MACROECONOMIC ENVIRONMENT AND FOREIGN DIRECT INVESTMENT NET INFLOWS: AN EMPIRICAL APPROACH

by
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1. Introduction

The multinational enterprises (MNEs) theory has gained an increasing share in the field of international economics during the 1980s. This evolution may be attributed to several factors. First, to the decisive change in the attitudes of the less developed countries towards foreign direct investment (FDI) (Woodward and Rolfe, 1993; Dunning, 1993b). Second, to the transition of the former communist countries to the market economy system. Lastly, to the transfer of a considerable fraction of the world economic activity from the developed to the developing countries. According to Dunning (1993b) the following four reasons are responsible for these changes: i) the renewed faith in the market economy; ii) the increasing globalization of economic activity; iii) the increasing number of countries now approaching the take-off stage, and iv) the increasing convergence of economic structures in the advanced industrialised nations. Thus, the share of FDI inflows in the developed countries increased from 74 percent of the total in the beginning of the 1980s to 84 percent by the end of the decade. This share, however, decreased to 56 percent in 1993. On the other hand the

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share of developing countries decreased from 26 percent in the beginning of the 1980s to 16 percent by the end of the decade and finally reached 41 percent in 1993. Regarding the central and eastern European countries, which lately have emerged in the market system, their share has stacked to the 3 percent during the 1990s. The above mentioned evolution and the expectation that the European integration will affect intra-EC and extra-EC foreign direct investment has led the international economic literature to show an increasing interest for developed countries (Coughlin et al., 1991; Dunning, 1993b; Hirsch, 1992; Itaki and Waterson, 1990; Mardas and Varsakelis, 1992; UN, 1992).

Among others, international economic theory tries to identify the determinants of FDI activities. Dunning (1993a), demonstrates that a firm will pursue an FDI to exploit: i) ownership-specific advantages, ii) internalisation incentive advantages, and iii) location-specific advantages. The firm has under control some of these advantages, e.g. property rights, production and management systems, innovatory capacity, etc. (Antonelli et al., 1989). While some others, such as the economic environment and the economic policy adopted by the government of the host country, are of special interest since they are usually not under the firm's control but they strongly influence the strategy of the MNE (Brewer, 1993; Woodward and Rolfe, 1993). Specifically, the macroeconomic environment described by factors, such as the wage rate, the inflation rate, the growth rate of the GDP and the real exchange rate movements affects the cost of production and the market potential giving rise to opportunities and risks (Cushman, 1988; Woodward and Rolfe, 1993).

The International literature has focused on the importance of the macroeconomic stability of the host country for the foreign investors. Our paper extends the empirical evidence by employing explicitly a set of macroeconomic indicators relative to the FDI decision for a sample of EC countries as well as for the USA and Japan. Moreover, we try to detect countries with common patterns among the countries of the sample with regard to possible common patterns among the countries of the sample with regard to possible common patterns among the countries of the sample with regard to possible common patterns among the countries of the sample with regard to their level of development and/or the orientation of the foreign investor (i.e., export or domestic market oriented). The empirical analysis proceeds by means of VAR modelling and Granger-causality inference to explore the relationship between FDI and the macroeconomic environment of the host country and hence to estimate the relative contribution of the examined determinants in attracting FDI inflows.

The paper is organised as follows: In Section 2 we present the model and the results from the econometric analysis. Concluding remarks are given in Section 3.

2. The Model

A multinational firm chooses to invest in a foreign country considering among others the host market structure, the potential of the market, the productivity of the host economy, the entry barriers, the macroeconomic instability, etc. (Bourlakis, 1987; Dunning, 1993a; Brewer, 1993). Thus, if the MNE considers these factors as promising for the profitability of the investment, then it may proceed to the realisation of the FDI decision and hence to increase the FDI net inflow of the host economy.

This paper attempts to investigate the causal relationships between the FDI net inflows behaviour of the host country and the above mentioned macroeconomic factors. The examined sample of countries includes Germany, France, Italy, Ireland, Spain, Portugal, the USA and Japan. The empirical analysis employs quarterly data[1] over the period 1981, third quarter, to 1988, fourth quarter. The choice of the countries sample focuses on detecting possible asymmetries between industrialised and semi-industrialised countries that attracted FDIs in the 1980s. It should be noted that the period of the empirical analysis has been limited to the 1980s because of the following reasons: i) in the 1970s the macroeconomic environment was highly unstable mainly due to the radical increases in input prices, and ii) during 1988-1989 started the implementation of the programme of 1992 in the European Community which in turn created a wave of extra and intra-EC new FDI flows.

Thus, the behaviour of the FDI net inflow in the i-th host country is investigated in the context of a VAR system considering the following vector of variables that we consider capable of describing the macroeconomic performance of the host country:

(1) $X=(FDI_{it}, INFL_{it}, GROW_{it}, WAGE_{it}, EXCGE_{it})$

where

I denotes Germany, France, Italy, Ireland, Spain, Portugal, the USA and Japan,

FDI_{it} is the change in the net inflows of FDI in the I-th country,

$INFL_{it}$ is the deviation of the inflation rate of country I from the OECD average,

$GROW_{it}$ is the growth rate measured as the percentage change of the real GDP for the country I,

$WAGE_{it}$ is the percentage change in the nominal wage rate in country i, and

$EXCGE_{it}$ is the percentage change in the real exchange rate for the i-th country.

The first step in our empirical analysis proceeds with the examination of the integrational properties of the series used. Since many macroeconomic series are characterized by nonstationarities, the traditional t-tests and F-tests are inappropriate for statistical inference (Fuller, 1985). Thus, it is customary to test the hypothesis that an individual series is integrated of order one, I(1). That is, to test for the existence of a unit root employing the Dickey-Fuller (DF) test. The results are reported in Tables 1a and 1b and suggest that every country-block includes at least one variable that is nonstationary in levels while all series exhibit stationarity in first differences.

Exploring for long run linkages by means of cointegration is inappropriate and hence we proceed to the empirical analysis with the postulation of Vector Autoregressive (VAR) systems, considering each country separately, and treating all variables as endogenous as well as in first differences to achieve stationarity.

VAR models have been extensively used in economic research since they constitute a convenient way of estimating multivariate time series models. The use of VAR models has been advocated, mainly by Sims (1980), as a method of estimating dynamic relationships among jointly endogenous variables where there is no need for imposing a priori restrictions. This approach has important advantages such as: i) the researcher does not have to discriminate a priori between endogenous and exogenous variables, and ii) VARs do not include current period variables among the regressors and thus avoid the problems concerning the estimation of simultaneous equations systems.

The length of the autoregressive lags for the variables included in each VAR is optimally determined, using the Final Prediction Error (FPE)[2] criterion and following Hsiao's (1979, 1981) methodology as extended by Ahking and Miller (1985). FPE values are calculated for lag lengths varying from 1 to 4 quarters[3]. The suggested non-standard VAR structures are known as near-VAR equation systems.

In order to remove any deterministic non-stationarity from the equation systems, we keep a constant term in all near-VARs. We also employ an institutional dummy (DUMMY) variable[4] aiming to capture possible effects from the Portugal's and Spain's accession in the EEC. DUMMY was found significant and hence was kept in the case of Germany, Ireland, Portugal and Italy. Furthermore, a linear time trend variable (TREND), was found significant in the cases of Portugal and Spain.

The adopted near-VAR systems are next used for estimation purposes employing the Seemingly Unrelated Regression Estimation (SURE) technique. It should be noted that, SURE is preferred instead of OLS, since,

Table 1a. Augmented D F unit roots tests (with trend)(levels)

Country	FDI	INFL	GROW	EXCGE	WAGE
Germany	-4.729*	-1.245	-2.570	-2.397	-3.549***
France	-4.119**	-2.142	-0.082	-2.155	-0.774
Italy	-3.578**	-2.266	-1.620	-2.938	-2.735
Ireland	-3.518	-2.447	-2.961	-2.320	-1.379
Spain	-2.502	-1.615	-2.536	-0.984	-4.201**
Portugal	-1.404	-0.743	-3.358***	-2.445	-1.720
USA	-4.703*	-2.591	-1.551	-0.807	-9.021*
Japan	-14.983*	-2.050	-20.593*	-1.415	-2.446

(*) significance at 1% level; (**) significance at 5% level; (***) significance at 10% level

[2] The FPE is defined as the asymptotic mean square prediction error and is determined from the relation

$$FPE(m,n) = \frac{T+m+n+1}{T-m-n-1} \sum_{i=1}^{T}(Y_i - \hat{Y}_i)^2 / T$$

where T is the number of observations, m and n are the orders of the lags of the examined variables. The right hand side of the relation, consists of two terms: the first term measures the estimation error while the second measures the modelling error.

[3] The calculated FPE values are available from the authors by request.

[4] DUMMY takes the value 0 over the period 1981, 3rd quarter to 4th quarter of 1985, and the value 1 for the rest of the examined period.

Table 1b. Augmented D-F unit roots tests (with trend) (first differences)

Country	FDI	INFL	GROW	EXCGE	WAGE
Germany	-7.207*	-4.842*	-7.770*	-4.263*	-6.222*
France	-10.321*	-4.304*	-6.137*	-5.117*	-3.545**
Italy	-5.917*	-6.161*	-5.807*	-5.674*	-4.791*
Ireland	-8.614*	-6.229*	-6.909*	-6.055*	-13.326*
Spain	-9.757*	-4.493*	-9.825*	-5.000*	-6.046*
Portugal	-6.860*	-3.797**	-7.870*	-5.160*	-5.790*
USA	-7.405*	-4.243*	-3.617*	-3.585**	-3.532**
Japan	-66.178*	-7.285*	-70.146*	-3.963**	-10.503*

(*) significance at 1% level; (**) significance at 5% level; (***) significance at 10% level
The Augmented Dickey-Fuller (ADF) tests are based on the following regressions:

(1)
$$\Delta X_t = \alpha + \beta X_{t-1} + e_t$$

and

(2)
$$\Delta X_t = \alpha + \beta X_{t-1} + \sum_{i=1}^{t} \gamma_i \Delta X_{t-i} + e_t$$

where Δ is the first difference operator and e_t is a stationary random error. The null hypothesis is that X_t is a non-stationary series and it is rejected when β is significantly negative. Regression (2) is estimated only in the case the errors from equation (1) are found to be serially correlated.

according to Theil (1971), the SURE gains in efficiency when the regressors are not the same in each equation, e.g., in the case of a near-VAR system. The estimation results are presented in Table 2.

The next step in our analysis concerns the detection of Granger-causal effects among the examined variables carried out by means of χ^2-tests. The results are reported in Table 3.

The empirical findings, reported in Tables 2 and 3, suggest different patterns of FDI net inflows behaviour, accross the investigated countries. In particular, economic theory suggests that inflation (INFL) may affect the FDI decision through the return on investment and the user cost of capital. An increase in the price level increases the value of the marginal product of capital and labour. If the costs of capital and labour are constant, then the marginal rate of return to investment increases. On the other hand, an increase in the price level also increases the user cost of capital since it forces nominal interest rates upwards. Moreover, it increases the risk of investment due to the inflation uncertainty and the associated macroeconomic instability. Thus, if the nominal interest rates in a country do not adjust rapidly to the inflation rate deviations from the mean of its trade partners,

then the marginal return of the investment increases more than the user cost of capital (i.e., in cases of anti-inflationary policy or administered interest rates). As a consequence there may be an increase in FDI net inflows. If, on the other hand, interest rates adjust fully to the inflation rate deviations, then we might expect that the rate of return to investment remains lower than the user cost of capital and hence the FDI net inflows are reduced. Inflation rate deviations are expected to affect the FDI inflows only in the short run since in open economies, such as the countries of our sample, prices and inflation rates converge in the long run. Here, it should be mentioned that the empirical literature (Bruno, 1993) presents evidence that there is a trade-off between economic growth and inflation rate. Thus, countries that have suffered from an inflation rate higher than the average (31%), have achieved the lower growth rate for the period 1960-86 (Levine and Renelt, 1990).

As we can see in Table 2, the net effect of the inflation rate coefficients is negative in the case of Italy, Spain, Portugal, thus being in consistency with the findings of Woodward and Rolfe (1993) for the export oriented countries of the Caribbean basin. Similar effects are reported for the case of the USA as well. This fact means that the inflation rate affects the rate of return to investment less than affects the user cost of capital. On the contrary, Germany has followed a tough anti-inflationary policy over the period thus affecting interest rates and causing the user cost of capital to increase less than the rate of return to investment.

An increase in the percentage change in the real exchange rate (EXCGE) may influence FDI net inflows in two ways: (i) by improving the competitiveness, and (ii) by decreasing the return to investment. Thus the positive or negative effect on FDI net inflows change is captured by the sign of the change in the real exchange rate. In particular, an increase in the real exchange rate affects positively the FDI net inflows in the case where the foreign investor is export oriented, e.g. France and Italy (a similar result is reported by Woodward and Rolfe, 1993). On the other hand we may observe a negative influence on FDI net inflows change in the case where the foreign investor is domestic market oriented, e.g. Germany, Japan and the USA (see also Yamawaki, 1991). Additionally, in case that the MNEs that intend to invest in Germany, Japan and the USA, are already exporters to these countries, then an increase in the real exchange rate may reduce the incentive for FDI since exports become cheaper. This result is similar to that reported by Cushman (1988) for the USA.

The net effect of the GDP growth is expected to be positive if the objective of the MNE is to exploit the potential of the host market. On the

other hand, the effect may be negative if the objective is to exploit the export potential of the country since a recession may force labour and capital cost downwards improving the cost positioning of the firm. During the early 1980s all sample countries faced a recession and an increasing growth rate in FDI net inflow. Considering GDP growth as a proxy for the potential of the host country, we use it in our analysis as an incentive for appealing FDI flows (Mainardi, 1992; Culem, 1988). Considering the results in Table 2 for the USA, we can notice that the net effect of the GDP growth is positive and comparable to that found in other studies (Cushman, 1988). This finding is justified by the strategy of European and Japanese MNEs regarding the USA market during the 1980s. In particular, the Japanese MNEs had established domestic affiliates in the USA to overcome the trade barriers raised by the US government with respect to Japanese exports (Yamawaki, 1991). On the other hand, the estimated effect for Portugal, Spain, Ireland and France was found negative. These countries have pursued a growth policy based on exports. Therefore they offer incentives to attract FDI targeting to the international markets.

The nominal wage rate (WAGE) in countries which attract labour intensive investment, like Spain, has a negative effect (Duran, 1991). In the other less developed countries of our sample, Portugal and Ireland, the nominal wage rate seems not to play a significant role for FDI attraction. The wage rate for Germany has a positive effect. This finding could be explained by the fact that the labour productivity in these countries, and over the examined period, has increased with a higher rate than nominal wage has. Thus, the efficiency wage rate has been improved and has caused FDI inflow to increase. Similar results have been reported by Papanastasiou and Pearce (1992) and Cushman (1988).

3. Conclusions

This paper attempted to identify the macroeconomic factors explaining the pattern of FDI net inflows during the 1980s. The present analysis addressed this issue by focusing on FDI net inflows in Germany, France, Italy, Ireland, Spain, Portugal, the USA, and Japan. The empirical findings support the hypotheses that FDI net inflow is sensitive to those macroeconomic factors related to the dynamism of the host country market (GDP growth rate), labour cost (wage differential), cost of capital and competitiveness (inflation rate and real exchange rate).

Table 2. Regression results for the FDI function

Variable		FDI Ireland	FDI Spain	FDI Portugal	FDI France	FDI USA	FDI Japan	FDI Italy	FDI Germany
INFL	(-1)		37.34 (1.802)	1.627 (2.638)		-1.038 (.818)		-165.111 (1.870)	.459 (1.40)
	(-2)		-19.396 (.931)	-1.818 (3.017)		-.105 (.083)			-.303 (.86)
	(-3)		-77.846 (3.507)			-4.329 (3.36)			.392 (1.22)
	(-4)					3.51 (3.082)			1.254 (3.95)
FDI	(-1)	-.378 (3.145)	-.587 (4.417)	-.188 (2.009)	-.871 (6.508)	-.3909 (3.439)	-.9559 (35.49)	-.370 (2.818)	-.015 (.08)
	(-2)		-.438 (1.651)	-.362 (3.571)	-.562 (3.482)	-.6606 (5.719)		-.637 (3.977)	-.87 (.67)
	(-3)		.120 (.956)		-.606 (4.225)				
GROW	(-1)	-176.412 (1.884)	-3635.89 (3.092)	-82.064 (1.532)	-27343.8 (2.031)	-100.6 (.99)			
	(-2)				-35140.2 (2.751)	-285.52 (3.12)			
	(-3)				15970.7 (1.244)	425.69 (4.36)			
WAGE	(-1)		-918.367 (2.897)						-9.94 (.679)
	(-2)		-625.804 (2.703)						55.58 (3.76)
	(-3)		-2103.76 (6.150)						

(Continued)

Table 2. (continued)

Variables	FDI Ireland	FDI Spain	FDI Portugal	FDI France	FDI USA	FDI Japan	FDI Italy	FDI Germany
EXCGE (-1)				-9705.386 (2.684)	-18.31 (.9604)	-13.626 (1.668)	7123.525 (1.685)	-14.95 (2.27)
(-2)				10575.65 (2.871)	-24.835 (1.306)	-13.101 (1.651)		
(-3)					20.658 (1.056)			
(-4)					-96.911 (5.0248)			
Constant	3.757 (1.132)	82.456 (1.441)	-6.668 (1.282)	71.694 (.596)	4.279 (1.291)	.6004 (1.822)	7.177 (.088)	3.107 (2.62)
Trend		4.758 (1.808)	.547 (2.681)					-1.37 (1.37)
Dummy	66.791 (3.894)		42.235 (9.046)				477.333 (1.586)	
R^2	.537	.743	.774	.703	.740	.975	.602	.62
D-W	2.186	1.639	2.611	2.044	2.448	2.379	2.032	2.057
Q-Stat	10.49	20.01	20.39	10.16	18.39	17.18	13.795	10.689
SEE	17.426	110.370	9.973	498.809	4.488	1.798	479.575	.888

Note: All estimations are SURE (Seemingly Unrelated Regression Estimation). The t-statistic is reported in parenthesis

Even though the analysis does not suggest a uniform pattern of FDI in all of the above countries, several features can be assimilated to a group formation in our sample. First, the less developed among the countries of the sample, i.e., Ireland, Spain and Portugal, seem to follow a pattern where inflation, GDP growth rate and wage rate are the crucial factors. Second, the more developed countries of the sample, i.e., Germany, Japan and the USA, follow a common pattern with respect to the real exchange rate where the negative effect of the real exchange rate implies that the foreign investors are mainly domestic market oriented. As it concerns France and Italy the real exchange rate causes positively FDI net inflows since foreign investors are likely to choose these countries pursuing an export oriented strategy. Our results are generally consistent with previous findings in the literature. However, our paper incorporates all the main macroeconomic factors together in an econometric model for the FDI net inflows behaviour. Moreover, even though our research provides some explanation concerning the importance of the macroeconomic factors for the FDI decision, much work is yet to be done in the field.

Table 3. Test of significance for the coefficients of the FDI function

Dependent Variable	Hypothesis Tested	χ^2-Statistic
FDI for USA	$b_{31} = b_{32} = b_{33} = 0$	22.14
	$b_{41} = b_{42} = b_{43} = b_{44} = 0$	16.66
	$b_{61} = b_{62} = b_{63} = b_{64} = 0$	28.89
FDI for Ireland	$b_{31} = 0$	3.55
FDI for Portugal	$b_{41} = b_{42} = 0$	11.90
	$b_{31} = 0$	9.58
FDI for Spain	$b_{41} = b_{42} = b_{43} = 0$	16.74
	$b_{31} = 0$	9.56
	$b_{61} = b_{62} = b_{63} = 0$	43.95
FDI for Japan	$b_{31} = b_{32} = 0$	7.76
FDI for Germany	$b_{41} = b_{42} = b_{43} = b_{44} = 0$	23.20
	$b_{51} = b_{52} = 0$	14.89
	$b_{61} = 0$	5.15
FDI for France	$b_{21} = b_{22} = b_{23} = 0$	12.47
	$b_{41} = b_{42} = 0$	15.28
FDI for Italy	$b_{31} = 0$	2.841
	$b_{41} = 0$	3.499

Note: The coefficients that have been tested for significance are defined in the equations of the Appendix.

As a future research agenda, using disaggregated data, it would be interesting to examine the effect of these macroeconomic factors on industry levels. That is, whether these factors affect more the high-tech industries or the traditional ones.

APPENDIX

For USA the estimated FDI function is

$$FDI_t = b_1 + b_2 TREND + \sum_{s=1}^{3} b_{3s} GROW_{t-s} + \sum_{s=1}^{4} b_{4s} INFL_{t-s} + \sum_{s=1}^{2} b_{5s} FDI_{t-s} + \sum_{s=1}^{4} b_{6s} EXCGE_{t-s} + u_t$$

For Ireland the estimated FDI function is

$$FDI_t = b_1 + b_2 DUMMY + b_{31} GROW_{t-1} + b_{41} FDI_{t-1} + u_t$$

For Portugal the estimated FDI function is

$$FDI_t = b_1 + b_2 TREND + b_{31} INFL_{t-1} + \sum_{s=1}^{2} b_{4s} EXCGE_{t-s} + b_5 DUMMY + u_t$$

For Spain the estimated FDI function is

$$FDI_t = b_1 + b_2 TREND + b_{31} GROW_{t-1} + \sum_{s=1}^{3} b_{4s} INFL_{t-s} + \sum_{s=1}^{2} b_{5s} FDI_{t-s} + \sum_{s=1}^{3} b_{6s} WAGE_{t-s} + u_t$$

For Japan the estimated FDI function is

$$FDI_t = b_1 + b_{21} FDI_{t-1} + \sum_{s=1}^{2} b_{3s} EXCGE_{t-s} + u_t$$

For Germany the estimated FDI function is

$$FDI_t = b_1 + b_2 DUMMY + \sum_{s=1}^{2} b_{3s} FDI_{t-s} + \sum_{s=1}^{4} b_{4s} INFL_{t-s} + \sum_{s=1}^{2} b_{5s} WAGE_{t-s} + b_{61} EXCGE_{t-1} + u_t$$

For France the estimated FDI function is

$$FDI_t = b_1 + \sum_{s=1}^{3} b_{2s} GROW_{t-s} + \sum_{s=1}^{3} b_{3s} FDI_{t-s} + \sum_{s=1}^{2} b_{4s} EXCGE_{t-s} + u_t$$

For Italy the estimated FDI function is

$$FDI_t = b_1 + b_2 DUMMY + b_{31} EXCGE_{t-1} + b_{41} INFL_{t-1} + \sum_{s=1}^{2} b_{5s} FDI_{t-s} + u_t$$

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ABSTRACT

This paper attempts to identify the macroeconomic factors explaining the pattern of FDI net inflows during the 1980s. The present analysis addresses this issue by focusing on FDI net inflows in Germany, France, Italy, Ireland, Spain, Portugal, the USA and Japan. The empirical analysis employs the VAR methodology in conjunction with Granger-causality tests. The results do not suggest a uniform pattern of FDI in all of the above countries. First, the less developed among the countries of the sample, i.e., Ireland, Spain and Portugal, seem to follow a pattern where inflation, GDP growth rate and wage rate are the crucial factors. Second, the more developed countries of the sample follow a common pattern with respect to the real exchange rate.(JEL: E21)