Do Currency Unions Affect Foreign Direct Investment? Evidence from US FDI Flows into the European Union

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ABSTRACT

This paper investigates the effect of EMU on US FDI flows into the European Union using panel data from fifteen EU countries for the period 1966-2003. The empirical findings suggest that EMU had a positive and statistically significant impact on US FDI flows into the twelve countries that adopted the euro as their national currency. The increase in US FDI flows into the EU-12 was not accompanied, however, by a decrease in US FDI flows into the three EU countries that opted out of adopting the euro as their national currency.

1. INTRODUCTION

DID THE ADOPTION OF THE EURO by twelve European Union countries as their common currency have an effect on their FDI inflows from overseas? This paper addresses the question by examining what happened to US FDI flows into the European Union (EU) using cross-sectional time-series data pooled by host country from 1966-2003.

A review of the literature has shown that this study is the first one to investigate the effect of European Economic and Monetary Union (EMU)[2] on FDI flows from either a theoretical or an empirical perspective. The results should be of interest not only to academicians who are investigating the impact currency unions have on FDI flows, but also to policy makers within Europe who are engaged in interminable debates on the benefits and costs of EMU. Such debates will most likely intensify in the near future as the ten European countries which joined the EU on 1 May, 2004, will be expected to decide whether or not to adopt the euro as their national currency.

2. Model Specification and Literature Review

A number of theories have been developed to explain the determinants of FDI ever since the topic began to interest scholars in the 1950s. These theories draw from different areas of economics and business including industrial organisation, corporate investment theory, strategic theory, portfolio theory, and more recently, economic geography. A good overview of the main FDI theories can be found in UNCTAD (1998).

The consideration of firm-specific, strategic, or portfolio factors in an empirical analysis of the determinants of FDI is appropriate for studies using highly disaggregated firm-specific data. Given the nature of this study's fundamental objective and the data available, an econometric model that draws from the conventional theories of corporate investment is more appropriate. These theories emphasise both demand-related (such as the size of the host market and the growth of the host market) and supply-related (such as factor prices and locational externalities) determinants of FDI. Thus, an econometric model similar to the one employed by Mold (2003) is used to investigate the effect of EMU on US FDI flows into the EU. The basic specification of the model incorporates both supply-related and demand-related locational determinants of FDI and is as follows:

$$FDI_{it}^{US} = ß_0 + ß_1 GDP_{it} + ß_2 GDPGR_{it} + ß_3 RULC_{it} + ß_4 RER_{it} + ß_5 VOL_{it} + ß_6 DIST_i + ß_7 TREND_{it} + ß_8 EU_{it} + ß_9 EMU_{it} + \varepsilon_{it} \quad (1)$$

where i refers to the fifteen EU host countries[3] of US FDI flows, t to the period 1966-2003, and e is the error term. The dependent variable, FDI_{it}^{US}, is real US FDI flows to EU host country i, measured in US dollars. It is calculated by dividing US FDI flows to country i by the US GDP deflator.

The first exogenous variable in equation (1), GDP_{it}, is host country i's real GDP measured in dollars at constant 2000 prices and exchange rates and it captures the effect of market size on the investment decision. Its sign is expected to be positive. The second variable, $GDPGR_{it}$, is the real *GDP* growth rate of host country i and it captures the change in the aggregate demand of each host country on its FDI inflows. According to the acceleration principle, an increase in aggregate demand leads to an increase in FDI inflows. The third variable, $RULC_{it}$, denotes the relative unit labour cost between the US and host country i and it captures differences in labour costs between locations. Economic theory suggests that the higher the unit labour cost in the US relative to a host country's unit labour cost, the higher US FDI flows into a host country will be.[4] The fourth variable, RER_{it}, is the real exchange rate measured by the nominal rate adjusted by the host country's and the US's GDP deflator. A real depreciation of the host country's currency (i.e. an increase in *RER*) will increase the relative wealth of US firms and lead to an increase in US purchases of assets in host countries.

The fifth variable included in equation (1), VOL_{it}, is the exchange rate volatility between the US dollar and host country *i*'s currency, measured by the moving standard deviation of the growth of the exchange rate:

$$VOL_{it} = [(1/m)\sum_{i=1}^{m}(\ln Q_{t+i-1} - \ln Q_{t+i-2})^2]^{1/2} \quad (2)$$

where Q is the monthly exchange rate and m, the order of the moving average, is set equal to 12.[5] The impact of exchange rate volatility on FDI flows is ambiguous from a theoretical perspective. Harvey (1989) argued that one way to avoid uncertainty in international trade generated by exchange rate variability is to 'avoid' the exchange market and engage in FDI. In other words, an increase in exchange rate volatility leads to an increase in FDI flows. On the other hand, UNCTAD (1993) argued that firms might not undertake long-term commitments to expand capacity in situations characterised by uncertainty, and will enter a foreign market only if the exchange rate is sufficiently stable to assure a reasonable level of profit. Thus, an increase in exchange rate volatility leads to a decrease in FDI flows.

Recently researchers have begun to pay more attention to ways of modeling an additional supply-related factor, namely locational externalities resulting from agglomeration economies, in studies of the determinants of FDI. Following Mold (2003), we use distance to capture the impact of market agglomeration effects within EU on US FDI inflows. Specifically, $DIST_i$ represents the great circle distance in kilometers between the capital of each host country and Frankfurt, commonly considered in the literature as the industrial centre of the EU. The distance variable is included in equation (1) in order to incorporate into the analysis a fundamental axiom of recent theory of multinational enterprises: that a trade-off exists between proximity to markets and the advantages of concentrating production in one location to reap scale economies. According to Mold (2003), the distance variable can be viewed as a proxy for transaction costs which increase with distance from the principal European markets. Its coefficient sign is expected to be negative because the greater the distance from the principal European markets, the greater the transaction costs and, consequently, the lower the FDI flows to peripheral areas. In other words, the smaller the distance between a peripheral market and the principal European markets, the greater the likelihood that a firm will engage in FDI in a peripheral market in order to be able to take advantage of the agglomeration economies that exist in the principal markets.

The seventh variable, $TREND_{it}$, is a trend variable included in equation (1) to capture primarily the impact of globalisation on US FDI flows into the EU. Given that over time more and more US corporations have pursued globalisation strategies (or intensified their existing globalisation strategies) for a variety of reasons, the sign on the trend variable is expected to be positive. The EU_{it} membership variable is a dummy that takes the value of one during the host country *i*'s years of membership of the Union and the value of zero oth-

erwise.[6] It captures the effect of host country *i*'s EU membership on its FDI inflows from the US.

The final exogenous variable included in equation (1) is the EMU dummy, EMU_{it}. It takes the value of one when host country *i* adopted the euro as its national currency and the value of zero otherwise. It is set equal to one from 1999 and onwards for Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain. In the case of Greece, it takes the value of one for 2001, 2002, and 2003 only. For Denmark, Sweden, and UK, the three EU members that did not adopt the euro as their national currency, the EMU dummy takes the value of zero for the entire period.

Given the specification of equation (1) $ß_9$, the coefficient of interest in this study, captures the effect of EMU on US FDI flows into the twelve EU countries that adopted the euro (EU-12). Its sign is expected to be positive because US corporations will most likely increase their direct investment in their existing subsidiaries in the EU-12 (or establish new subsidiaries) in order to meet the additional demand for their goods and services resulting from the expanded trade between the EU-12 countries. Recent work on how currency unions influence trade provides empirical support for this claim. Rose (2000 and 2001) and Glick and Rose (2002) found that the effect of currency unions on trade is positive, significant and large. In particular, Rose (2000) concluded that 'two countries sharing the same currency trade three times as much as they would with different currencies' and Rose and Glick (2002) estimated that 'a pair of countries that starts to use a common currency experiences a near doubling in bilateral trade.' Micco *et al* (2003) investigated specifically the impact of EMU on bilateral trade between EMU member countries and found its impact also to be positive and significant. Given the overwhelming empirical evidence that currency unions lead to significant increases in trade between countries with common currencies, it is, therefore, reasonable to expect US FDI flows into EU-12 countries to increase.

Several empirical studies examined the determinants and pattern of FDI flows into the EU over the years. A representative sample of such studies includes: Scaperlanda and Mauer (1969), Lunn (1980), Culem (1988), Neven and Siotis (1993), Aristotelous and Fountas (1996), and Mold (2003). As pointed out earlier, however, no study as of yet has investigated the impact of EMU on FDI inflows into the twelve countries that adopted the euro. This is precisely what this study purports to do.

The sample used in this study to investigate empirically the impact of EMU on US FDI inflows covers the period 1966-2003. Given that EMU was launched on 1 January, 1999 in eleven EU countries, the sample contains a period of five years during which EMU was in effect. This is a lengthy enough period to produce meaningful results. A word of caution is in order, however. It is premature to consider the results of this study as conclusive when it comes to the long-run impact of EMU on FDI inflows.

3. Results of the regression analysis

Regression models that use pooled data can be estimated in a number of different ways. The simplest estimation model used when working with pooled data assumes that the intercept and slope coefficients are the same for the different cross-sectional entities. Following convention, this model was estimated to provide 'base-line' results. A second model also used when working with pooled data, called the fixed effects model, allows for different intercepts for each cross-sectional entity, but forces the slope coefficients to be the same. The fixed effects model is appropriate when differences between the intercepts for the cross-sectional entities are considered constant, not random. Because the entities in the cross-section data in this study are not chosen at random to represent a larger population, the fixed effects model is the appropriate model for the analysis at hand. Additionally, in order to account for the possible presence of cross-section heteroskedasticity in the data, a Generalized Least Squares (GLS) estimation technique was used for both the 'base line' and 'fixed effects' models.

Equation (1) is estimated using pooled data comprised of 570 observations (15x38).[7] The cross-sectional dimension of the data covers US FDI flows into the fifteen EU host countries, whilst the time-series dimension of the data covers observations over the period 1966-2003.[8] The first two numerical columns in Table 1 present the GLS estimates for the variance components (i.e. the base line model) and fixed effects models for equation (1) along with standard statistics and tests that support the adequacy and acceptability of the estimated models.[9]

The results presented in the first two numerical columns of Table 1 have the expected signs, are sensible in size, and are statistically significant in almost all cases. Overall, they support the predictions discussed in section 2. Specifically, the results suggest that 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 US FDI flows into the EU regardless of model specification. This finding is in agreement with the findings of Mold (2003) and Aristotelous and Fountas (1996). The difference in labour costs between the US and each host EU country, measured by relative unit labour costs, is also a statistically significant determinant of US FDI inflows into the EU. This supply-related determinant of FDI was not found to be significant by Mold (2003). The real exchange rate, trend and distance introduced to capture locational externalities, were found to be statistically significant in both model specifications, suggesting that they are important determinants of US FDI inflows into the EU as well, whereas exchange rate volatility and EU membership were found to be statistically significant in only one of the two model specifications. In conclusion, this study finds strong evidence that not only demand-related but also supply-related variables are important determinants of FDI.

Table 1: The Impact of EMU on US FDI flows into the EU: Empirical estimates

	GLS Estimation: Variance Components	*GLS Estimation: Fixed effects*	*GLS Estimation: Variance Components*	*GLS Estimation: Fixed effects*
Constant	131.1		47.4	
	(102.5)		(86.6)	
Real GDP	2.07***	4.14***	2.15***	4.29***
	(0.31)	(0.78)	(0.28)	(0.68)
Real GDP growth rate	33.9***	14.86***	31.5***	13.24***
	(5.99)	(3.37)	(4.87)	(2.2)
Relative unit labour costs	0.22***	0.16***	0.24***	0.16***
	(0.03)	(0.03)	(0.03)	(0.02)
Real exchange rate	0.27***	0.28*	0.32***	0.23*
	(0.05)	(0.15)	(0.05)	(0.12)
Exchange rate volatility	-5.31	-10.7*	-2.01	-6.34
	(5.54)	(6.43)	(5.07)	(5.94)
Distance	-0.38***		-0.36***	
	(0.07)		(0.07)	
Trend	11.35***	8.08***	15.6***	6.43**
	(3.61)	(2.71)	(3.14)	(2.74)
EU membership dummy	116.62***	35.58	148.7***	22.86
	(40.89)	(39.38)	(26.38)	(30.03)
EMU dummy	670.2***	345.3***		
	(119.1)	(66.2)		
EU-3 dummy			2447	2144
			(2007)	(1434)
R-squared	0.34	0.47	0.35	0.48
Adjusted R-squared	0.33	0.46	0.34	0.45
F-statistic	9.7	28.1	11.1	30.2
Durbin-Watson Statistic	1.85	1.96	1.85	1.98
Total observations	570	570	570	570

White's heteroskedasticity-consistent standard errors are given in parentheses. *** denotes statistical significance at the one percent level, ** at the five percent level and * at the ten percent level.

The coefficient estimate for the EMU dummy variable ($ß_9$) is the primary focus of this study, however. It is found to be positive, as expected, and statistically significant in both models at the one percent level, a finding that indicates that EMU has raised US FDI flows into the twelve countries that adopted the euro. The increase in US FDI flows into the EU-12 could be explained, as suggested earlier, by the decision of US corporations to increase their direct investment in their existing subsidiaries in EMU member countries (or establish new subsidiaries) in order to meet the additional demand for their products resulting from the anticipated increase in intra EU-12 trade.

The finding that EMU led to an increase in US FDI flows into the EU-12 gives rise to the following interesting question. What is the impact of EMU on US FDI flows into Denmark, Sweden, and UK, the three countries that decided not to adopt the euro (EU-3)? In other words, did the increase in US FDI flows into the EU-12 lead to a decrease in US FDI flows into EU-3? This is a particularly interesting question for the UK given the Chancellor of the Exchequer's explicit emphasis on the impact of EMU membership on FDI as one of the five additional criteria that will be used to evaluate the UK's possible membership of EMU.

In order to be able to answer the above question, equation (1) was re-estimated by including a new dummy variable, $EU\text{-}3_{it}$, instead of the EMU dummy variable in the analysis. The EU-3 dummy variable takes the value of one only in the years 1999-2003 for Denmark, Sweden, and the UK and the value of zero otherwise. Given its specification, the EU-3 dummy captures the impact of EMU on the US FDI flows into these three countries. The last two columns in Table 1 present the Generalised Least Squares estimates for the variance components and fixed effects model for the revised version of equation (1). The coefficient estimate for the EU-3 dummy is positive in both cases but not statistically significant. This finding can be interpreted as suggesting that the increase in US FDI flows into EU-12 is not associated with a decrease in US FDI flows into EU-3. In other words, the findings suggest that EMU did not result in US FDI flow 'diversion' from the countries that did not adopt the euro to those that did. Even though the UK, Denmark, and Sweden did not experience a decline in their FDI inflows from the US, the three non-EMU members are still losing out since they did not benefit from the statistically significant increase in FDI inflows enjoyed by EMU members.

4. Summary and conclusions

This paper investigated the effect of EMU on US FDI flows into the European Union, using panel data comprised of 570 observations. The study utilised data from all fifteen EU members at the time when the third stage of EMU was launched. The third stage of EMU involved the irrevocable fixing of exchange rates and introduction of the single currency on the foreign-exchange markets and for electronic payments on 1 January, 1999. Twelve EU members, namely, Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy,

Luxembourg, Netherlands, Portugal, and Spain finally adopted the euro as their national currency while Denmark, Sweden, and UK opted out of the third stage of EMU. The time series dimension of the pooled data were observations for the period 1966-2003.

The empirical findings suggest that EMU had a positive and statistically significant impact on US FDI flows into the twelve countries that adopted the euro. The impact of EMU on US FDI flows into Denmark, Sweden, and UK was found to be positive but not statistically significant suggesting that the increase in US FDI flows into EU-12 was not accompanied by a decrease in US FDI flows into the three countries that opted out of adopting the euro. Put differently, this suggests that there is strong evidence that EMU is an important determinant of FDI flows into Europe and that EMU members benefited from it whereas non-EMU countries did not.

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ENDNOTES

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2. EMU is the name given to the process of harmonising the monetary policies of the EU members that began in July 1990 with a view to the introduction of a single currency, the euro, on January 1, 1999. In this paper, the term 'EMU' will refer to the third stage of the process that involved the irrevocable fixing of exchange rates and introduction of the single currency on the foreign-exchange markets and for electronic payments. The third stage was launched on January 1, 1999 in eleven countries: Austria, Belgium, Finland, France, Germany Ireland, Italy, Luxemburg, Netherlands, Portugal, and Spain. Greece joined the group on January 1, 2001. Denmark, Sweden, and the UK chose to opt out of adopting the euro.

3. The fifteen European countries included in the study are the ones that were members of the EU when the third stage of EMU was launched on January 1, 1999.

4. The RULC variable is calculated by dividing the 'Wages: Hourly Earnings Index' series of the US with the host country *i*'s 'Wages: Hourly Earnings Index' series (base year is 2000). The data were obtained from the IFS CD ROM. Because the 'Wages: Hourly earning Index' series was not available for Greece, Portugal, and Luxembourg, it was proxied by the consumer price index of each country.

5. Exchange rate volatility is commonly measured in the literature by the moving standard deviation of the growth of the exchange rate.

6. The year of EU membership for the countries included in the analysis is as follows: 1958 for Belgium, France, (West) Germany, Italy, Luxemburg, and the Netherlands;

1973 for Denmark, Ireland, and UK; 1981 for Greece; 1986 for Portugal and Spain; and 1995 for Austria, Finland, and Sweden.

7. All data used in the calculation of the variables in equation (1) were obtained from the International Financial Statistics CD-ROM, except for US FDI flows into the fifteen EU host countries and Great Circle distances. Great Circle distances were obtained from the U.S. Department of Agriculture web site:
(http://www.wcrl.ars.usda.gov/cec/java/lat-long.htm)
and US FDI flows into the EU from the US Bureau of Economic Analysis.

8. The beginning of the sample was determined by the availability of the data for the dependent variable. US FDI outflows are not available by host country prior to 1966.

9. A Correlation matrix for all independent variables included in equation (1), except dummy variables, was estimated. The correlation matrix showed that no single correlation coefficient between any two independent variables was larger than +0.3 or smaller than -0.3, a finding that suggests that multicollinearity is not a problem in the estimated regression model.

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