as the information barriers are suggested to be lower than in the case of countries with two different languages.

The updated gravity model including all above mentioned explanatory variables reads as following:

$$\ln FDI_{ijt} = \tau_t + \ln \beta_1 GDP_{it} + \ln \beta_2 GDP_{jt} + \delta_0 EMU_{ijt} + \delta_1 EMU_{it} + \delta_2 EMU_{jt} + \gamma EUi_{jt} + \\ + \zeta ERV_{ijt} + \phi TRADE_{ijt} + \lambda LANG_{ij} + \ln \mu DIST_{ij} + \varepsilon_{ijt} \quad (3)$$

The data on annual FDI flows has been collected from the OECD International Direct Investment Statistics and it covers 36 countries for 23 years from 1985 to 2007[2]. As noted by Stefano Schiavo (2003) FDI flows data has an inherited problem of high year to year variability due to the irregularity of high value foreign investments. The high FDI variability is also highlighted by Christopher Taylor (2007) who studied the FDI flows by looking at the Mergers and Acquisitions (M&A) deals, which constitute a big share of FDI in a given year. Taylor (2007) notes that the high levels of FDI are mainly caused by some mega M&A deals. Another problem concerning FDI flows is the big number of missing values, as not all countries report them and if they do report them they are not consistent every year. That is why the inclusion of countries which are not part of either the European Union or the EMU but are reporting their FDI outflows and inflows are increasing the number of observations and supporting the creation of a more robust data set.

The problem of missing values has been tackled by Loungani *et. al.* (2002) and Mody *et. al.* (2003) trough taking-three year averages, but this shortens the sample, which is not a desirable outcome, when the data sample is already limited (Schiavo, 2007). Within this paper the FDI_{ijt} is equal to the FDI outflows from country i to country j. In this way the FDI flow is seen as an inflow from the perspective of country j. It should be noted that FDI outflows are

[2] The countries covered within the study are Australia, Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Republic of Korea, Latvia, Lithuania, Luxembourg, Malta, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom and United States

never equal to FDI inflows for a country which is both reporting and partner, although in theory they should be the same. That is why it is subjective to judge which estimate is the better one. Some academics take an average between these two estimates but in this way they are left with fewer observations, because not every country is both reporting and partnering. Furthermore, it is not sure whether the average of both, reporter's FDI inflows and partner's FDI inflows, is a better estimate of the true value of FDI flows. All figures used within this paper were already denominated in US dollars when they were obtained from the databases.

In order that the natural logarithm of the FDI flows is computed, Stefano Schiavo (2007) proposed transformation of the data to be applied because some of the annual figures are recorded negative values and this imposes an econometric problem. In order to correct for negative values the following conditions will be imposed on the data selection:

$FDI_{ijt} = 1 + flow_{ijt}$

$flow_{ijt} = 0$ where $investment_{ijt} \leq 0$ and

$flow_{ijt} = investment_{ijt}$ where $investment_{ijt} > 0$

(Schiavo ,2007, p. 547)

Annual figures for both Gross Domestic Product (GDP) and the Gross Domestic Product Deflators were obtained from the International Monetary Fund (IMF) - World Economic Outlook database.

Exchange rates data was obtained from the IMF - International Financial Statistics database. The exchange rates are expressed in national currencies equal to 1 SDR, which represents a unit of money created by the IMF that is a weighted average of various convertible currencies. The exchange rate between each national currency and the SDR has been the basis for computation of the exchange rates between countries i and j. In order to be able to compute the natural logarithm of the exchange rate volatility the following transformation of the data has been done:

ERV_{ijt} = 1+ exchange rate $volatility_{ijt}$

Trade data is collected from the IMF - Direction of Trade Statistics. The imports and exports have been expressed in US Dollars when obtained from the database, thus not requiring any currency conversion. In order to compute the real net exports, the US Consumer Price Index (CPI) was used. This approach is a common one, which has been used by Micco *et. al.* (2003) and Schiavo (2007) who suggest that neither national deflator is more appropriate than the other one.

In order for the dummy variable $LANG_{ij}$ to be set to 1 or zero data for each country was collected from the Central Intelligence Agency (CIA) World Fact Book.

Distance between the capitals of two countries is computed by Daft Logic with the use of the 'great circle' formula, which is commonly applied in other researches such as Rose (2000) and Micco *et. al.* (2003).

Presentation and analysis of the findings

Considering all previous studies discussed within the literature review, Table 1 presents some expected signs of the explanatory variables coefficients. Both GDP_i and GDP_j can be expected to result in positive coefficients because with the growth of one country's economy its attractiveness should also increase. GDPs are also good indicator of market size, which is a key consideration when FDI is planned. EMU_{ijt} is the key explanatory variable of interest to this research paper. Its coefficient sign is expected to be positive, which means that the elimination of the exchange rate uncertainty and the possibilities offered by the broader EMU community increase FDI inflows within the member countries. In addition to this core explanatory variable, both EMU_{it} and EMU_{jt} will aim shed some light on the FDI flows to and from non-EMU countries. As estimated by the previous studies of Pavlos Petroulas (2006), Stefano Schiavo (2007), Andrew Rose (2000) and Micco *et. al.* (2003), the euro did not deteriorate the commercial links with the other non-members. However, those studies had limited time span for their observations mostly up until 2003, which might not be a highly representative sample.

The EU_{ijt} is expected to result in a positive coefficient because the creation of the European Union and the development of a single market ease the free movement of goods, services, capital and labour. That is why the FDI flows are expected to become higher among EU countries. Exchange rate volatility (ERV_{ijt}) is expected to be negatively correlated to the FDI inflows as it creates an uncertainty for future profits and is considered by many academics to be a significant barrier for investments (Campa, 1990; Kiyota and Urata, 2004; Schiavo, 2007). However, as the academic debate of how the exchange rate volatility influences FDI has not settled yet, the findings below will contribute to the existing literature. $TRADE_{ijt}$ is an explanatory variable, which can be either positively or negatively correlated with FDI flows, because trade can be either a complementary or substitute for it. The estimation of this explanatory variable will add to the knowledge of researchers who study trade and FDI relationship.

The first additional explanatory variable representing common language - $LANG_{ij}$ is expected to have a positive sign as sharing a common language can help both countries to overcome information barriers. The second additional variable representing the distance between the capitals of two countries - $DIST_{ij}$ is expected to have a negative coefficient as with the rising distance between two countries, information transfer becomes more difficult (Bun and Klaassen, 2007).

Table 1 Expected Signs of Explanatory Variables

Dependent Variable	Explanatory variables	Coefficient	Expected Sign
ln FDI_{ijt}	ln GDP_i	$\beta 1$	+
	ln GDP_j	$\beta 2$	+
	EMU_{ijt}	$\delta 0$	+
	EMU_{it}	$\delta 1$	+
	EMU_{jt}	$\delta 2$	+
	EU_{ijt}	γ	+
	ERV_{ijt}	ζ	-
	$TRADE_{ijt}$	ϕ	+/-
	$LANG_{ij}$	λ	+
	ln $DIST_{ij}$	μ	-

Simple graphical representation of FDI outflows

The graphs below represent FDI outflows in millions of US Dollars for the years between 1985 and 2007. Figures 1 and 2 represent FDI outflows from countries which are non-members of the EMU to countries which are part of the EMU and to countries which are only part of the European Union. Figures 3 and 4 represent FDI outflows from EMU countries to countries which are only members of the EU and to other EMU countries.

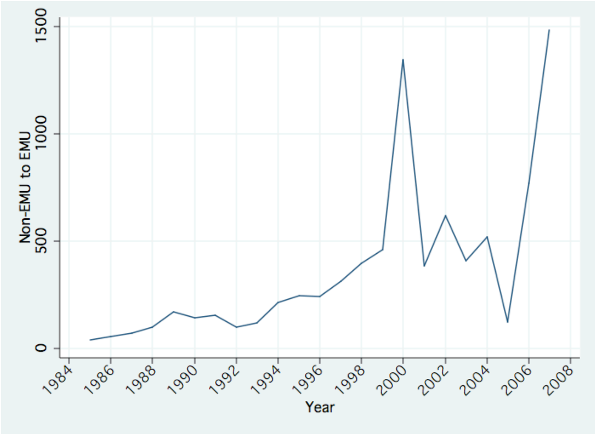

FIG. 1 FDI outflows in (Non-EMU to EMU)

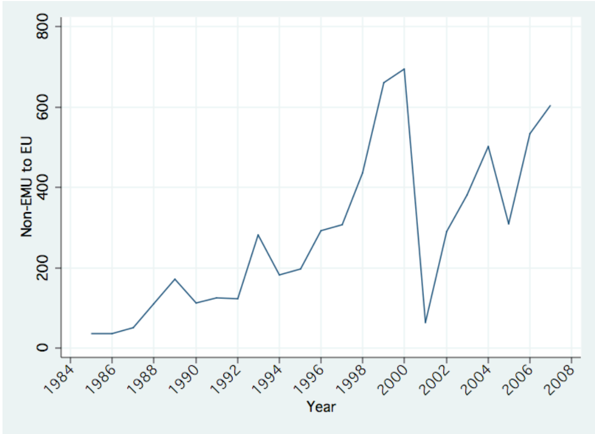

FIG. 2 FDI outflows (Non-EMU to EU)

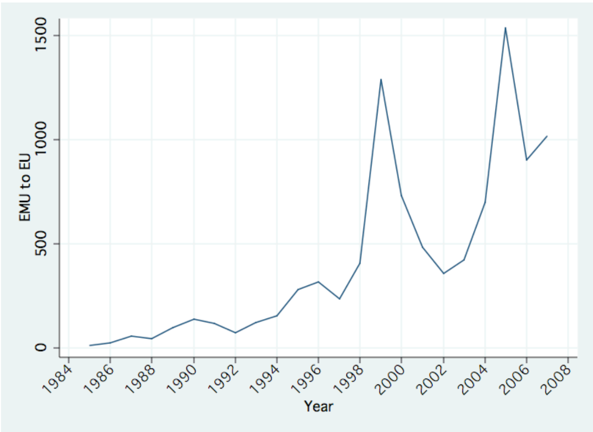

FIG.3 FDI outflows (EMU to EU**)**

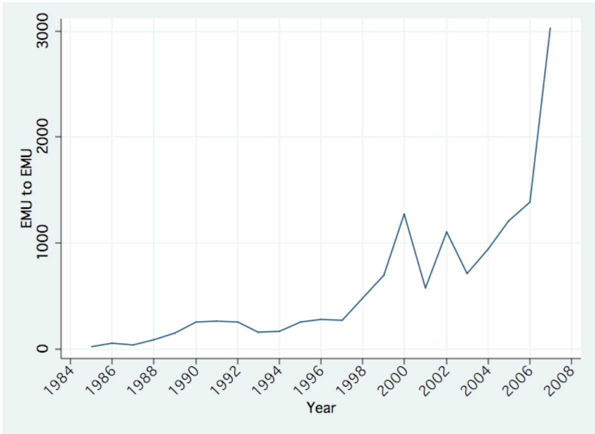

FIG.4 FDI outflows (EMU to EMU)

A sharp increase of FDI outflows in the years between 1998 and 2000 to the countries which became part of the EMU in 1999, can be observed in all figures. Figure 1 illustrates the FDI outflows from non-EMU members to the EMU countries. The sharp increase of FDI outflows in 1999 is clear, but it has been followed by a sharp decline after the year of 2000. The reason for this decline is most commonly associated with the crisis in the US which followed the 'IT bubble' burst in 2000 (Taylor, 2007). Only after 2005 the FDI outflows seem to have risen sharply again up to the levels from 1999. Similar pattern can be observed on figure 2 where non-EMU member countries invested in the countries only part of the EU.

However, the effect has been even more severe as in 2000 when the FDI outflows have fallen to the levels of the 1980s and reached less than 200 million US dollars.

Figure 3 illustrates the FDI outflows from EMU countries to countries which are only part of the EU. It seems that not only the EMU countries received higher levels of FDI inflows from non-EMU countries in 1999, but that they also had significant increase in their investments to other EU countries. This positive effect might be explained with the creation of the Euro, which offered higher possibilities for money borrowing and capital rising and thus increased the opportunities for foreign investment (European Commission-Consumer benefits, 2010).

The last figure above illustrates the FDI outflows from EMU members to EMU members. It can be seen that the FDI outflow spikes in 1999 similarly to the other figures, but that it fell in 2001 and managed to recover much quicker than the FDI outflows from the other countries. Furthermore, figure 4 shows that FDI outflows have more than doubled between 1999 and 2007, from less than 1 bn. to 3 bn. US Dollars, which might mean that the Euro has impacted the intra-EMU FDI flows positively. The relative comparison between all FDI outflows could be seen in Fig. 8, 9 and 10 in Appendices.

Overall, all figures above indicate a trend of increasing FDI outflows to the countries part to the EMU between 1998 and 2000. The time of this upward sloping trend coincides with the introduction of the Euro, which could be the reason causing it. Another trend which is evident in the figures above is that in almost all of them the growth of FDI outflows has been followed by a sharp decrease just after 2000. Some previous researches suggested that this decrease of FDI outflows is closely correlated with the burst of the 'IT bubble' in the US.

Results of Regressions with Fixed Effects

Below, Table 2 represents the results from gravity regressions (1) and (2). The explanatory variables have been added one by one in order to represent the changing coefficients within the regressions. All results include country-pair and time fixed effects.

The first variable from the regressions is GDP_{it} its coefficient' value stays positive and significant in all variations of equation (1) and (2). This result could be explained by assuming that when the economy of the investment source country is growing its investments abroad are also growing. The results contradict with previous studies (Petroulas, 2007; Schiavo, 2007) as they found that the country source of the investment has insignificant impact over the FDI flows. The second explanatory variable GDP_{jt} shows significant negative coefficients throughout the whole regression, which can be caused due to omitted variables in models (1) and (2).

The most important explanatory variable within the regressions EMU_{ijt}, shows positive significant coefficients in almost all variations of regression models (1) and (2). This means that countries which are both part of the EMU have a significant increase of FDI inflows when they join. This increase of FDI inflows varies between 25% and 40%. Although the EMU_{ijt} variable stays positive within the majority of regressions, when EMU_{it} is added EMU_{ijt} changes its value to negative while EMU_{it} is significant and positive. EMU_{it} represents all cases in which the investor country is part of the EMU. It has constant significant and positive sign throughout all variations of the regressions. This could mean that when the investment source country is part of the EMU it increases the FDI inflows in the other country. Similar observation was evident above in figure 3, which suggests that countries part of the EMU increased their FDI outflows to other EU countries after they have joined in.

The sudden change in signs of EMU_{ijt} becomes clearer when EMU_{jt} is added. EMU_{ijt} returns to its positive sign in all later variations of regression (2), while EMU_{jt} stays negative throughout all regressions. These results can interpret that those countries, which are part of the EMU do not receive higher FDI inflows than the rest of the European Union countries after they have adopted the euro. However, this result can also be caused by other factors influencing the global FDI flows. Furthermore, the academics researching the euro effect on trade, also reached the conclusion that overall, the euro did not cause trade diversion from non-EMU members (Rose, 2000; Micco *et. al.,* 2003; Bun and Klaassen, 2007). An additional regression was run in order to test the suitability of EMU_{jt} and whether it will result in a positive coefficient if the regression includes only countries part of the EMU. The results are presented in Appendices - Table 4 and indicate that when the sample includes only countries which are part of the EMU then the dummy variable EMU_{jt} becomes positive but fails to pass the 5% significance level. Overall, the effect on FDI inflows within countries part of the EMU is about 25% increase[3].

The next explanatory variable EU_{ijt} aims to illustrate the effect of the membership within the European Union. The coefficient of the variable has been positive and significant and is expressed as an increase in FDI inflows by exactly 31%. Furthermore, the variable met the expected sign, which reconfirms the hypothesis of previous studies that the EU increases FDI as it provides access to the Single European Market (Schiavo, 2007).

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[3] The commutative euro effect could be calculated as following: exp.($\delta_0+\delta_1+\delta_2$)-1

Table 2 Ordinary Leased Squares (OLS) Regressions

	1	2	3	4	5	6
GDP it	0.341 (2.94)***	0.401 (3.47)***	0.445 (3.85)***	0.422 (3.65)***	0.415 (3.60)***	0.407 (3.53)***
GDP jt	-0.185 (-7.00)***	-0.16 (-6.07)***	-0.151 (-5.74)***	-0.161 (-6.10)***	-0.157 (-5.91)***	-0.157 (-5.92)***
EMU ijt	0.231 (3.10)***	-0.19 (-2.14)***	0.301 (2.30)***	0.34 (2.59)***	0.332 (2.53)***	0.338 (2.58)***
EMU it		0.685 (8.54)***	0.404 (4.16)***	0.363 (3.72)***	0.352 (3.61)***	0.363 (3.72)***
EMU jt			-0.497 (-5.11)***	-0.474 (-4.87)***	-0.463 (-4.74)***	-0.476 (-4.87)***
EU ijt				0.265 (4.27)***	0.265 (4.27)***	0.27 (4.35)***
ERV ijt					-0.039 (0.094)	-0.036 (-1.59)
TRADE ijt						-0.0000148 (-2.39)***
Country-pair Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6348	6348	6348	6348	6348	6348
R^2 (within)	0.32	0.33	0.33	0.34	0.34	0.34

Note: Absolute t statistic values in parentheses; *** significant at 1%, country pair fixed effects and time fixed effects not reported

In order to visualise the significant increase of FDI flows after countries join the EU, figure 5 represents the averaged FDI inflows in 10 countries which entered the European Union in 2004[4]. The surge of FDI inflows since 2004 can be well reasoned with the result

[4] The countries which joined the EU in 2004 are: Cyprus, Malta, Slovenia, Slovakia, Hungary, Poland, Estonia, Lithuania, Latvia, Czech Republic

obtained for EU_{ijt}. Previous research done by Bajo-Rubio and Sosvilla-Rivero (1994) and Barrell and Pain (1997) concluded that after Spain joined the EU in 1986 they have received significantly high FDI inflows. Therefore the result estimated for EU_{ijt} is in line with those previous studies and reconfirms their findings.

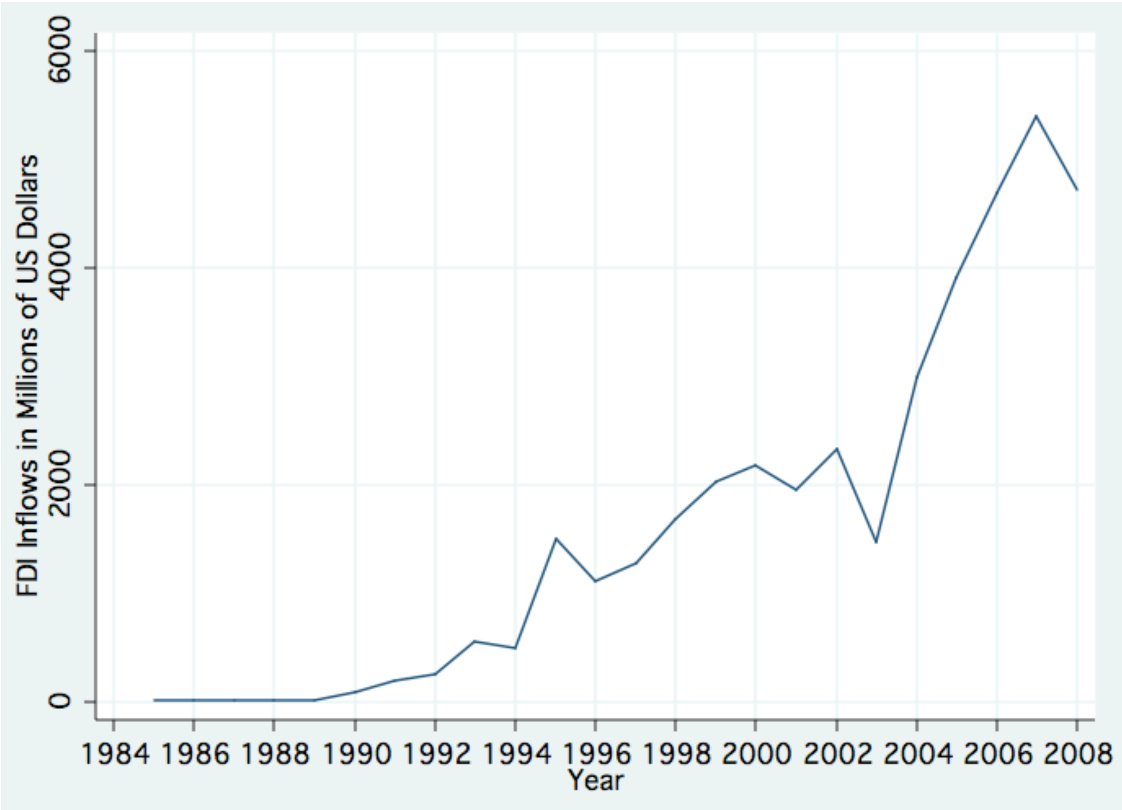

FIG.5 FDI inflows in countries joining EU in 2004 (mil. US Dollars)

The next variable studied by regression (2), Exchange rate volatility, has resulted in the expected negative coefficient, but it was estimated not to be significant. This result supports previous empirical studies, which aimed to estimate whether the exchange rate volatility has any significant effect on FDI and who reached to the same conclusions (Baily *et al.,* 1986; Koray and Lastrapes, 1989). However, the results might not have been significant due to the high number of different countries within the regression sample, which could have offset the exchange rate volatility. As noted by Ozturk and Kalyoncy (2009), the exchange rate volatility could have negative or positive effects on FDI flows depending on the country, thus it is possible that this effect will be offset when the sample includes many different countries.

The last explanatory variable from equation (2) $TRADE_{ijt}$ resulted in a negative sign, which can be interpreted as that trade and FDI are substitutes. These results reconfirm the studies of Gopinath et. al, 1999, Ramster, 1991 and Svenson, 1996, which claim that trade and FDI substitute each other. Furthermore, the overall results contradict with the hypothesis of Nigel Pain (2002) that countries which join the EMU will suffer from decreasing levels of FDI, as they will benefit from lower barriers of trade and lower uncertainty which will induce higher trade. On the contrary, EMU countries seem to have benefited from increased levels of FDI inflows and considering the recent studies of Bun and Klaassen (2007) the euro caused only a slight increase of trade, which is in line with the more significant increase of FDI inflows. Furthermore, the higher increase of FDI flows which seems to substitute trade suggests that after the creation of the EMU, there has been more horizontal FDI, which has the characteristics to substitute trade compared to vertical FDI which usually complements trade.

Results of Regressions with Random Effects

In order for both additional explanatory variables $LANG_{ij}$ and $DIST_{ij}$ ti be included the country-pair fixed effects are excluded. This is done due to the time invariant nature of both explanatory variables that prevents their inclusion in models with fixed country-pair effects.

The results of regression (3) are presented in Table 3 below. The same pattern of variables inclusion was followed as with regressions (1) and (2) presented in Table 2. In this regression the GDP_{it} of the investor country is strongly positive as observed to be in the previous regressions. Its significance rises when additional explanatory variables are added to the equation. When the regressions are run with random effects the GDP_{jt} of the investment recipient country becomes positive but insignificant in all variations of the gravity model. This might mean that the economic growth and market size of the investment recipient country do not influence the investment decision, specifically in the case of countries part of the EMU.

Table 3 OLS Regression with additional explanatory variables

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
GDP it	0.386 (9.30)***	0.391 (9.48)***	0.395 (9.56)***	0.397 (9.65)***	0.398 (9.68)***	0.397 (9.65)***	0.411 (10.42)***	0.724 (16.01)***
GDP jt	-0.015 (-0.60)	0.013 (0.53)***	0.022 (0.86)	.000 (0.01)	0.006 (0.24)	0.006 (0.24)	0.011 (0.46)	0.043 (1.65)
EMU ijt	0.403 (4.90)***	-0.097 (-0.99)	0.207 (1.46)	0.262 (1.85)	0.25 (1.76)	0.257 (1.81)	0.209 (1.48)	0.203 (1.43)
EMU it		0.799 (9.19)***	0.629 (6.05)***	0.542 (5.19)***	0.524 (5.01)***	0.534 (5.10)***	0.546 (5.25)***	0.497 (4.75)***
EMU jt			-0.312 (-2.96)***	-.282 (-2.68)***	-0.264 (-2.51)***	-0.276 (-2.62)***	-0.273 (-2.61)***	-0.276 (-2.65)
EU ijt				0.471 (7.00)***	0.471 (7.00)***	0.474 (7.05)***	0.465 (6.95)***	0.399 (5.90)***
ERV ijt					-0.069 (-2.61)***	-0.067 (-2.54)***	-0.066 (-2.51)***	-0.064 (-2.43)***
TRADE ijt						-0.0000136 (-1.98)***	-0.000013 (-1.94)	-0.0000117 (-1.70)
LANG ij							3.13 (9.42)***	2.36 (7.08)***
DIST ij								-0.615 (-7.54)***
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	6348	6348	6348	6348	6348	6348	6348	6348
R^2 (within)	0.36	0.36	0.37	0.37	0.37	0.37	0.37	0.37

Note: Absolute t statistic values in parentheses; *** significant at 1%, time fixed effects not reported

The dummy variable EMU_{ijt} which is included in order to capture the euro effect on FDI inflows when both countries are part of the EMU is positive and significant only in the first variation of the regression. Afterwards, it becomes insignificant as EMU_{it} and EMU_{jt} are added which seem to split and absorb the overall euro effect. The positive impact of the EMU on FDI inflows varies now between 40% and 60%[5]. Furthermore, the EU dummy variable stays positive and significant as within the previous regressions, presented in Table 2. However within regression (3) it is predicted that the EU membership increases the FDI inflows between 50% and 60%[6] compared to 31% in regression (2).

The following variable in regression (3) which accounts for the exchange rate volatility results in negative value and stays significant in all variations of the model in comparison with the results of regression (2), where its value was negative but insignificant. These negative results are in line with the arguments of Campa (1990), Kiyota and Urata (2004) and Schiavo (2007), who suggest that exchange rate volatility acts as a barrier for FDI. Their arguments assume that the exchange rate volatility adds uncertainty to the decisions made by companies to engage in FDI, because companies' cashflows and profits will be harder to estimate and more expensive to hedge. The significance of ERV_{ijt} suggests that companies both outside the EMU and within the EMU will be reluctant to engage in FDI when exchange rate volatility is present. Figure 6 represents the exchange rates of the US Dollar and the Euro between 1999 and 2007 and the World FDI outflows. As it can be seen, the euro became stronger than the US dollar towards the end of 2001, just before the euro notes were printed. Figure 7 represents the FDI outflows from the US, the EMU and the World. Combined, the

[5] The effect of the EMU is calculated as follows: exp.$(\delta_1+ \delta_2)$-1

[6] The effect of the EU is calculated as follows: exp.(γ)-1

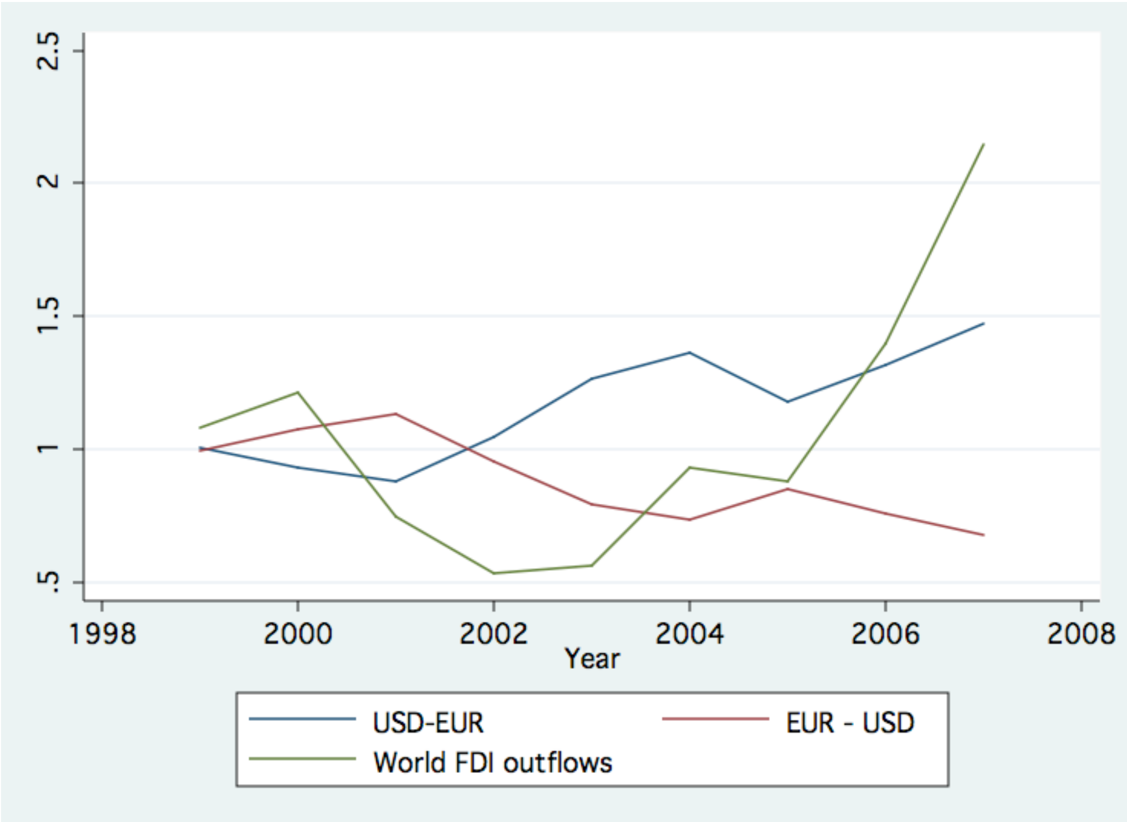

Fig. 6 US Dollar - Euro exchange rates and World FDI outflows (tr, USD) (1999-2007)

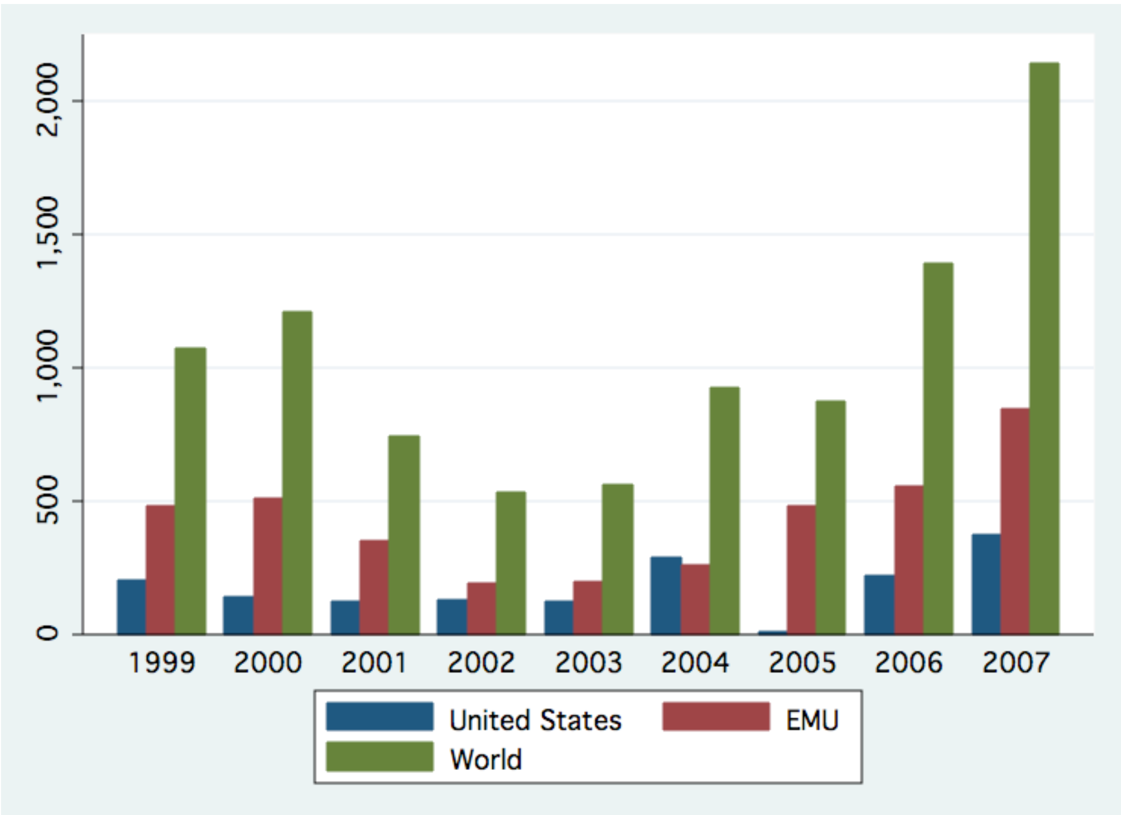

Fig. 7 US, EMU and Total World FDI outflows (in mil. US Dollars)

US and the EMU countries represented two thirds of the total world FDI outflows between 1999 and 2007 (See Fig. 11 in Appendices).

The exchange rate volatility between the US dollar and the Euro seems to have played a significant role for the diminished FDI outflows in the years between 2001 to 2006. Furthermore, after running a simple linear regression for the period 2001 and 2006, presented in Table 5 in the Appendices, the obtained results suggest that the exchange rate US Dollar/ Euro has a significantly negative correlation with the World FDI outflows.

A closer analysis of Fig. 6 illustrates this negative correlation between the US Dollar/Euro exchange rate and the world FDI outflows. This might mean that when the US Dollar weakened against the Euro, the World FDI outflows dropped significantly. As evident from Fig. 6 the Euro appreciated against the US Dollar after the middle of 2001 and since then it has continued to rise. Furthermore, as noted above in the analysis of Figures 1 to 4, the sudden drop of FDI outflows after the 2000 is suggested to be the consequence of the crisis, following the burst of the US 'IT bubble' also in 2000 (Taylor, 2007). Therefore, the appreciation of the Euro against the US Dollar, which started in 2001 seems to have boosted the overall negative effect and to further diminish the total FDI outflows in the world.

An additional explanation which supports the argument for the negative effect of the US Dollar/Euro exchange rate on the World FDI outflows might be that the US Dollar occupied been 70% and 64% of world's reserve currencies between 2001 and 2007 respectively[7]. That is why the sharp depreciation of the US Dollar against the Euro might have caused not only a fall of US FDI outflows but also a fall of FDI outflows from countries which held the US

[7] IMF- Currency Composition of Official Foreign Exchange Reserves (2009): http://www.imf.org/external/np/sta/cofer/eng/cofer.pdf)

Dollar as their reserve currency. This hypothesis is in line with the argument of Kiyota and Urata (2004) that when host country's currency appreciates against the home country's currency, investments in the host country fall. After analysing the factors which could have influenced the World FDI flows it seems reasonable to expect that the exchange rate volatility will have a negative impact on FDI inflows and thus the significantly negative coefficient of ERV_{ijt} seems to predict correctly this relationship.

The argument that the US Dollar depreciation against the Euro has diminished the World FDI outflows could also shed some light on the significantly negative coefficient of the EMU_{jt} in equation (2). Considering that the studied sample includes a high number of countries which held the US Dollar as their reserve currency and the EMU countries held the Euro as a reserve currency, it seems plausible to expect that only a part of the diminished World FDI outflows will reach the EMU countries. Therefore, the reason for the negative coefficient of EMU_{jt} might not be that the countries part of the EMU receive less investments than the rest of the world, after they join. Part of the reason for the negative coefficient of EMU_{jt} can also be attributed to the weakening of the US Dollar against the Euro which might have caused all world FDI outflows to fall, including the ones to the countries part of the EMU. Previous research done by Schiavo (2007) and Petroulas (2007) studied samples of data up until 2003, which deterred them from observing this effect of the appreciating Euro against the US Dollar. That is why, both of the studies found a positive coefficient of their similar variables which accounted for FDI inflows to the EMU members from non-members.

Furthermore, the explanatory variable for $TRADE_{ijt}$ which tries to describe the relationship between trade and FDI is again negative and significant, but only in the first variation when neither $LANG_{ij}$ or $DIST_{ij}$ are included. Although not significant in the last two variations of equation (3), the coefficient $TRADE_{ijt}$ remains negative.

Language is one of the additional variables, which is most commonly met in previous research studying the FDI flows and trade. Its inclusion in gravity models studying the currency union effect on trade started in the research of Andrew Rose (2000); however, since then the approach of inclusion time invariant explanatory variables has been criticised as it was assumed to lack the power to control for omitted variables and thus might lead to bias results (Bun and Klaassen, 2007). On the one hand, estimating gravity models with random effects and including additional time-invariant variables is a commonly used approach that delivers robust results. On the other hand when controlling for country-pair fixed effects the time invariant variables are automatically dropped and the expectation is that the generated fixed effects dummies are capable of absorbing the majority of omitted variables (Bun and Klaassen, 2007); however, the academics are still using both fixed and random effects when estimating gravity models in their papers. Therefore, the explanatory variable for common language between countries 'i' and 'j' has been included within equation (3). Its coefficient is positive as expected and stays significant for all variations of the regression. Similar results are reached by all previous empirical studies, which reconfirms that shared language leads to increased FDI inflows, perhaps as information transfer barriers are lowered (Rose, 2000,2002; Micco *et. al.*, 2003).

The last explanatory variable within equation (3) is aimed to capture the effect of the distance between both countries 'i' and 'j'. The coefficient of $DIST_{ij}$ meets the expected negative sign and is significant. This result suggests that FDI flow diminishes with the increasing distance between two countries. That is why, it can be expected that two countries which are closer to each other will have higher levels of FDI flows, compared to countries which are further away from each other. The result for distance estimated in equation (3) is also in line with previous research.

Overall, the results of regression (3) presented in Table 3, which included two additional controls and no country-pair fixed effects, showed similar results as regression (2). However, it was found that in regression (3) the overall euro effect on FDI inflows varied between 40% to 60%. Furthermore, the exchange rate volatility became negative and significant, which suggests that it could reduce FDI inflows. In the case of no country-pair fixed effects, trade was negative but insignificant, when both controls for language and distance were added. Finally, both language and distance resulted in the expected signs and passed the 5% significance level.

Additional control for ERM II

The gravity models discussed above tried to control for an extensive set of variables which might have influenced the FDI inflows from one country to another. As the results suggested, the euro has an overall positive impact of 25% to 60% on FDI inflows. Including additional explanatory variables such as EU_{ijt}, which accounted for membership of a country within the European Union, diminishes the chance of bias estimation which could have captured the effect of the Single European Market instead of the euro effect. In order to apply a robustness check of the model and to increase the control for omitted variables, an additional explanatory variable ERM_t has been added.

ERM_t is a dummy variable that represents the time when a country has participated in the Exchange Rate Mechanism II (ERM II). Since every European country that is going to become a member of the EMU has to pass at least two years within ERM II, it is useful to control for the effects following from the participation in it. ERM II requires every country to maintain a tight exchange rate fluctuation band of ±15% from the Euro. Therefore, the participation within the ERM II could be seen as a softer version of the EMU, which could affect FDI inflows positively (Schiavo, 2007).

The results from gravity models (2) and (3) after the inclusion of ERM_t can be found in Table 6 in the Appendices. The coefficient of the additional explanatory variable stays insignificant in both equations with and without country-pair fixed effects. However, the coefficients in all other variables do not differ much from the previously estimated ones in equations (2) and (3). By including ERM_t, the overall euro effect on FDI inflows has been estimated at 46%.

The results after controlling for any effects following from a country's participation within the ERM II suggest that even if its currency can fluctuate by a maximum ±15% from the Euro, this form of soft peg does not earn similar positive effects as the full participation within the EMU. The reason behind the insignificant effect of the ERM II might be that investors still associate the country's currency with uncertainty that could require additional costs for hedging.

Conclusions

This paper investigated the euro effect on the Foreign Direct Investment inflows in the countries part of the Economic and Monetary Union of the European Union. The study used panel data for 36 countries for the period 1985 to 2007. The countries used for the analysis can be separated in three broad categories: countries not part of the EMU, countries only part of the EU and countries part of the EMU.

The analysis of the data was initiated with a simple graphical representation of the FDI outflows between the three broad country categories in the years 1985 to 2007. The graphs outlined similar pattern of increased FDI outflows around 1999, between all analysed country categories and suggested that this could be caused by the creation of the EMU. Furthermore, after 2000 a trend of decreased FDI outflows from Non-EMU countries to both of the other groups of categories was evident, which might have been caused by the burst of the 'IT bubble' and the following crisis in the United States.

The analysis of the data utilised a log-linear gravity model, which is a commonly used method in previous similar studies. The regressions resulted in 14,490 observations but, due to some missing FDI values the total number of actual observations fell to 6,348 and 624 country-pair groups. In comparison with the few previous studies done on the topic, the majority of them had a sample which studied the years only up to 2003, that is why the lack of available data might have deterred them from obtaining enough representative observations. This paper builds on the studies done by, Kyriacos Aristotelous (2005), Stefano Schiavo (2007) and Pavlos Petroulas (2006), which found that the euro had a significant positive impact on FDI flows.

The results regarding the impact of the euro on FDI inflows in the countries part of the EMU proved to be positive and significant. This study shows that within the EMU the FDI inflows increase by 25% to 40% after a country becomes a member. Furthermore, when additional variables are added to account for the euro effect on FDI inflows and EMU members are only investors or recipients then the results show an overall positive and significant FDI inflow increase of 25% to 60%. This result suggests that the euro not only increases FDI inflows in other EMU countries but that it also has a positive effect on FDI inflows in other countries part of the EU. In other words, the creation of the EMU did not cause any FDI deterioration from countries which are only part of the EU or have opted out from the euro.

The results of the gravity model also showed that exchange rate volatility impacts FDI flows negatively and causes their reduction. An additional regression within this paper suggests that the exchange rate volatility between the US Dollar and the Euro was probably one of the major reasons for the significant drop of World's FDI outflows between the years 2001 and 2007. Since 2001, the Euro started appreciating against the US Dollar and in the meantime the total World FDI outflows were falling.

Previous studies, concentrated on studying either the euro effect on FDI or either the euro effect on trade. In the gravity model developed in this paper, the relationship between trade and FDI was also analysed. The estimated results of the study showed that there is a significant negative correlation between trade and FDI. Therefore it could be argued that FDI and trade are substitutes for each other. Furthermore, considering the relationship between the FDI and trade the results suggest that the EMU attracted more horizontal FDI than vertical FDI after the creation of the euro.

In addition to the factors used within the gravity model two explanatory variables were added in order to reduce the possibility of omitted variables bias. These variables are common language and distance between the capitals of both countries in each pair. On the one hand, it was found that language significantly increase FDI inflows when it is common in both countries. On the other hand distance is found to reduce FDI inflows significantly, when it is increasing. When both variables are added to the gravity model the overall effect of the euro on FDI inflows rises and reaches between 40% and 60%.

This research showed that the creation of the euro has significantly influenced the FDI inflows in the countries members of the EMU. Therefore, the members of the EMU benefit from the FDI inflows which are taught to lead to positive effects. Some of the general benefits of FDI inflows are resource-transfer that can translate into technology improvements and economic development. Other benefits following from the FDI inflows are increased employment rates and improved balance of payment effects. Overall, FDI inflows support the competitiveness and the economic growth of the recipient country.

Recommendations for further research

This paper tried to estimate the effect of the euro on FDI inflows in the countries part of the EMU. For the purpose of its analysis a log-linear gravity model was utilised, which is a common approach undertaken by researchers in this field. Although the gravity model included a comprehensive set of explanatory variables with the aim of obtaining higher robustness, the formulation is by no means exhaustive and some additional explanatory variables might improve its predictive ability. However, due to the time scale of this research, inclusion of such additional variables has not been feasible.

Future research could also concentrate on the inclusion of additional data, which will account for all new members of the EMU such as Cyprus, Malta, Slovakia and possibly Estonia.

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Appendices

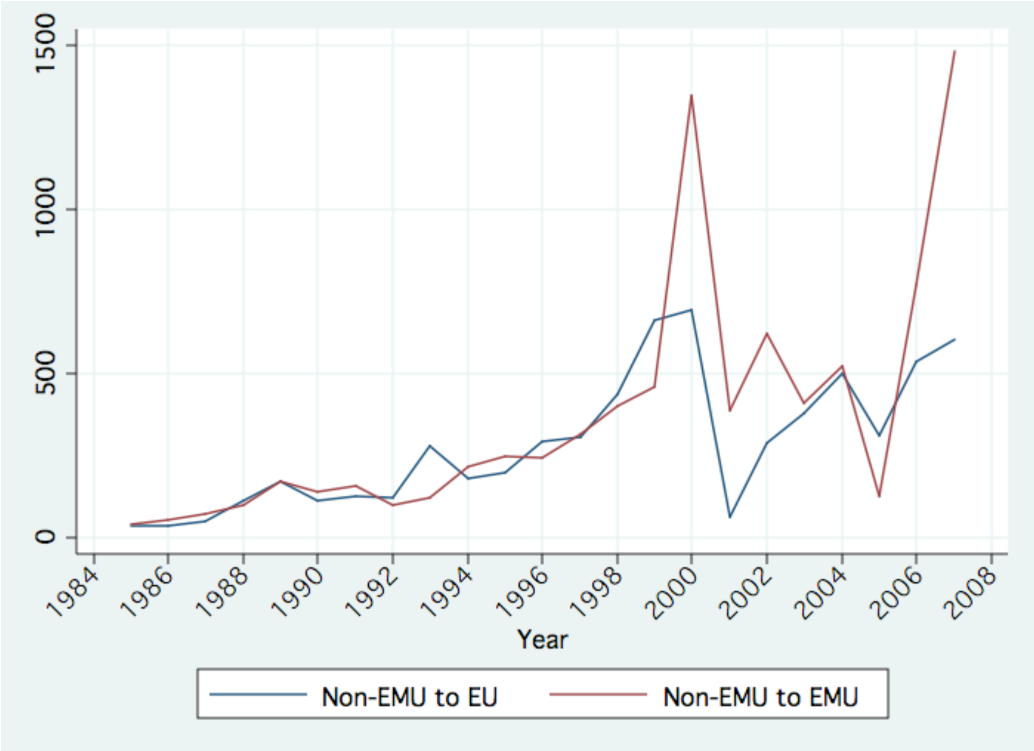

FIG. 8 FDI outflows from Non-EMU to EU and EMU (mil. US Dollars)

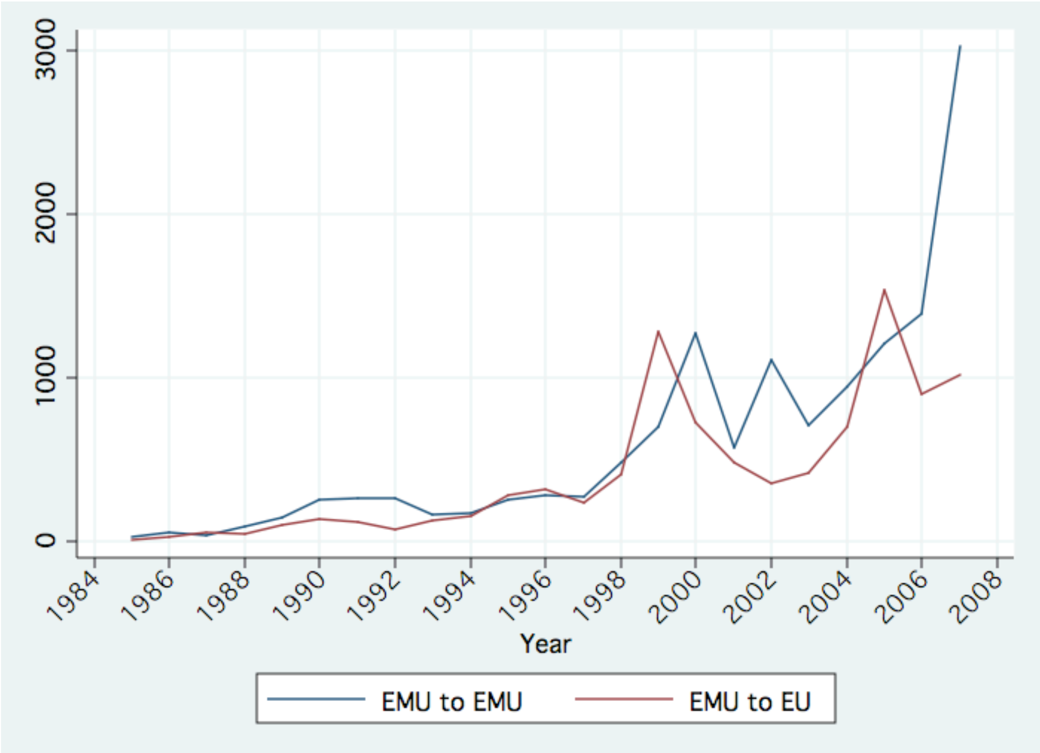

FIG. 9 FDI outflows from EMU to EMU and EU (mil US Dollars)

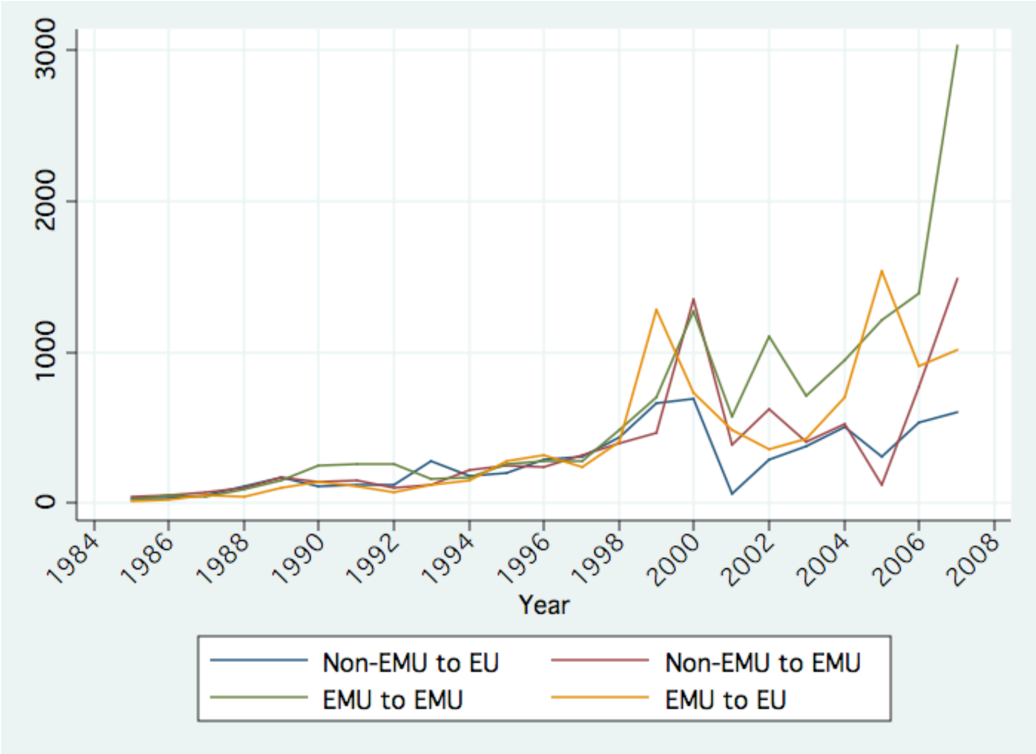

FIG. 10 Combined FDI outflows (mil. US Dollars)

Table 4 OLS Regression of EMU to EMU sample

GDP it	1.369 (6.17)**
GDP jt	0.942 (5.34)**
EMU it	1.16 (7.39)**
EMU jt	0.216 (1.29)
EU ijt	0.259 (1.97)**
ERV ijt	0.108 (1.76)
TRADE ijt	-0.0000312 (-3.35)**
Country-pair Fixed Effects	Yes
Time Fixed Effects	No
Observations	2013
R^2 (within)	0.34

Note: Absolute t statistic values in parentheses; ** significant at 5%, country pair fixed effects
not reported

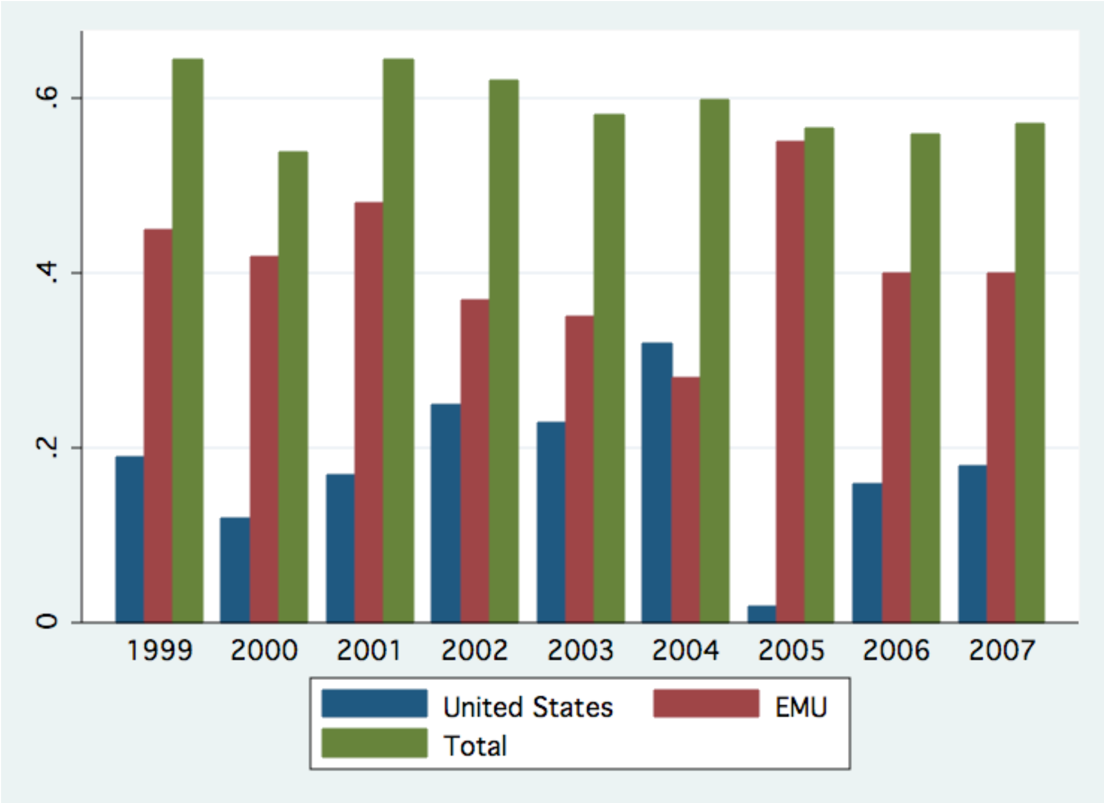

Fig. 11 US and EMU FDI outflows represented in % of total world outflows

Table 5 Simple Linear Regression - World FDI outflows (2001-2006)

	Coeff.	Std. Err.	t	p > t	[95% Conf. Interval]	
US Dollar/ Euro	-1670.811	216.0572	-7.73	0.016	-2600.43	-741.1924
US FDI outflows	-1.90293	0.4455295	-4.27	0.051	-3.819888	0.0140291
Growth of World FDI outflows	1270.061	145.4147	8.73	0.013	644.3923	5516.144
R^2	0.9766					
Adj. R^2	0.9415					

Note: both the US FDI outflows and the Growth of World FDI outflows were included in order to strengthen the explanatory power of the linear regression

Table 6 OLS Regression including ERM II

GDP it	0.423 (3.30)**	0.724 (16.03)**
GDP jt	-0.219 (-7.40)**	0.044 (1.68)
EMU ijt	0.353 (2.42)**	0.204 (1.44)
EMU it	0.38 (3.48)**	0.487 (4.62)**
EMU jt	-0.539 (-4.89)**	-0.291 (-2.75)**
EU ijt	0.297 (4.23)**	0.411 (5.94)**
ERM t	0.085 (1.00)	-.071 (-0.82)
ERV ijt	-0.037 (-1.44)	-0.063 (-2.40)**
TRADE ijt	-0.0000169 (-2.46)**	-.0000116 (-1.70)
LANG ij		2.363 (7.08)**
DIST ij		-0.614 (-7.54)**
Country-pair Fixed Effects	Yes	No
Time Fixed Effects	Yes	Yes
Observations	6348	
R^2 (within)	0.38	

Note: Absolute t statistic values in parentheses; ** significant at 5%, country pair fixed effects not reported