

## **Effects of Currency Unions on Foreign Direct Investment Inflows: The European Economic and Monetary Union Case**

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**ABSTRACT:** Reducing exchange rate and inflation, transaction costs and achieving the economic convergence among member countries are major causes of establishing a monetary union. This paper examines the effects of European Economic and Monetary Union on inflows of foreign direct investments to the Eurozone by using panel data from 16 Group of 20 countries for the period 1999-2012. We found that real GDP, GDP growth rate and exchange rates of 16 Group20 countries affect inflows of real foreign direct investment positively while exchange rate volatility, inflation volatility and distance affects inflows of real foreign direct investment negatively. So European Economic and Monetary Union contribute to the inflows of foreign direct investment by reducing the exchange rate volatility, inflation volatility and distance and supporting economic growth.

**Keywords:** European Economic and Monetary Union; Group 20 Countries; Foreign Direct Investment; Panel Data Analysis.

**JEL Classifications:** E42; F15; F36

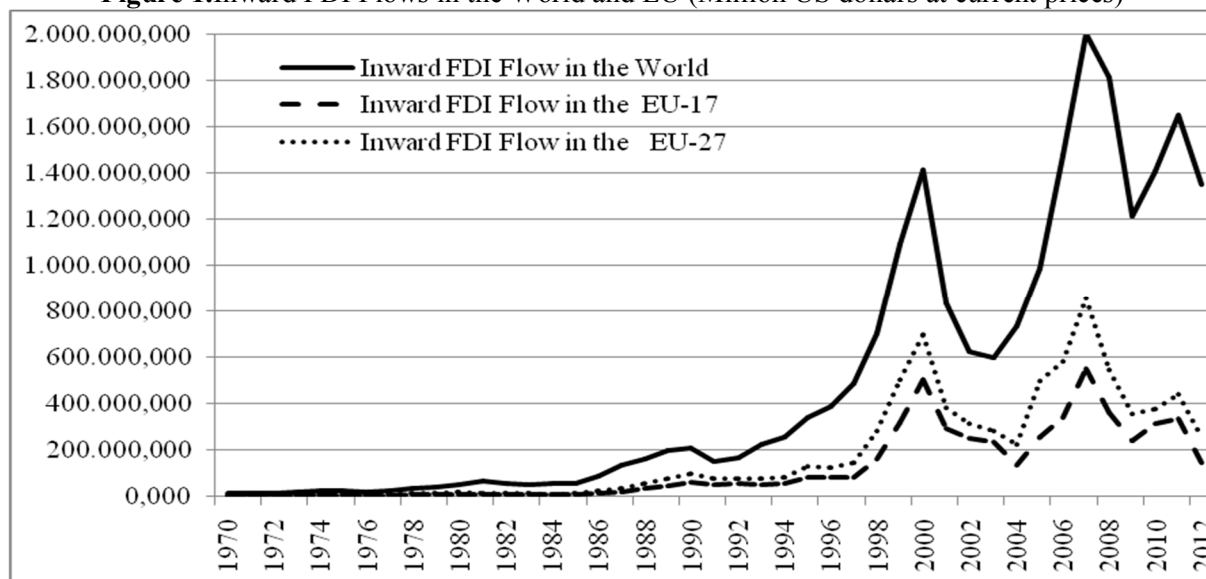
### **1. Introduction**

European Union (EU) has reached the stage of European Economic and Monetary Union (EMU) in the European integration process which began in 1950s. The transition to EMU has occurred in three stages. Removal of all the internal obstacles which prevented free movement of capital, goods, services and people in EU member countries was completed at the first stage between 1990 and 1994. The second stage of EMU began with the establishment of European Monetary Institute in July 1994 and during the second stage technical preparations for the transition to the single currency, strengthening the fiscal discipline, activities aimed at convergence of economic and monetary policies of member countries were conducted, 11 EU member countries (Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain) which met the convergence criteria, formed the EMU in May 1998, European Central Bank (ECB) and the European System of Central Banks were established in June 1998. The third stage of EMU began with the introduction of euro on 1 January 1999 (European Commission, 2007:7-9). The last stage of EMU has continued nowadays, Greece, Slovenia, Cyprus and Malta, Estonia and Slovakia which met the convergence criteria joined the EMU respectively on 1 January 2001, 1 January 2007, 1 January 2008, 1 January 2009, thusly EMU has reached 17 member countries.

Foreign Direct Investment (FDI) flows increased in parallel with the globalization of financial markets and peaked with about 2 trillion United States (US) dollars in 2007 on the eve of global financial crisis, and then began to decrease with the negative effects of global financial crisis and the

Eurozone sovereign debt crisis. The share of EU-17 in total FDI inflow firstly increased from 25.91% in 1970 to 40.24% in 2012, and then decreased to 10.82% in 2012 with a downward trend (figure 1).

**Figure 1.**Inward FDI Flows in the World and EU (Million US dollars at current prices)



Source: UNCTAD, FDI Statistics, [http://unctadstat.unctad.org/TableViewer/tableView.aspx? ReportId=88](http://unctadstat.unctad.org/TableViewer/tableView.aspx?ReportId=88)

There are lots of motives or determinants which cause enterprises to be a multinational enterprise (MNE) in other words own or controls their activities in more than one country (Dunning and Lundan, 2008:3). Many studies have been conducted in order to determine the motives behind FDI. Assunção et al. (2011) summarize these studies as follows in Table 1:

**Table 1.**Summary of Theories of FDI Determinants

Theory/Theoretical Approach	Determinants
Heckscher-Ohlin Model / MacDougall-Kemp Model	Higher return on investment, lower labor costs, exchange risk
Market imperfections	Ownership benefits (product differentiation), economies of scale, government incentives
Product differentiation	Imperfect competition
Oligopoly markets	Following rivals, responding to competition in domestic market
Product life cycle	Production function characteristics
Behavior theory	Fear of loss of competitive edge, following rivals and increased competition at home
Internalization	Market failures/inefficiencies
	Know-how, market failures
OLI (ownership, location, internalization) paradigm	Benefits of owning productive processes, patents, technology, management skills
	Advantage of locating in protected markets, favorable tax systems, low production and transport costs, lower risk
	Advantage of internalization cutting transaction costs, lowering risk of copying technology, quality control
New trade theory	Market size
	Transport costs
	Barriers to entry
	Factor endowments
Institutional approach	Political variables
	Financial and economic incentives
	Tariffs
	Tax rate

Source: Assunção et al., (2011: 3).

In this context EMU has potential to affect FDI inflows through reduced exchange rate volatility, increasing market size and trade volume, reduced transaction costs and increased price transparency (Dinga and Dingová, 2011:2). The effects of exchange rate risk on FDI are mixed. While Cushman (1988) and Markusen (1995) find a positive relationship between exchange rate volatility and FDI, Zis (1989), Tavlas (1991), Dixit and Pindyck (1994), Wei and Choi (2002), Servén (2003), De Sousa and Lochard (2009), Schiavo (2007) and Petroulas (2007) found a negative relationship between exchange rate volatility and FDI. So it is uncertain whether the reduced exchange rate volatility will affect FDI inflows to the Eurozone positively or not. On the other hand elimination of exchange rate risk and reducing currency conversion costs by EMU decreases transaction costs and thusly leads to cost saving and affects returns positively (Dinga and Dingová, 2011:2). So it is expected that EMU affects FDI positively by reducing transaction costs. Moreover Wei and Choi (2002), Aristotelous (2005) found that increasing market size and economic growth rate, which mean larger demand, affect FDI inflows positively.

This paper investigates the effects of real GDP (size of the host market), change in GDP (growth of the host market), exchange rate volatility, inflation rate volatility (price stability), distance between capital of countries and Frankfurt (transaction cost) on FDI inflows to the Eurozone and exchange rates of 16 Group of 20 (G20) countries by using panel data regression based on a data set of 16 G20 countries (except France, Germany, Italy using euro and the European Commission) for a period of 1999-2012. We will disregard the potential negative effects of 2008 Global Financial Crisis and the ongoing Eurozone Sovereign Debt Crisis. The remainder of this paper is organized as follows. Section 2 outlines the previous literature, Section 3 discusses the data, and Section 4 considers the empirical methodology and presents the empirical findings. Section 5 concludes the paper.

## **2. Literature Review**

Many studies have been conducted to determine the effects of monetary arrangements on international trade such as Rose (2000), Frankel and Rose (2002), Micco et al. (2003). On the other hand there have been limited studies on the effects of monetary arrangements on FDI. The gravity model has been used in the most of the studies such as Adam (2013), Flam and Nordström (2007), Petroulas (2007), Schiavo (2007), Brouwer et al. (2008), De Sousa and Lochard (2009 and 2011), Jienwatcharamongkhol (2010), Dinga and Dingová (2011), Folfas (2012), panel regression model was used in some studies such as Pantelidis et al. (2012), Aristotelous and Fountas (2012), Aristotelous (2005) and Wei and Choi (2002).

Adam (2013), Aristotelous and Fountas (2012), De Sousa and Lochard (2009 and 2011), Jienwatcharamongkhol (2010), Brouwer et al. (2008), Petroulas (2007), Schiavo (2007), Aristotelous (2005) and Wei and Choi (2002) found that EMU affected FDI inflow positively, while Kyrikilis et al. (2013), Dinga and Dingová (2011) and Flam and Nordström (2007) found that euro had no significant impact on FDI.

Adam (2013) examined the effect of currency union membership on FDI inflows to Economic Community of West African States by using gravity model during a period of 1995-2010. He found that the currency union had positive effects on FDI inflows.

De Sousa and Lochard (2011) examined the effect of EMU on FDI by using gravity model and they found that EMU has increased intra-EMU FDI stocks on average about 30%. In another study Aristotelous and Fountas (2012) also examined the effect of EMU on FDI inflows to the Eurozone by using panel data from 22 OECD countries for the period 1973-2006 and they found that EMU had a statistically significant positive effect on FDI inflows to the Eurozone countries and the EMU effect on FDI inflows differs substantially across member countries.

Jienwatcharamongkhol (2010) examined the effect of EMU on intra-Eurozone FDI flows by using the gravity model with FDI inflows of 24 countries during a period of 1993-2007 and he found that the EMU had positive effects on intra-Eurozone FDI inflows.

Brouwer et al. (2008) examined the effects of potential enlargement EMU on trade and FDI by using gravity models with a data set of unbalanced panel data including the bilateral trade flows among 29 countries and the distribution of outward FDI stocks among these countries during a period of 1990-2004. They found that there was a complementary relationship between trade and investment and EMU had positive effects on FDI.

Petroulas (2007) also examined the effect of EMU on FDI inflows from 18 OECD countries by using a gravity based general equilibrium approach during a period of 1992-2001. He found that the launch of euro increased FDI inflows within the EMU. On the other hand Schiavo (2007) examined the effect of EMU on FDI flows by using a gravity model on a sample of 25 developed countries for the period of 1980-2001 and he found that currency unions had a positive impact on FDI and increases in exchange rate uncertainty hindered cross-border investment flows.

Aristotelous (2005) examined the effect of EMU on the US FDI flows into the EU by using panel data from 15 EU countries for the period 1966-2003. He found that EMU had a positive and statistically significant effect on US FDI flows into the Eurozone countries and also there was a positive relationship between host country's real GDP, real GDP growth rate, relative labor costs, real exchange rate and FDI, and a negative relationship between exchange rate volatility, distance and FDI. In a similar study Wei and Choi (2002) examined the effects of currency unions including European Monetary System and dollar blocs (Panama, Hong Kong and Argentina) on international investments by using bilateral FDI from 16 source countries to 57 host countries with panel regression. They found that decreases in exchange rate volatility caused increases in FDI.

On the other hand Kyrkilis et al. (2013), Folfas (2012), Dinga and Dingová (2011) and Flam and Nordström (2007) found that euro had no significant impact on FDI. Kyrkilis et al. (2013) examined the intra EU-FDI position of various EMU countries during a period of 1985-2011 and they found that the EMU had no significant impact on FDI inflows across member countries. Folfas (2012) also examined the effects of the EMU on international flows among the EU member countries by using gravity model during a period of 1995-2010. He found that exchange rate volatility didn't affect bilateral FDI flows and stocks between EU Member countries.

Dinga and Dingová (2011) examined the effects of euro on international FDI flows by using gravity model with data on 35 OECD economies during a period of 1997-2008. They found that the euro had no significant impact on FDI and there was a positive relationship between GDP and FDI, and a negative relationship between distance, unit labor costs, long term exchange rate volatility and FDI.

Pantelidis et al. (2012) examined the effects of the EMU on FDI inflows by using panel regression during a period of 1980-2010. They found that EMU had statistically negative effect on FDI inflows to Greece, Portugal, France, Belgium and Spain, while Germany and Ireland had statistically insignificant negative correlation and Finland and Netherlands had a statistically insignificant positive correlation between launch of Euro and inward FDI.

### **3. Data and Model**

We used a sample covering a period of 1999-2012 to examine the possible effects of EMU on inward FDI flows to the Eurozone. Eleven EU countries were a member of EMU at the beginning of last stage of EMU on 1 January 1999, but the number of Eurozone member countries has reached 17 EU countries as of 1 January 2009. We examined the possible effects of EMU on FDI flows from 16 G20 countries (Argentina, Australia, Brazil, Canada, China, India, Indonesia, Japan, Mexico, Russia, Saudi Arabia, South Africa, South Korea, Turkey, United Kingdom and the United States of America) except the Eurozone member countries to the Eurozone member countries. E views 7.0, Gauss 6.0 were used for the analysis.

We examined the relationship between real FDI inflows and real GDP, real GDP growth rate, inflation volatility, exchange rate volatility, distance, exchange rates of 16 G20 countries in terms of euro with a panel data analysis. The model is following as:

$$RFDI_{it} = \gamma_0 + \gamma_1.GDP_{it} + \gamma_2.GDPGR_{it} + \gamma_3.INFVOL_{it} + \gamma_4.EXVOL_{it} + \gamma_5.DIST_{it} + \gamma_6.MEURO_{it} + e_{it} \quad (1)$$

A description of the variables used in this study and their data sources follows: The dependent variable, RFDI, is real FDI inflows to the Eurozone. The nominal FDI inflows to the Eurozone are taken from United Nations Conference on Trade and Development (UNCTAD) and converted to real value by dividing GDP deflator.

The first independent variable, GDP, is the Eurozone's real GDP measured in euros at constant 2000 prices and it is an indicator of the market size. The data on GDP are taken from International Monetary Fund (IMF).

The second independent variable, GDPGR, is the real GDP growth rate of the Eurozone and it is an indicator of change in the aggregate demand of the Eurozone. The data on GDPGR are taken from International Monetary Fund (IMF).

The third independent variable, INFVOL, the inflation rate volatility of home country, is found by using a GARCH(1,1).

The fourth independent variable, EXVOL, the exchange rate volatility of home country, is found by using a GARCH (1,1).

The fifth independent variable, DIST, is the distance between the capital of each home country and Frankfurt which is generally accepted as the industrial center of the Eurozone and is taken as an indicator of market agglomeration effects within the Eurozone. The data on DIST are taken from <http://www.timeanddate.com/worldclock/distance.html>.

The final independent variable included in the regression (1) is MEURO<sub>it</sub>. MEURO is exchange rate of selected G-20 countries in terms of euro. The data are taken from European Central Bank (ECB).

#### 4. Econometric Methodology and Empirical Findings

We firstly apply Pesaran and Yamagata's (2008) homogeneity test, which modified Swamy's (1970) dispersion test for the panels. An homogenous panel data model (or pooled model) is a model in which all coefficients are common while an heterogeneous panel data model is defined as a model in which all parameters (constant and slope coefficient) vary across individuals (Hurlin, 2010). The estimation methods differentiate in accordance with the selection of a homogenous panel or heterogeneous panel data. We follow Pesaran and Yamagata (2008)'s delta\_tilde test statistic in order to determine whether slope coefficients vary across individuals because the cross section dimension is large relatively to the time dimension in the study. Results of the homogeneity test of Pesaran and Yamagata (2008) are presented in Table 2. According to Pesaran and Yamagata (2008), the problem of the small sample can be overcome under the normally distributed errors by considering mean and variance bias adjusted version, delta\_tilde\_adjusted. Thus, we rely on the results regarding delta\_tilde\_adjusted statistic in Table 2. Because the p-value of delta\_tilde\_adjusted is bigger than 0.05 significance level we cannot reject that slope coefficients don't vary across individuals. That is, it is clear that the null of hypothesis Pesaran and Yamagata (2008)'s homogeneous test isn't rejected at 95%.

**Table 2.** Pesaran and Yamagata (2008)'s Homogeneity Test

	Test statistic	P-value
delta_tilde	-1.721	0.957
delta_tilde_adjusted	-2.357	0.991

Source: Authors' calculations.

According to Yule (1926), who introduced spurious regression problem and further analyzed by Granger and Newbold (1974) using non-stationary time series steadily diverging from long-run mean will produce biased standard errors, which causes to unreliable correlations and unbiased estimations within the regression analysis leading to unbounded variance process (Korap, 2007). In order to get unbiased estimations, we investigate the existence of unit root in the series. We have used the approach of Levin, Lin and Chu (LLC) (2002) as the unit root test. LLC (2002) assume homogeneous autoregressive coefficients between individual. i.e.  $\beta_i = \beta$  for all  $i$ , and the null hypothesis of the test is  $H_0 : \beta_i = \beta = 0$  against the alternative  $H_A : \beta_i = \beta < 0$  for all  $i$ . The structure of the LLC analysis may be specified as follows:

$$\Delta Y_{i,t} = \alpha_i + \beta_i \cdot Y_{i,t-1} + \delta_i \cdot \tau + \sum_{j=1}^{p_j} \phi_{ij} \cdot \Delta Y_{i,t-j} + u_{it} \quad i = 1, \dots, N \quad t = 1, \dots, T$$

where  $\tau$  is trend,  $\alpha_i$  is individual effects,  $u_{it}$  is assumed to be independently distributed across individuals. LLC estimate to this regression using pooled OLS. Results for the panel unit root tests are showed in Table 3.

**Table 3.**Panel Unit Root Test

Variable	LLC	
	Constant	Constant Trend
RFDI	-2.924 [0.00]*	-7.956 [0.00]*
GDP	9.957 [1.00]	-2.66 [0.00]*
DLGDP	-9.389 [0.00]*	-10.070 [0.00]*
GDPGR	-10.013 [0.00]*	-11.215 [0.00]*
INFVOL	-63.460 [0.00]*	-85.160 [0.00]*
EXVOL	-4.892 [0.00]*	-5.986 [0.00]*
MEURO	-16.930 [0.00]*	-4.831 [0.00]*

Numbers in brackets are p-values.

\* indicates the statistical significance at 1% level.

The max lag lengths were set to 2 and Schwarz Bayesian Criterion was used to determine the optimal lag length. D is the first difference operator and L denotes the logarithm of the variable.

According to LLC, only GDP is not level stationary variable for constant model. But we can clearly reject the null hypothesis of unit root for the other variables at 1% significance level. Similarly, this result is obtained by taking log-first difference of GDP.

We estimate equation (1) using the panel least squares estimation procedure. Table 4 reports the results of the panel least squares estimation procedure. The estimates are obtained under the assumption that the intercept and slope coefficients are identical for the different cross-sectional units. The results presented in Table 4 are statistically significant.

**Table 4.**Panel Least Squares Estimates Dependent Variable: RFDI

Variable	Coefficient	Std. Error	T-stat	Prob.
C	-51234.80	13013.33	-3.937	0.000**
DLGDP	6669.052	1154.557	5.776	0.000**
GDPGR	2188.138	560.7966	3.901	0.000**
INFVOL	-14.17321	1.978746	-7.162	0.000**
EXVOL	-0.000281	4.55E-05	-6.172	0.000**
DIST	-0.80050	0.4469	-1.791	0.074*
MEURO	82542.79	11432.06	7.220	0.000**

\*\*\* indicate the statistical significance at 10 and 1% level, respectively.

The impact of real GDP, real GDP growth rate and exchange rate of selected G20 countries in terms of euro on FDI inflows is found positive and statistically significant, while the impact of exchange rate volatility, inflation volatility and distance on FDI is found negative and statistically significant. So the demand-related factors, such as market size and market growth, respectively measured by the host country's real GDP and real GDP growth rate, are statistically significant determinants of real FDI inflows. Similarly, supply-related factors, such as distance, inflation and exchange rate volatility and exchange rate of foreign currency against euro are also statistically significant determinants of real FDI inflows.

## 5. Conclusion

The introduction of the euro was both an immense political and symbolic step towards an integrated Europe. This currency affects economic activity ranging from trade and foreign direct investments to wage-setting behavior and corporate business strategies. The euro exerts influence on many economic activities, one of them being the flow of capital among countries resulting from the removal of restrictions on investment location decisions.

The 2008 global financial crisis raised a challenge for nations to reconsider the decision to join the monetary union. The investigation of the economic impacts of the Economic and Monetary Union is an important issue for both future euro-zone members and other world countries. Thus the impact of the euro on international transactions has become a major concern. On the other hand, the impact of EMU on foreign direct investment turns out to be the key issue in macroeconomics. Monetary integration may strengthen foreign investments, since it reduces macroeconomic uncertainty, exchange rate and inflation volatility, transaction costs. The creation of the European Monetary Union, exchange rate stability, inflation stability, distance, GDP growth are important factors behind FDI flows.

From this point of view, we examined the possible effects of the EMU on FDI inwards from 16 G20 countries by examining the relationship between real FDI inflows and real GDP, real GDP growth rate, exchange rate volatility, inflation volatility, distance, exchange rates of selected G20 countries in terms of euro for a period of 1999-2012. We found that real GDP, GDP growth rate and exchange rate of selected G20 countries affect inflows of real foreign direct investment positively while exchange rate volatility, inflation volatility, distance affects inflows of real foreign direct investment negatively.

An exchange rate stability and price stability were achieved in the Eurozone countries after establishment of EMU and also EMU contributed to the reductions in transactions costs and the Eurozone member countries achieved significant economic growths until the outburst of global financial crisis. So EMU contributed to the FDI inflows via decreases in exchange rate volatility, inflation rate volatility and transaction costs together with increases in GDP and GDP growth rates especially in first years of EMU.

In order to contribute suggestions to improve future researches, this study could address other policies, which aim at stronger economic integration, such as Single Euro Payment Area, TARGET2, which affect the pan-European multinationals. We hope that the analysis presented here offers a convenient framework within which further empirical and theoretical researches on such issues can be conducted.

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