

# **The Impact of the Single Market on foreign direct investment in the European Union**

Khalid Sekkat\* and Olivia Galgau\*\*

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## **Abstract**

The purpose of this paper is to investigate the impact of the Single Market and the Single Currency on FDI in an aggregate and sectoral perspective. The Single Market had a stronger impact on FDI from EU countries and it has had a stronger effect on small sized countries and a more subdued effect on large sized countries. The Single Currency may lead to a decrease in FDI from EU countries by eliminating exchange rate volatility and may increase FDI from non-EU countries. The SMP increased FDI in low technology sectors but not in high technology sectors. The Single Currency may lead to an increase in FDI inflows by EMU countries in the petroleum, rubber, chemical and plastic products sector. The Single Market did not have a significant effect on FDI inflows into the aggregate services sector. The Single Currency is unlikely to have a significant impact on FDI inflows in the aggregate services sector.

**Keywords:** Foreign Direct Investment, Market Integration, Single Currency, European Union, Regional Integration Agreements, exchange rate volatility

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\* Dulbea and Ecares, ULB, e-mail: ksekkat@ulb.ac.be

\*\* Dulbea, ULB, e-mail: ogalgau@ulb.ac.be

## **I. Introduction**

Europe has gone over two major steps of economic integration during the past decade. At the end of 1992, the Single Market Program (SMP) came into effect while the Single Currency was adopted at the beginning of 1999. The Single Market Program was aimed at eliminating the remaining barriers to trade among member countries. The adoption of the Single Currency should result, among other things, in the elimination of transaction costs, price transparency and the elimination of exchange rate variability among European countries. Both steps of economic integration were expected to induce higher trade and a better allocation of economic activities for instance through foreign direct investment (FDI).

The purpose of this paper is to investigate the impact of the SMP and the Single Currency on FDI in Europe. While there was a large body of research on the impact of the SMP and the Single Currency on trade (see Sapir and al (1994) for a survey), their impact on FDI received less attention. Some recent papers (Van Aarle (1996), Barrell and Pain (1999)) have analyzed the impact of the SMP on FDI but none have also considered the role of the Single Currency. Moreover, the analysis of the impact of the SMP on FDI is always conducted at the aggregate level. Such an impact need not be the same across sectors however (see for instance Sapir and Sekkat (1995), Goldberg (1997) and Francisco Rivera-Batiz and Luis Rivera-Batiz (1992)). The sectoral dimension is not only useful in shedding further light on the impact on FDI but also necessary in terms of targeted policy. Hence, the analysis in this paper adopts both an aggregate and a sectoral perspective. In the latter we look at the impact of the Single Market and of the Single Currency on FDI separately for the manufacturing industry and for the services sector, given the common belief that the impact will be stronger on the latter than on the former. Even though our data ends in 1994, five years before the launch of the Single Currency, we can still evaluate if the Single Currency is susceptible to have an effect on FDI in an indirect manner by investigating the relationship between exchange rate volatility and FDI. Given that the adoption of the Single Currency led to the elimination of exchange rate variability among EMU members, if we find a significant relationship between exchange rate volatility and FDI, we can conclude that the Single Currency is susceptible to have an effect on FDI. If however we find an insignificant relationship between volatility and FDI, we can conclude that the Single Currency will not have an impact on FDI.

The rationale for examining the effect of the SMP and the Single Currency on FDI comes from both empirical and theoretical reasons. Blomstrom and Kokko (1997) provide an up to date analysis of the impact of economic integration on FDI. They suggest the existence of two opposite effects. If FDI is motivated by a tariff-jumping argument, then regional integration is likely to decrease intra-regional FDI flows. High trade barriers induce export-substituting FDI, while trade liberalization makes exporting from the home country less costly as a way of serving the regional market. If the major motive for FDI is the exploitation of intangible assets, then a reduction in trade barriers is likely to increase FDI since multinationals become able to operate more efficiently across international borders. This positive impact is reinforced by the fact that a Regional Integration Agreement (RIA) implies a larger integrated common market that can bear the fixed costs for the establishment of new foreign affiliates. Belderbos (1997) has attempted to uncover evidence of tariff-jumping FDI. The results show that antidumping actions in the EU are more threatening for exports and are more likely to induce tariff - jumping FDI. Just the beginning of an antidumping action is enough to induce a Japanese firm to start investing without waiting for the outcome. Usual tariff barriers increase FDI. Girma and al (1999) also investigated the role of trade policy and anti-dumping actions in determining FDI and found that trade barriers acted as an incentive to FDI. As far as the SMP is concerned, Barrell and Pain (1999) and Van Aarle (1996) found that it has raised the locational attractiveness of Europe for both Europeans and non-Europeans.

By eliminating exchange rate variability, the adoption of the Single Currency may also affect FDI. A first analysis of the theoretical effects of real exchange rate variability on foreign direct investment is provided by Cushman (1985) (see also Goldberg and Kolstad (1995)). He showed that the effects depend on whether the firm sells the output in the host country or abroad, uses the host country or foreign inputs and finances its capital at home or abroad. For instance, if the firm produces and sells in the host country, then exchange rate variability may be associated with more FDI because of lower risk. In contrast, if inputs are imported or output is sold abroad then foreign direct investment may be reduced. On the empirical front Cushman (1985) found significant decreases in US FDI linked with increases in the current value of foreign exchange and evidence that increases in risk consistently raise foreign direct investment. Goldberg and Kolstad(1995) also found that volatility tends to stimulate the share of investment activity located abroad. However, when the analysis is conducted at the sectoral level, Goldberg (1993) suggested that exchange rate volatility had mixed effects on investment, i.e. it may be associated with contracted investments in some sectors. Moreover, in some sectors there may be a change in the sense of the relationship between variability and

investment over time. These over time changes of the relationships can be caused by altered competitive structures of the industries or by altered patterns of reliance on domestically supplied and imported factor inputs.

The paper is organized as follows: in the second section we use descriptive statistics to analyze FDI trends both from a bilateral and a sectoral perspective. In the third section we describe the data, the regression models and the results. The fourth section concludes.

## **II. Bilateral and Sectoral FDI trends before and after the Single Market Program**

Before a formal estimation of the models, we will present a brief analysis of statistics referring to FDI trends at the bilateral level on the one hand, in the sample countries, and at the sectoral level on the other hand, in the five sub-sectors of the manufacturing industry and in the services sector (see the annex for the corresponding graphs).

We begin by examining FDI inflows over the 1980-1994 period for nine EU countries (Denmark, Portugal, Spain, Belgium and Luxembourg together, France, Italy, the UK, the Netherlands, Germany) and eight non-EU countries (US, Australia, Japan, Switzerland, Norway, Sweden, Finland and Austria).

For each country in the sample we divide total FDI inflows into two groups: FDI inflows coming from EU countries and inflows coming from non-EU countries. In order to obtain the two groups, we aggregate total FDI inflows coming from EU and non-EU sources, respectively, to get the two observations (EU and non-EU) for each year.

The overall picture for EU countries shows a rising tendency in intra-EU FDI inflows beginning in 1986-1987. This coincides with the launch of the Single Market Program (SMP). Non-EU FDI inflows into the European Union do not show the same strong tendency.

These movements in terms of EU and non-EU FDI inflows are not present in the non-EU sample.

Given the pattern of FDI movements in the EU sample, we can distinguish two groups of countries.

In the first group, which includes Denmark, Portugal, Spain, Belgium and Luxembourg, France and Germany, EU FDI inflows are systematically higher than non-EU FDI inflows starting from 1986-1987. There is an almost "parallel" evolution between EU and non-EU FDI inflows. Non-EU FDI inflows are either rising at a smaller pace for some countries or not showing any significant movement compared to the previous years for other countries.

The second group of EU countries (Italy, the UK and the Netherlands) shows a much more "chaotic" movement in EU and non-EU FDI inflows.

EU FDI inflows are higher than non-EU inflows most of the time, but there are portions in which reversals take place.

In the non-EU sample we can not distinguish any specific pattern.

We now turn to FDI outflows for the same period. The observations were obtained in a similar way as for FDI inflows: we aggregated total FDI outflows from EU and non-EU sources respectively, to get the two observations for each year.

The overall picture shows a rising tendency in EU FDI outflows from 1986-1987 onwards for all EU countries. The tendency is not as strong in the case of non-EU FDI outflows.

We again can divide the EU sample into two groups.

In the first group there is an almost "parallel" evolution between EU and non-EU FDI outflows, with EU outflows being systematically higher than non-EU outflows since 1986-1987. The countries included in this group are: Germany, Portugal, Italy and France.

The second group, which includes Denmark, the Netherlands, Belgium and Luxembourg, the UK, Spain and Finland is characterized by a more "chaotic" evolution of FDI outflows with EU FDI outflows surpassing non-EU FDI outflows in general. There are certain portions in which the reverse happens over the 1986-1994 period.

In the last two graphs we compared the amount of foreign direct investment received before and after 1987, the year the Single Market Program was launched, first in a bilateral and then in a sectoral context.

For each country in the EU sample we have summed up, for each year over the 1980-1994 period, foreign direct investment received from all the other countries in the EU sample.

Then, for a given country, we summed up total foreign direct investment received during the 1980-1987 period on the one hand and during the 1987-1994 period on the other hand.

The graph shows an increase in foreign direct investment after 1987 in all EU countries in the sample. But the magnitude of the increase differs from one country to another. According to the graph, the countries that have benefited the most from the Single Market in terms of FDI inflows are France, the UK, Belgium and Luxembourg and Spain. It is interesting to compare the case of Spain to that of Portugal since both countries became members of the EU at the same time and both countries benefited from the simultaneous effects of becoming members of a customs union and of the implementation of the Single Market Program. The increase in FDI inflows in Spain after 1987 was a lot higher than in Portugal. One possible explanation for this may be the difference in market sizes between the two countries, making Spain a more attractive location for FDI than Portugal.

In the cases of Germany and Italy, the increase in FDI after 1987 was weaker than in other countries. This can be explained, in the German case at least, by the fact that Germany tends to have an overall position as a home country for FDI rather than as a host country.

We rank the countries in our EU sample according to the magnitude of the increase in FDI inflows after 1987, with rank 1 being attributed to the country with the highest increase in FDI inflows after 1987 and rank 10 being attributed to the country with the lowest increase after 1987. We will later compare the rank attributed by the evolution of FDI inflows after 1987 as given by descriptive statistics with the rank obtained by each country according to the magnitude of the SMP as given by our regression results. This comparison will allow us to determine if the increase in FDI inflows after 1987 is due to the Single Market or to structural factors specific to each country.

**Table I.1.**

**Country Rankings according to the magnitude of the increase in FDI inflows after 1987**

Country	Rank
Belgium and Luxembourg	4
Denmark	9
France	3
Germany	7
Ireland	10
Italy	6
Netherlands	5

Portugal	8
Spain	2
United Kingdom	1

We have also used descriptive statistics to study the pattern of foreign direct investment inflows in different sub-sectors of the manufacturing industry as well as in the services sector before and after the launch of the SMP. The availability of data has determined the desagregation of the manufacturing industry into five sub-sectors: total textile and wood activities, total petroleum, rubber, chemical and plastic products, total metal and mechanical products, total machinery, RTV, computers and communication and total vehicles and other transport equipment.

For each one of the five sub-sectors mentioned above and for each year in the 1980-1994 period we have summed up all foreign direct investment inflows in the given sector in all the EU countries from the sample.

Then, for a given sector, we have summed up total foreign direct investment received in the 1980-1987 period on the one hand and in the 1987-1994 period on the other hand.

We have applied the same methodology to the services sector, but because of data limitations we were only able to conduct our analysis for the aggregated services sector.

The graph shows that foreign direct investment inflows have increased after 1987 in all the five sub-sectors of the manufacturing industry, but to varying extents. The highest increase was in the total petroleum, chemical, rubber and plastic products sector, followed by the total metal and mechanical products sector. The sectors with the lowest increase in FDI after 1987 are total textile and wood activities and total machinery, computers, RTV and communication.

We have again ranked the sectors according to the magnitude of the increase in FDI inflows after 1987, with rank 1 being given to the sector with the highest increase in FDI inflows after 1987 and rank 5 being given to the sector with the lowest increase.

**Table I.2.**

**Sector rankings according to the magnitude of the increase in FDI inflows after 1987 in the manufacturing industry**

Sector	Rank
Total textiles and wood activities	4

Total petroleum, chemical, rubber and plastic products	1
Total metal and mechanical products	2
Total machinery, computers, RTV and communication	5
Total vehicles and other transport equipment	3

We can also observe a substantial increase in FDI in the services sector after 1987 and the magnitude of the increase is higher than in all of the five sub-sectors of the manufacturing industry. The regression estimations will allow us to determine if the significant increase in FDI in the services sector after 1987 is due to the implementation of the Single Market or to other factors. The fact that we have a higher amount of FDI in the services sector as compared to the five sub-sectors of the manufacturing industry both before and after 1987 can be explained in several ways. The services sector is an aggregated sector, whereas manufacturing industry is disaggregated into several sub-sectors. Another explanation is that services are relatively less traded than manufacturing goods and so FDI is often the best way of serving the market.

This brief descriptive analysis allows us to draw some preliminary conclusions.

First, in the EU sample we see two groups clearly emerging both in the case of FDI inflows and outflows. This justifies the use of the panel data approach as an estimation method, since it is a tool that allows to isolate country-specific effects that are obviously present according to the graphs.

The usual core-periphery division of Europe does not seem to apply in the FDI case, as there are countries from both the core and the periphery in each sub-group of the sample, indicating a similar behavior in the pattern of FDI inflows and outflows.

Second, in all EU countries there is a rising tendency in both FDI inflows and outflows starting in 1986-1987, due to the launch of the Single Market Program, which is a specific phenomenon of European economic integration. This is confirmed by the fact that no such pattern is revealed in the non-EU sample. Had this pattern been due to some other phenomenon common to Europe as a whole or taking place at a global scale, we would have

seen it emerging as well in the European non-EU countries, respectively in the non-European sample as a whole. Therefore, the preliminary data seem to be indicating a significant and strong Single Market effect on both FDI inflows and outflows for the EU countries.

Third, the SMP seems to have had a stronger effect on intra-EU FDI, as shown by the systematically higher EU FDI inflows and outflows as compared to non-EU flows. The Single Market has induced EU companies to raise their investments in EU countries, whereas the response of non-EU countries to the Single Market apparently has not been as enthusiastic as that of EU countries.

Tariff-jumping FDI does not play a very important role in the EU as this together with the access to a large and unified common market should have determined a surge in non-EU FDI inflows.

So, going back to the theoretical effects of regional integration described by Blomstrom and Kokko (1997) the SMP did not have a very strong effect on non-EU FDI outflows to the EU. Intra-EU FDI seems to follow the internalization model: the reduction in non-tariff barriers operated under the Single Market Program, has enabled multinationals to operate more efficiently across international borders, thus increasing EU FDI inflows.

The graph on total FDI inflows in the EU countries before and after 1987 shows that the SMP affected EU countries to varying extents.

The study of FDI patterns in the manufacturing industry before and after 1987 shows evidence that the SMP had varying effects on different parts of the manufacturing industry, affecting some sectors more than others. FDI has also increased substantially in the services sector after 1987. The regression estimations will allow us to determine if this increase is due to the implementation of the Single Market or to other factors.

### **III. Empirical Analysis**

In the empirical analysis section we study the impact of the Single Market Program on bilateral FDI flows between countries, as well as on FDI flows in the five sub-sectors of the manufacturing industry and in the services sector.

In the bilateral FDI flows section we start from a basic model in which we introduce classical explanatory variables of FDI. Building on this model, we gradually introduce other categories of explanatory variables (integration variables and volatility measures), obtaining three regression models for the EU sample and three for the non-EU sample.

The regressions for all models of the EU and non-EU sample respectively are done in double-log.

In the sectoral FDI flows section we adopt a similar approach: we start from a basic model in which we introduce classical explanatory variables of FDI flows. We then introduce other independent variables (integration variable, effective exchange rates, volatility measures), obtaining four models.

The regressions for all the models are again done in double-log.

## ***1. Bilateral FDI flows***

### **1.1. The Data**

In this section we study the impact of the Single Market on bilateral FDI flows, with the aid of a gravity model.

We will first estimate a basic model using classical explanatory variables appearing in almost all empirical models in the literature as determinants of FDI.

One such variable is market size, which is used in all studies on the determinants of FDI. We should expect a positive relationship between market size and FDI, since the bigger the market, the more attractive it is for a foreign firm to locate production in that market. Furthermore, all empirical studies have verified this relationship in practice.

In the gravity model we use both the market size of the host and the home countries as proxied by their respective GDPs ( $GDPCOR = \text{GDP of the home country}$  and  $GDPC = \text{GDP of the host country in millions of current US dollars}$ ).

Another basic variable is unit labor costs which measures the cost of labor corrected for productivity. Again, it is a variable that appears in most models. From a theoretical point of view, the relationship between unit labor costs and FDI can go either way. On the one hand we should expect that an increase in wages in the host country will lead to a decrease in foreign direct investment, since a more expensive labor force should render the host country a less attractive location for a firm to establish production. But on the other hand, if there is a

strong substitution effect between capital and labor, then an increase in wages will determine a substitution of labor by capital and lead to an increase in FDI.

In practice however, the overwhelming majority of studies have found a negative relationship between host country unit labor costs and FDI. Only Nicholas Billington (1999) has found a non-linear relationship between these variables in the case of Japanese investment in the UK, but at a regional and not at a country level. In the case of the relationship between home country unit labor costs and FDI, Lucas (1993) has found a positive relationship between the two, indicating that an increase in wages in the home country would lead firms to locate production abroad.

In our model, we use the real unit labor costs of the home country as such and we use a transformation of the real unit labor costs of the host country by multiplying the latter by an index constructed from the bilateral nominal exchange rate between the host and home countries and assuming 1991 as the base. According to previous empirical results, we should see a positive relationship between FDI and home country unit labor costs and a negative relationship between FDI and host country unit labor costs ( $REALCOR$  = the real unit labor costs of the home country and  $R1ALLC$  = the real unit labor costs of the host country).

We also consider the geographic distance in kilometers between the capital cities of the home and host countries as one of the basic variables ( $DISTGAB$ ). There should be a negative relationship between FDI and distance, since locating production abroad still implies transport costs for both goods and human capital.

Our final basic variables are the spread or difference between the long term interest rates of the host and home countries respectively ( $SPREAD$ ) and the level of the nominal bilateral exchange rate between the host and home countries ( $NIVN$ ). An increase in the exchange rate means a depreciation of the host country currency. Again, from a theoretical point of view, the effect of a depreciation in the host country's currency can imply both an increase and a decrease in FDI. On the one hand a depreciation in the host country's currency will make it cheaper for investors to establish production in that country and increase FDI. On the other hand a depreciation in the host country's currency may decrease FDI if the costs of other inputs are affected.

Even from an empirical point of view the effect of a depreciation in the host country's currency is inconsistent and ultimately it depends on the changing export and imported input orientation of producers.

Once we have estimated the basic gravity model made up of variables considered as the main determinants of FDI in the literature, we introduce integration variables to study the impact of the Internal Market on FDI, these giving us our second model.

We use several integration variables. A first variable, SMPI, is aimed at capturing the effect of the Single Market on FDI. It is a dummy variable that equals 0 between 1980 and 1987 for all the countries in our sample. It then takes a value of 1 from 1988 to 1994 for FDI inflows into EU member countries whatever the donor country (EU or non - EU member). The variable is always equal to 0 for FDI inflows into non-EU member countries. The SMPI variable takes the value 1 starting with 1988 even though the Single Market was implemented in 1987, as a certain period of time was necessary for it to start generating effects.

At the same time we have included country specific dummy variables (SPAINI, SPAINO, PORTI, PORTO) for Spain and Portugal which became members of the EU during the implementation of the Single Market. This way we can distinguish between the classical effects of joining a customs union and the effects of implementing the Single Market Program (SMP). While the effects of implementing the SMP are captured by the SMPI dummy variable, the classical effects of joining a customs union are captured by the country specific dummy variables. For Spain and Portugal these variables are equal to 0 up to 1986 and to 1 from then on.

Given the country specific dummy variables we have also made a distinction between FDI inflows and outflows. Thus the variable SPAINI for example equals 1 for all EU and non-EU FDI inflows into Spain between 1986 – 1994 and 0 otherwise. SPAINO equals 1 for Spanish outflows into EU and non-EU countries for the same period 1986 – 1994 and 0 otherwise.

From a theoretical point of view (see Blomstrom and Kokko (1997)), there are two models that explain changes in FDI flows when countries form a Regional Integration Agreement (RIA): the tariff-jumping model and the internalization model.

In the tariff-jumping model, factor mobility and trade are viewed as substitutes and high tariff barriers increase FDI. For intra-regional FDI flows, the dismantling of trade barriers should decrease FDI, whereas for inter-regional FDI flows trade barriers should determine an increase in flows.

According to the internalization model, the main reason for incurring FDI is the exploitation of intangible assets. According to this model we should see an increase in both intra and inter-

regional FDI flows. And so, from a theoretical point of view, the effect of the SMP and of joining a customs union is inconclusive for EU member states. It depends on which of the two models is really at work. In practice all the studies done on the effect of the SMP on FDI have found a positive relationship between the two of them.

The SMP should lead to an increase in FDI flows into the EU from non-EU countries.

We continue enriching the estimation model by introducing different exchange rate volatility measures (third model). The theoretical effects are mixed: in the model developed by Darby, Hughes Hallet, Ireland and Piscitelli (1999) there is an important negative impact of exchange rate volatility on FDI. In models developed by Goldberg (1993) there can be a positive impact on FDI of exchange rate volatility.

Empirically, most studies have found an insignificant relationship between FDI and exchange rate volatility. Goldberg found a change in the relationship between FDI and volatility over the years in the case of some US sectors. Goldberg and Kolstad (1995) and Cushman (1985) found a positive relationship between exchange rate volatility and FDI.

The data covers the period 1980 – 1994 and we estimate the gravity model using the fixed effects panel data approach.

We divide the sample in two parts: the EU sample made up only of FDI inflows to EU countries from EU member countries and the non-EU sample made up of FDI inflows to EU countries from non-EU countries. The non-EU countries considered in the sample are: the United States, Canada, Australia, Japan, Switzerland, Norway, Sweden, Austria and Finland.

The models are estimated in double logs and the dependent variable is the inflows of FDI expressed in millions of current US dollars. We use a total of 999 observations for the EU sample and 855 observations for the non-EU sample.

## **1.2. The Results**

In the first part of the bilateral flows section we allow for only one coefficient associated with the SMPI dummy variable both in the EU and non-EU samples (see the annex for the corresponding tables).

We first estimated the models for the EU sample (see table III.1.).

In the basic model for the EU sample we find a positive relationship between FDI and the GDPs of both the host and home countries, with the coefficients highly significant, with t-statistics of respectively 7.47 and 18.57. There is evidence that an increase in real unit labor costs in the home country will lead to an increase in FDI in the host country, as multinationals start locating production abroad possibly in search of cheaper labor. However, the relationship between host country unit labor costs and FDI is insignificant.

We find the expected effect of an increase in the geographic distance on FDI, namely the larger the distance between home and host countries, the less FDI takes place between them. While the coefficient on the geographic distance variable is significant, the magnitude of the effect is very small.

An increase in the spread between long term interest rates of the host and home countries will increase FDI. There is some evidence that a depreciation in the host country's currency will lead to a decrease in FDI, given that a t-statistic of  $-1.88$  means that the coefficient associated with the bilateral nominal exchange rate is insignificant at the 5% confidence level, but it is significant at the 10% confidence level.

In terms of explanatory power, the basic model succeeds in explaining over 64% of the changes in FDI.

We have also investigated the pertinence of using the fixed effects model in the panel data approach by first testing the null hypothesis of a common intercept for all countries in the sample against the alternative of the existence of different fixed effects. We reject the null hypothesis at a 5% confidence level, the choice of the fixed effects model being appropriate in this context. We then used the Hausmann test to see if the choice of the fixed effects model is pertinent compared to the possibility of using the random effects model. We reject the null hypothesis of the random effects estimators being more appropriate than the fixed effects estimators at the 5% confidence level.

Once we introduce the integration variables (model 2), the coefficient associated with the GDP of the home country becomes insignificant, whereas the relationship between the GDP of the host country and FDI remains positive and highly significant with a t-statistic of 18.66. The relationship between the real unit labor costs of the host country and FDI becomes negative, but remains insignificant with a t-statistic of  $-0.75$ . There is no other change in the sense of the relationships between the other variables from the basic model and FDI, nor in

the significance of the relationship, with the exception of the coefficient associated with the nominal bilateral exchange rate which now becomes insignificant even at the 10% confidence level.

The SMPI dummy variable has a positive and significant coefficient, indicating that the implementation of the Single Market has raised FDI inflows from other EU countries on average by 0.49%. In terms of the other integration variables, there are positive and significant coefficients associated with SPAINI, SPAINO and PORTI. Therefore, the simple fact of joining a customs union has increased FDI inflows into Spain and Portugal from other EU countries. At the same time, joining a customs union has increased Spanish FDI outflows into other EU countries, but did not have any significant effects on Portuguese FDI outflows into other EU countries.

By incorporating integration variables into the model, the explanatory power of the model was raised to over 68% of the changes in FDI inflows. The F-test rejects the null hypothesis of a common intercept for all the countries in the sample at the 5% confidence level. The Hausman test rejects the null hypothesis of the random effects estimators being more appropriate than the fixed effects estimators at the 5% confidence level.

In the third model we investigate whether the introduction of the Single Currency is susceptible to have an effect on FDI inflows into the EU by studying the relationship between exchange rate volatility and FDI. We studied three types of volatility measures, obtaining three versions of the third model: the standard deviation of the level of the monthly nominal bilateral exchange rate (ETCHN), the standard deviation of the percentage change in the level of the monthly nominal bilateral exchange rate (CVNIVN) and the 5-year moving standard deviation of the annual percentage change of the bilateral exchange rate (ST5AV).

There is no change in the sign or the significance of the coefficients associated with the variables that had already been present in the second model. The implementation of the SMP has succeeded in raising FDI inflows from other EU countries and joining a customs union has increased FDI inflows into Spain and Portugal from other EU countries and it also increased Spanish FDI outflows to other EU countries.

Whatever exchange rate volatility measure we used in the regressions, ETCHN, CVNIVN or ST5AV, we have found a positive and significant relationship between exchange rate volatility and FDI, meaning that an increase in exchange rate volatility will increase FDI inflows into the host country. This is in line with the empirical evidence found by Cushman (1985) according to which increases in risk consistently raise foreign direct investment as well

as by Goldberg and Kolstad (1995) who found that volatility tends to stimulate the share of investment activity located abroad. The relationship between exchange rate volatility and FDI allows us to draw some conclusions on the impact of the introduction of the Single Currency on FDI. Given that the launch of the Single Currency led to the elimination of exchange rate volatility and the risk associated with it among EMU member states, it may lead to a decrease in FDI inflows into EMU countries from other EMU countries.

The explanatory power of the three versions of the third model is situated between 68.21% and 68.40%. The F-test rejects the null hypothesis of a common intercept for all countries at the 5% confidence level for all the versions of the third model. The Hausman test rejects the null hypothesis of the random effects estimators being more appropriate than the fixed effects estimators at the 5% confidence level for all the versions of the third model.

We have estimated the same models for the non-EU sample (see table III.2.).

In the basic model estimated for the non-EU sample we find a positive and significant relationship between the GDPs of both the host and home countries and FDI. An increase in home country real unit labor costs will lead to an increase in FDI inflows in the host country, whereas while the relationship between host country real unit labor costs and FDI is negative, it is also insignificant. We again find the expected negative and significant relationship between geographic distance and FDI, whereas the coefficient associated with the spread is negative and insignificant. We now find a negative and significant relationship between the nominal bilateral exchange rate and FDI, meaning that a depreciation in the host country's currency will lead to a decrease in FDI, although the magnitude of the effect is small. The basic model succeeds in explaining over 59% of the changes in FDI inflows.

The F-test rejects the null hypothesis of a common intercept for all the countries in the sample at the 5% confidence level. However, the Hausman test does not reject the null hypothesis of the random effects estimators being more appropriate than the fixed effects estimators either at the 5% or the 10% confidence level. Despite this, we still prefer the fixed effects model to the random effects model, since we can give an economic interpretation to fixed effects but not to random effects. Also, in order for comparisons with the results obtained in the literature to be possible, we have to use the fixed effects model.

In the second model where we introduce integration variables alongside the basic explanatory variables, we find that the coefficient associated with the GDP of the home country becomes

insignificant. The coefficient associated with the real unit labor costs of the host country is now negative and significant, uncovering evidence that an increase in host country labor costs will lead to a decrease in FDI from non-EU countries. There is no other change in the significance or the sign of the coefficients associated with the explanatory variables that were also present in our basic model. We do not find any significant relationship between the implementation of the Single Market and FDI inflows from non-EU countries into EU countries. The fact that Spain joined a customs union when it became a member of the EU did not have any significant impact on FDI inflows into Spain from non-EU countries. However, there is some evidence Portuguese membership into a customs union has led to an increase in FDI inflows from non-EU countries, given a t-statistic of 1.88, meaning that the coefficient associated with the PORTI dummy variable may not be significant at the 5% confidence level, but it is significant at the 10% confidence level.

The explanatory power of the model is over 59% of the changes in FDI. The F-test rejects the null hypothesis of a common intercept for all the countries in the sample at the 5% confidence level. The Hausman test rejects the null hypothesis of the random effects estimators being more appropriate than the fixed effects estimators at the 10% confidence level, but not at the 5% confidence level.

In the three versions of the third model there is no change in the sign or the significance of the coefficients associated with the variables which were also present in the second model. If exchange rate volatility is measured by ETCHN then we find a negative and significant relationship between exchange rate volatility and FDI, meaning that an increase in short-term exchange rate volatility will lead to a decrease in FDI inflows from non-EU member countries. The same result holds if volatility is measured by ST5AV leading to the same relationship between long-term volatility and FDI from non-EU countries, although this relationship is significant at the 10% confidence level, but not at the 5% confidence level.

The F-test rejects the null hypothesis of a common intercept for all the countries in the sample at the 5% confidence level. The Hausman test rejects the null hypothesis of the random effects estimators being more appropriate than the fixed effects estimators at the 10% confidence level, but not at the 5% confidence level for all the versions of the third model.

If we compare the results obtained in the EU and non-EU samples we see that the relationship between host country real unit labor costs and FDI was always insignificant in the EU sample,

whereas it was usually negative and significant in the non-EU sample. A first conclusion then is that multinationals from EU countries do not take into account the evolution of labor costs in other EU countries when deciding whether to locate production abroad or not, but they do look at the evolution in labor costs in their country of origin. If the latter increase, then they locate production in other EU countries. On the contrary, multinationals from non-EU countries take both host and home country unit labor costs into consideration when deciding whether to locate production abroad or not: again, if labor costs in their country of origin increase, they locate production in EU countries and if labor costs in the host country increase, they reduce their FDI to that country.

Another observation is that we always find a positive and significant relationship between the spread of long term interest rates and FDI in the EU sample, but the relationship is always insignificant in the non-EU sample.

The Single Market Program has significantly increased FDI inflows into EU countries from other EU member states, but it did not significantly affect FDI inflows into EU countries from non-EU member states. Spain's membership in a customs union has significantly increased FDI inflows into Spain from other EU member states and Spanish FDI outflows towards other EU countries, but it did not have a significant impact on FDI inflows into Spain from non-EU countries. Portuguese membership into a customs union has significantly increased FDI inflows into Portugal from EU countries, but it has not significantly affected Portuguese FDI outflows to other EU countries. There is some evidence that Portuguese membership into a customs union has increased FDI inflows into Portugal from non-EU countries, the relationship between the two being significant at the 10% confidence level, but not at the 5% confidence level.

We found an insignificant relationship between the bilateral nominal exchange rate and FDI in the EU sample, but we found this relationship to be negative and significant in the non-EU sample.

Finally, we found a positive and significant relationship between exchange rate volatility and FDI in the EU sample, leading us to conclude that the Single Currency may lead to a decrease in FDI inflows into EU countries from other EU countries by eliminating exchange rate volatility between them. On the contrary, there is a less strong negative relationship between exchange rate volatility and FDI inflows into EU countries from non-EU countries, leading us to conclude that the Single Currency may increase FDI inflows into the EU from non-EU countries by reducing exchange rate variability.

In the second part of the bilateral flows section we reestimate models two and three, but now we allow for different coefficients associated with the SMP variable for each EU country in our samples. We again run the regressions for the EU and the non-EU samples.

In the EU sample (see table III.3.) we find no changes in the sign or the significance of the coefficients associated with the GDPs of the host and home countries, the real unit labor costs of the host and home countries, geographic distance and the nominal bilateral exchange rate as compared with the results done for the EU sample in the previous estimation exercise. The coefficient associated with the SPREAD now becomes insignificant, but remains positive.

We find the same results for country specific integration variables as the ones we found in the previous regressions: Spanish membership into a customs union has significantly increased FDI inflows from other EU countries and has also significantly increased Spanish FDI outflows towards other EU countries. Portuguese membership in a customs union has significantly increased FDI inflows from EU countries, but did not significantly affect Portuguese outflows to other EU countries. An increase in short-term and long-term volatility will lead to an increase in FDI inflows from EU countries, although the relationship between ST5AV and FDI is now only significant at the 10% confidence level, but not at the 5% confidence level.

The implementation of the Single Market has led to a significant increase in FDI inflows from other EU countries into most EU countries, but it did not significantly affect FDI inflows from other EU member states into Germany and Italy. We can explain this result in the German case at least by the fact that Germany tends to be a net donor of FDI and not a net receiver.

In table III.4. we rank the EU countries according to the magnitude and significance of the coefficients associated with the SMP variable. For all significant coefficients we rank the countries according to the magnitudes of the coefficients. The country with rank 1 has the biggest coefficient associated with SMP and the country with rank 5 has the lowest coefficient. In order to rank Germany and Italy whose coefficients are insignificant, we look at their magnitudes.

#### **Table III.4.**

#### **Country Rankings according to the magnitude and significance of the coefficients associated with SMP**

Countries	Rankings for model 2	Rankings for model 3		
		V1	V2	V3
<b>Belgium and Luxembourg</b>	1	1	1	1
<b>France</b>	5	5	5	5
<b>Germany</b>	7	6	7	7
<b>Italy</b>	6	7	6	6
<b>Netherlands</b>	2	2	2	2
<b>Portugal</b>	3	3	3	3
<b>Spain</b>	4	4	4	4

If we compare the rankings in table I.1. with those in table III.4. and after eliminating Denmark, the UK and Ireland from table I.1. we see some important differences in the positions occupied by the different countries. In table I.1. France and Spain ranked ahead of Belgium and Luxembourg, the Netherlands and Portugal, whereas in table III.4. they rank after these three countries. And so a conclusion is that an important part of the increase in FDI inflows into Spain and France from other EU countries observed after 1987 is due to structural factors specific to these countries and only part of that increase is due to the implementation of the Single Market. In Spain in particular, a part of the increase in FDI inflows from other EU countries is due to it becoming part of a customs union with its membership in the EU. Belgium and Luxembourg and the Netherlands rank after Spain and France in table I.1., but they rank before them in table III.4. occupying the first and second positions respectively meaning that the increase in FDI inflows after 1987 observed in these countries is particularly due to the implementation of the Single Market and less to country specific structural factors. Germany and Italy score better than Portugal in table I.1., but worse in table III.4. Furthermore, given that the coefficient associated with the SMP variable is insignificant for Germany and Italy, we can conclude that the increase in FDI inflows observed after 1987 in these two countries is entirely due to country specific structural factors and not to the implementation of the Single Market. Finally, while the increase in FDI inflows in Portugal after 1987 was considerably less than in other EU countries, a large part of that increase is due to the implementation of the Single Market, given its third rank in table III.4.

A last conclusion is that the implementation of the Single Market has had a stronger positive impact on FDI in small EU countries, whereas the impact was more subdued in large EU countries where structural factors played an important role in attracting FDI after 1987.

The explanatory power of the models in this estimation exercise varies between 72.89% and 73.09% of the changes in FDI.

The F-test rejects the null hypothesis of a common intercept for all the countries in the sample at the 5% confidence level for all the models that were estimated. The Hausman test rejects the null hypothesis of the random effects estimators being more appropriate than the fixed effects estimators at the 5% confidence level for all the models estimated.

In the non-EU sample (see table III.5.) there is no change in the sign and the significance of the coefficients associated with the GDPs of the host and home countries, the real unit labor costs of the home country, geographic distance, SPREAD and volatility as measured by ETCHN and ST5AV compared to the results of table III.2. The relationship between host country unit labor costs and FDI remains negative in table III.5., but is now insignificant and the same can be said about the relationship between the nominal bilateral exchange rate and FDI. The coefficient associated with long-term volatility as measured by ST5AV is insignificant even at the 10% confidence level in table III.5., although it remains negative.

Neither Spanish nor Portuguese membership into a customs union has had a significant influence on FDI inflows into Spain and Portugal respectively from non-EU countries.

Comparing the results in tables III.2. and III.5. for the SMP variable, we see that although the implementation of the Single Market did not significantly influence FDI inflows into EU countries from non-EU countries on the whole, the effect varies from one country to another.

The Single Market did significantly increase FDI inflows from non-EU countries into Belgium and Luxembourg, the Netherlands and Portugal. It did not have a significant impact on FDI inflows from non-EU countries into Germany, Spain and France and it significantly decreased FDI inflows from non-EU countries into Italy.

These results confirm what we had seen in the EU sample, namely that the Single Market has had a more powerful effect on FDI inflows into small-sized EU countries and less of an effect on FDI inflows into larger-sized EU countries. Indeed, the Single Market has increased FDI inflows in small EU member states from both other EU countries and from non-EU countries. It significantly increased FDI inflows into France and Spain from other EU countries, but it

did not have a significant influence on FDI inflows into these countries from non-EU countries. It did not significantly influence FDI inflows into Germany either from EU or non-EU countries. It did not have a significant impact on FDI inflows into Italy from other EU countries and it decreased FDI inflows from non-EU countries.

The explanatory power of the models in table III.5. varies between 63.33% and 63.67%.

The F-test rejects the null hypothesis of a common intercept for all the countries in the sample at the 5% confidence level for all the estimated models. The Hausman test rejects the null hypothesis of the random effects estimators being more appropriate than the fixed effects estimators at the 5% confidence level for version 3 of model 3. The test rejects the null hypothesis at the 10% but not at the 5% confidence level for the other estimated models.

## ***2. Sectoral FDI flows***

### ***Manufacturing Industry***

#### **2.1. The Data**

In the second part of the empirical section we examine the impact of the Single Market Program on FDI inflows in the manufacturing industry.

We use an approach similar to the one on bilateral FDI flows, again starting from a basic model, where we only include variables considered as classical determinants of FDI. Labor costs are used as an explanatory variable in most sectoral studies, the main expectation being that an increase in labor costs within a sector is likely to reduce FDI in that sector. We use the wage levels in each manufacturing sub-sector as a measure for labor costs (WAGESL). The observations were taken from the UNIDO database and converted into millions of current US dollars, using the average yearly bilateral exchange rate between the national currency and the US dollar.

Value-added (VA1) and gross fixed capital formation (FBCFUN) in each sub-sector are used as additional classical explanatory variables in most empirical studies. The value-added variable is taken from the OECD STAN database, whereas the gross fixed capital formation variable comes from the UNIDO database. The last classical variable we use in the model is the interest rate spread (SPREAD).

The dependent variable is represented by FDI inflows into each sector converted in millions of current US dollars and it also is taken from the OECD STAN database.

We use observations on the five manufacturing sectors from 7 EU member countries (Germany, Denmark, Spain, France, United Kingdom, Italy, Netherlands) which cover the period 1980 – 1994.

In the second model we introduce the Single Market Program dummy variable (SMP), which takes a value of 0 between 1980 and 1987 for all the countries in the panel. Then it equals 1 for EU member countries from 1988 to 1994. We gave the value 1 from 1988, even though the Single Market was implemented in 1987, as a certain period of time was necessary for the SMP to start generating effects.

In the third model we introduce the nominal effective exchange rate (NIVN), which is defined as the ratio (expressed in base 1995 = 100) of an index of the period average exchange rate of the currency in question to a weighted geometric average of exchange rates for the currencies of selected countries. An increase in the effective exchange rate index reflects an appreciation of the respective currency. The effective exchange rate is taken from the IMF's "International Financial Statistics".

In model four we introduce four volatility measures: ETCHN (the standard deviation of the level of the monthly nominal effective exchange rate), CVNIVN (the percentage change in the level of the monthly nominal effective exchange rate), DANIVN (the variation of the nominal effective exchange rate from the preceding period) and ST5AV (the 5-year moving standard deviation of the annual percentage change in the level of the nominal effective exchange rate). All volatility measures are calculated from the effective exchange rates taken from the IMF's "International Financial Statistics".

We use the panel data approach with fixed effects. Unlike the bilateral flows section, we allow different coefficients for each of the five sectors for the same independent variable.

## 2.2. The Results

We estimate the models in double-log, using a total of 168 observations (see table III.7.).

In the basic model the coefficients associated with the value-added variables are positive and significant for the total textile and wood activities sector, the total petroleum, chemical, rubber and plastic products sector and the total metal and mechanical products sector, implying that an increase in value-added will lead to an increase in FDI inflows in these three sub-sectors. The relationship between value-added and FDI in the total vehicles and other transport equipment sector is positive and significant at the 10% confidence level, but not at the 5% confidence level.

The coefficient associated with gross fixed capital formation is negative and significant in the vehicles and other transport equipment sector, implying that an increase in the capital stock in this sector will lead to a decrease in FDI inflows. The coefficients associated with gross fixed capital formation are insignificant in all the other remaining four sub-sectors.

The relationship between wages and FDI is negative and significant in the textiles and wood activities sector and in the metal and mechanical products sector, although the coefficient in the latter is only significant at the 10% confidence level, but not at the 5% confidence level. The coefficient associated with wages is insignificant in all the other remaining sub-sectors.

An increase in the spread will negatively and significantly influence FDI inflows in the textiles and wood activities sector, but will have an insignificant effect in the other sub-sectors. The basic model explains over 39% of the changes in FDI inflows.

We have again investigated the pertinence of using the fixed effects model in the panel data approach by first testing the null hypothesis of a common intercept for all the countries in the sample against the alternative of the existence of different fixed effects. We reject the null hypothesis at the 5% confidence level. We then used the Hausman test to see if the choice of the fixed effects model is pertinent compared to the possibility of using the random effects model. We reject the null hypothesis of the random effects estimators being more appropriate than the fixed effects estimators at the 5% confidence level.

In the second model we introduce the SMP variable alongside the basic explanatory variables. The coefficient associated with value added in the textile and wood activities sector is positive and significant only at the 10% confidence level, but not at the 5% confidence level as was the case in the basic model. The coefficient associated with value-added in the metal and

mechanical products sector is positive and significant with a t-statistic of 3.04, whereas the relationship between value-added and FDI in the vehicle and other transport equipment sector is insignificant.

The relationship between wages and FDI is now insignificant in the textile and wood activities sector compared to the basic model. The coefficient associated with wages in the metal and mechanical products sector is now negative and significant at the 5% confidence level. There are no other changes in the sign or the significance of the coefficients associated with the other explanatory variables that were also present in the basic model.

The implementation of the Single Market has led to a significant increase in FDI inflows into the textile and wood activities sector, whereas it did not significantly affect FDI inflows in the other sub-sectors of the manufacturing industry.

This model succeeds in explaining nearly 40% of the changes in FDI.

The F-test rejects the null hypothesis of a common intercept for all countries in the sample at the 5% confidence level. The Hausman test rejects the null hypothesis of the random effects estimators being more appropriate than the fixed effects estimators at the 5% confidence level.

In the third model we introduce the effective exchange rate alongside the variables present in model 2. Doing so renders the coefficient associated with value-added in the textiles and wood activities sector insignificant, whereas the coefficient associated with value-added in the vehicle and other transport equipment sector is now positive and significant at the 10% confidence level.

The coefficient associated with the SMP variable remains positive, but is now significant at the 10% confidence level and no longer at the 5% confidence level. There is no other change in the significance or the sign of the significant coefficients as compared to the results obtained in model 2.

The coefficient associated with the nominal effective exchange rate is negative and insignificant in almost all the sub-sectors of the manufacturing industry, the only exception being the vehicle and other transport equipment sector, where the relationship between the nominal effective exchange rate and FDI is negative and significant at the 10% confidence level.

The third model explains 39.58% of the changes in FDI. The F-test rejects the null hypothesis of a common intercept in all the countries in the sample at the 5% confidence level. The

Hausman test rejects the null hypothesis of the random effects estimators being more appropriate than the fixed effects estimators at the 5% confidence level.

In the fourth model we introduce different volatility measures alongside the variables we estimated in model three. The coefficient associated with value-added in the textile and wood activities sector is positive and significant at the 10% confidence level in the first version of model three, but it is insignificant in the other versions of model four. The coefficient associated with value-added in the vehicle and other transport equipment sector is insignificant in versions one and two of model four, but it is positive and significant at the 10% confidence level in versions three and four of model four.

The coefficient associated with the SMP variable is positive and significant in the textiles and wood activities sector in the first two versions of model four. It is positive and significant at the 10% confidence level in version four of model four and it is insignificant in version three of model four.

The relationship between the nominal effective exchange rate and FDI in the vehicle and other transport equipment sector is negative and significant at the 10% confidence level in versions three and four of model four and it is insignificant in the first two versions of model four.

There are no other changes in the significance or in the sign of the significant coefficients in any of the versions of model four for all other explanatory variables that had already been included in model three.

We do not find a significant relationship between exchange rate volatility and FDI in any of the sub-sectors of the manufacturing industry, if volatility is measured by ETCHN, CVNIVN or DANIVN. If volatility is measured by ST5AV we find a negative and significant relationship between exchange rate variability and FDI in the rubber, petroleum, chemical and plastic products sector, indicating that an increase in long-term exchange rate volatility will reduce FDI inflows into this sector. This means that by eliminating exchange rate variability, the Single Currency may lead to an increase in FDI inflows by EMU countries in the petroleum, rubber, chemical and plastic products sector.

The explanatory power of versions one through four of model four varies between 37.81% and 39.80%.

The F-test rejects the null hypothesis of a common intercept for all the countries in the sample at the 5% confidence level for all the versions of model four. The Hausmann test rejects the

null hypothesis of the random effects estimators being more appropriate than the fixed effects estimators at the 5% confidence level for all the versions of model four.

In table III.6. we rank the five sub-sectors of the manufacturing industry according to the magnitude and significance of the coefficients associated with the SMP variable. For the sub-sectors whose SMP coefficients are insignificant we look at the magnitude of their coefficients. The sector with rank 1 has the biggest and most significant coefficient associated with SMP and the sector with rank 5 has the lowest coefficient.

**Table III.6.**

**Sector rankings according to the magnitude and significance of the coefficients associated with SMP**

Sectors	Rankings for model 2	Rankings for model 3	Rankings for model 4			
			V1	V2	V3	V4
Total textile and wood activities	1	1	1	1	1	1
Total petroleum, chemical, rubber and plastic products	2	2	2	2	2	2
Total metal and mechanical products	4	4	3	4	4	3
Total machinery, computers, RTV and communication	5	5	5	5	5	5
Total vehicles and other transport equipment	3	3	4	3	3	4

If we compare the rankings in table I.2. with those in table III.6. we see some differences in the positions occupied by the different sub-sectors of the manufacturing industry.

In table I.2. the textile and wood activities sector ranked fourth, whereas it occupies first place in table III.6., having the only coefficient associated with the SMP variable that is positive and significant in most models. This means that even though on the whole the increase in FDI

inflows into this sector after 1987 was mediocre, a large part of this increase is due to the implementation of the Single Market. The coefficients associated with the SMP variable are insignificant for the other remaining sub-sectors of the manufacturing industry, whereas we can see an important increase in FDI inflows into these sectors after 1987, implying that this increase is entirely due to sector specific factors and not to the implementation of the Single Market.

Another interesting observation is that the Single Market increased FDI inflows into low technology intensive sectors like textiles and wood activities, but it did not have a significant impact on high technology intensive sectors like machinery, computers, RTV and communication.

### *Services Sector*

#### *2.3. The Data*

In the third part of the empirical section we analyze the impact of the Single Market and of the Single Currency on FDI in the services sector. Although the services sector was desagregated into seven sub-sectors (electricity, gas and water, construction, trade and repairs, restaurants and hotels, transport and communication, financial intermediation and real estate and business activities), we were only able to study the services sector as a whole, given the scarcity of data available. We used a similar approach as the ones used in the previous two sections, namely starting from a basic model in which we only included classical explanatory variables of FDI: value added, gross fixed capital formation, the spread and labor costs, the latter being represented by the variable LWGWO. The LWGWO variable represents total wages for each of the seven sub-sectors mentioned above divided by the total number of workers in each sub-sector. Given that there were occasions when the number of workers was only available for aggregated sub-sectors of the services sector and not separately for each sub-sector mentioned above, we applied the following method to desagregate the number of workers according to the sub-sector desaggregation we had in our database. For example, say we only have data in terms of employment for two aggregated sub-sectors  $k+l$  and not for sub-sectors  $k$  and  $l$  separately. But we do have separate data for sub-sectors  $k$  and  $l$  in terms of wages. In a first step, we sum up the wages for sub-sectors  $k$  and  $l$  to get aggregated wages for sector  $k+l$  and then we determine the proportion represented by wages in sub-sector  $k$  in the aggregated  $k+l$  sector and we do the same for sector  $l$ . In a second step we apply these

proportions to the aggregated employment data for sector  $k+1$  in order to have an estimate of employment in sub-sector  $k$  and an estimate in sub-sector  $l$ . Once we desaggregate employment in this manner for all of the original seven sub-sectors where necessary, we construct the LWGWO variable by dividing wages by employment in each of the seven sub-sectors of the services sector. All the other variables used in the models are constructed in the same way as they were for the manufacturing sector. The data cover the period 1980-1994 and are available for the same EU countries used in the manufacturing industry analysis.

## **2.4. The Results**

We estimate the models in double-log using a total of 81 observations (see table III.8.).

In the basic model the coefficient associated with the value-added variable is positive and significant, meaning that an increase in value-added in the services sector by 1% will increase FDI by nearly 2%. The coefficient associated with gross fixed capital formation is negative and statistically significant showing that an increase in the capital stock in the services sector will lead to a decrease in foreign investment. The coefficients associated with the other variables in the basic model, namely LWGWO and SPREAD are statistically insignificant. The basic model succeeds in explaining 18.71% of the changes in FDI in the services sector.

We have again investigated the pertinence of using the fixed effects model in the panel data approach by first testing the null hypothesis of a common intercept for all the countries in the sample against the alternative of the existence of different fixed effects. We can not reject the null hypothesis at the 5% confidence level. We then used the Hausman test to see if the choice of the fixed effects model is pertinent compared to the possibility of using the random effects model. We again can not reject the null hypothesis either at the 5% or at the 10% confidence level.

In the integration model, the coefficient associated with the value added variable is positive and significant, whereas the coefficient associated with the gross fixed capital formation variable is negative and statistically significant. The sign and the significance of the coefficients associated with the LWGWO and SPREAD variables do not change as compared to the basic model. The coefficient associated with the SMP dummy variable is statistically insignificant both at the 5% and 10% confidence levels. This empirical result is contrary to common belief that the Single Market is likely to have a stronger effect on FDI in the services

sector as compared to the manufacturing industry. In particular, it differs from the theoretical findings by Francisco Rivera-Batiz and Luis Rivera-Batiz (1992) according to which a decrease in restrictions will lead to an increase in FDI in the services sector, but not in the manufacturing industry for a small open economy. One reason for the different result is that we look at the effect of the Single Market on FDI at the EU level and not at the country level and therefore the small open economy hypothesis is not valid in this case. At the same time the result that we found is available for the aggregate services sector and at the EU level, but this does not mean that the Single Market may not have had significant effects on FDI in some disaggregate services sectors or in some individual member countries of the EU. A more detailed database is needed in order to be able to estimate the Single Market effect for disaggregate sub-sectors of the services sector. The integration model succeeds in explaining 18.20% of the changes in FDI. The F-test can not reject the null hypothesis of a common intercept for all the countries in the sample at the 5% confidence level. The Hausman test can not reject the null hypothesis of the random effects model being more pertinent than the fixed effects model at the 5% confidence level, but it can do so at the 10% confidence level.

In the exchange rate model there is no change in the sign or the significance of the variables associated with the value-added, gross fixed capital formation and integration variables as compared with the integration model. The coefficient associated with the spread is negative and statistically significant at the 10% confidence level, but not at the 5% confidence level. The coefficient associated with the nominal effective exchange rate is positive and significant at the 10% confidence level, but not at the 5% confidence level, providing some evidence that an appreciation in the currency in question will lead to an increase in FDI. The exchange rate model explains around 20.21% of the changes in FDI. The F-test can not reject the null hypothesis of a common intercept for all countries in the sample at the 5% confidence level, whereas the Hausman test can not reject the null hypothesis of the random effects model being more pertinent than the fixed effects model at the 5% confidence level, but can do so at the 10% confidence level.

In the four versions of the volatility model there is no change in the sign or the significance of the coefficients associated with value-added, gross fixed capital formation, labor costs and the SMP variable as compared to the exchange rate model. The coefficient associated with the spread is negative and statistically significant at the 10% confidence level in some versions of this model, but not at the 5% confidence level. The coefficient associated with the nominal

effective exchange rate is positive and significant at the 10% confidence level in some versions of the model, but again not at the 5% confidence level. The coefficients associated with exchange rate volatility are always insignificant whatever measure for exchange rate volatility is being used, suggesting that the introduction of the Single Currency is unlikely to have a significant impact on FDI in the services sector. Again, this result does not imply that the Single Currency may not significantly influence FDI in some sub-sectors of the services sector or in the services sector in general in some individual member countries. However, data limitations for the services sector prevent us from conducting a deeper analysis of this effect. The volatility model succeeds in explaining between 19.28% and 19.81% of the changes in FDI. The F-test can not reject the null hypothesis of a common intercept for all the countries in the sample at the 5% confidence level, whereas the Hausman test does allow us to reject the null hypothesis of a random effects model being more appropriate than a fixed effects model at the 10% confidence level, but not at the 5% confidence level for all of the versions of this model.

#### **IV. Conclusions**

The regressions done on bilateral FDI flows uncover evidence that the implementation of the Single Market has significantly increased FDI inflows into EU countries from other EU member states, but it did not significantly affect FDI inflows into EU countries from non-EU member states. However this is only part of the picture as isolating the effects of the Single Market on individual member countries and comparing them with the magnitude of the increase in FDI after 1987 leads to some interesting conclusions. The Single Market has had a stronger positive impact on FDI inflows into small EU countries, whereas the impact was more subdued in large EU countries, where country specific structural factors played an important role in attracting FDI after 1987. The extreme cases are those of Germany and Italy where the Single Market did not significantly influence FDI inflows from other EU states into those countries, implying that the entire increase in FDI after 1987 into those countries was due to country specific structural factors.

While the Single Market did not significantly influence FDI inflows into EU countries from non-EU countries on the whole, once we isolate the SMP effect for individual countries we see that the implementation of the Single Market has significantly increased FDI inflows into some EU member countries from non-EU countries. The results for the non-EU sample

confirm that the SMP has had stronger effects on small-sized countries and weaker effects on large countries.

Given these observations and comparing them to the potential effects on FDI inflows of a Regional Integration Agreement as described by Blomstrom and Kokko (1997), in the case of inter-regional flows it seems that the main motive for incurring FDI is the exploitation of intangible assets. This implies that a reduction in trade barriers enables multinationals to operate more efficiently across international borders, leading to an increase in intra-regional FDI inflows. Since we observe an increase in intra-regional FDI inflows, we have to assume that it is the internalization model that is at work as the other possibility given by the tariff-jumping argument would have implied a reduction in FDI inflows in the case of a Regional Integration Agreement. The reduction in trade barriers would make serving the market via exports from the home country more attractive.

According to the theory developed by Blomstrom and Kokko (1997) for inter-regional FDI flows, i.e. FDI inflows from non-EU countries in this case, whatever the pre-existing motive for FDI (tariff jumping or the internalization model) there should be an increase in FDI inflows from non-EU members. We do see an increase in FDI inflows into some EU countries particularly small-sized states from non-EU countries due to the Single Market, but not in all of them and not for the EU as a whole. An explanation for the smaller impact of the Single Market on FDI inflows from non-EU countries and the absence of an effect for some countries is the following. The theoretical models developed to assess the effects of forming a Regional Integration Agreement on FDI flows from non-member countries assume that there are two entities in the world: a group represented by the RIA and an individual country that is not a member of the RIA. It also assumes that the non-RIA member has pre-existing investment in the member countries and assesses the effects on this investment of the other countries forming a RIA. In reality the non RIA member country can be a member of another rival RIA, which is the case for four of the countries in our non-EU sample (the US and Canada are members of both NAFTA and APEC, while Japan and Australia are both members of APEC). And so the smaller effect of the Single Market on FDI inflows from non-EU countries can be due to the fact that the non-EU countries' FDI flows could for the most part be directed inside rival Regional Integration Agreements. Developments in the other RIA (in this case the EU) may not be very successful in changing that pattern despite the obvious advantages of access to a large, integrated, single market. One direction of future research into FDI can be to assess how deep integration in one Regional Integration Agreement can change the FDI pattern of a country that is a member of one of several rival RIAs.

Spanish integration into a customs union has significantly increased FDI inflows into Spain from other EU countries, but did not affect FDI inflows into Spain from non-EU countries. It has also significantly increased Spanish FDI outflows into other EU countries. Portuguese integration into a customs union has significantly increased FDI inflows into Portugal from other EU countries and there is some evidence that it may have increased FDI inflows from non-EU countries. Portuguese integration into the EU did not affect Portuguese FDI outflows towards other EU countries.

There is some evidence that multinationals from EU countries do not take into account the evolution of labor costs in other EU countries when deciding whether to locate production abroad or not, but they do look at the evolution in labor costs in their country of origin. If the latter increase, they locate production in other EU countries. On the contrary, multinationals from non-EU countries take both host and home country labor costs into consideration when deciding whether to locate production abroad or not: if labor costs in their country of origin increase, they locate production in EU countries and if labor costs in the host country increase, they reduce their FDI to that country.

Another conclusion is that multinationals take market size of the host country into consideration when deciding to invest abroad, but they do not take into account the market size of the home country.

We found an insignificant relationship between the nominal bilateral exchange rate and FDI in the EU sample, but we found some evidence of a negative relationship between the two in the non-EU sample.

In the EU sample we found that an increase in exchange rate volatility will significantly increase FDI inflows. This allows us to do a preliminary assessment on the impact of the Single Currency on foreign direct investment. Given that the Single Currency led to the elimination of exchange rate variability among EMU countries we can conclude that it may lead to a decrease in FDI inflows into EU countries from other EU countries.

In the non-EU sample we found some evidence that an increase in exchange rate volatility will lead to a decrease in FDI inflows into EU countries from non-EU countries. The Single Currency may therefore increase FDI inflows into the EU from non-EU countries by reducing exchange rate volatility.

The double-log regressions done on sectoral FDI flows in the manufacturing industry show that the impact of the explanatory variables on FDI inflows is different, depending on the sector studied. It was therefore important to disaggregate the manufacturing industry into the

sectors mentioned above rather than doing the regressions for the manufacturing industry as a whole.

According to the regression results, the implementation of the Single Market did not have a significant effect on FDI inflows in the entire manufacturing industry, but just in certain parts of it. While a large part of the increase in FDI inflows into the textiles and wood activities sector after 1987 is due to the Single Market, the increase in FDI inflows into the remaining four sub-sectors of the manufacturing industry after 1987 is entirely due to sector specific structural factors and not to the implementation of the Single Market.

There is evidence that the implementation of the Single Market has significantly increased FDI inflows into low technology intensive sectors like textiles and wood activities, but it did not affect FDI inflows into high technology intensive sectors like machinery, computers, RTV and communication. One possible explanation is that potential economies of scale arising from concentrating production at a single plant tend to discourage FDI and geographically dispersed production. The implication then is that in sectors subject to economies of scale, the SMP will lead to relatively more trade than FDI. In our case, more technology intensive sectors also tend to be the ones where economies of scale tend to arise and so we observe this pattern in which the Single Market Program has a significant and positive effect on FDI inflows in less technology intensive sectors, but it has a negligible effect on more technology intensive sectors. At the same time, the literature also states that for sectors characterized by knowledge-based assets, FDI may increase as compared to trade in those member countries whose location advantages are significantly improved by the Single Market Program because of the removal of market fragmentation and the dynamic impacts on economic growth and prosperity. And so, while it appears that the Single Market Program did not have a significant effect on high technology intensive manufacturing sectors in the European Union as a whole, it may have nevertheless had a significant and positive effect on FDI inflows in these sectors in certain EU member states. Further studies on the impact of the SMP on sectoral FDI flows are needed on a country by country basis.

We found the relationship between the nominal effective exchange rate and FDI to be insignificant and the same can be said about the relationship between short-term volatility and FDI. However we found some evidence that an increase in long-term exchange rate volatility will decrease FDI inflows into the petroleum, rubber, chemical and plastic products sector. Therefore, the Single Currency may lead to an increase in FDI inflows by EMU countries in the petroleum, rubber, chemical and plastic products sector by eliminating exchange rate

variability. The Single Currency is not expected to significantly affect FDI inflows into the other four remaining sub-sectors of the manufacturing industry.

The regression estimations done for the aggregated services sector show a positive and significant relationship between value-added and FDI and a negative and significant relationship between gross fixed capital formation and FDI. The relationship between labor costs and FDI is always insignificant, whereas there is some evidence of a significant and negative relationship between the spread and FDI at the 10% confidence level. There is also some evidence of a positive relationship between the nominal effective exchange rate and FDI at the 10% confidence level.

The results for the services sector show that, contrary to common belief, the Single Market did not have a significant effect on FDI, but several nuances should be added to this conclusion. First, the result is available for the aggregate services sector at the EU level and therefore may be different once the services sector is disaggregated into several sub-sectors or once the analysis is done on a country by country basis, something that we are unable to do because of data limitations. Second, the result is derived from studying a sample whose observations span over the 1980-1994 time period. Even with the implementation of the Single Market Program, barriers in the services sector were the last to come down and there are still sub-sectors where the process of dismantling barriers is currently on-going and so some effects may occur later than 1994 and therefore are not captured in our regression estimations.

We found the relationship between exchange rate volatility and FDI in the services sector to be statistically insignificant for all the different short-term and long-term volatility measures that we used, suggesting that the introduction of the Single Currency is unlikely to have a significant impact on FDI in the services sector. Again, this does not mean that we may not get a different result once we disaggregate the services sector into several sub-sectors or if we conduct a country by country study.

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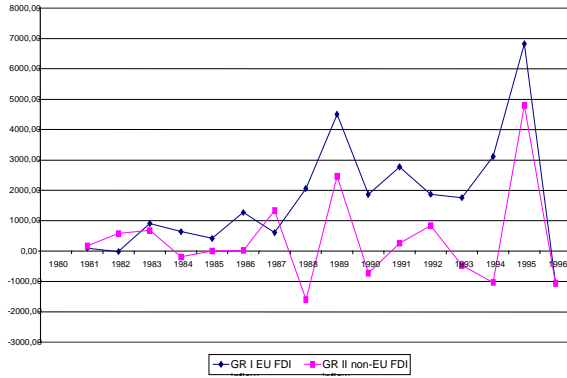
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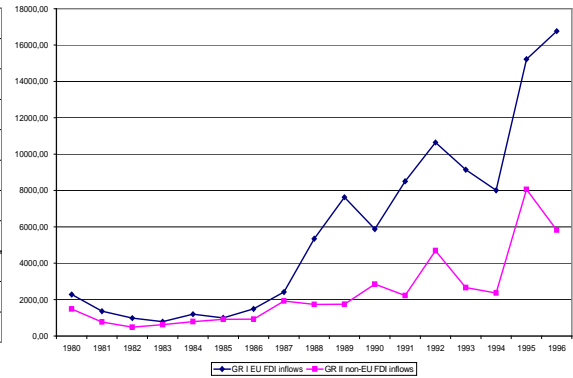
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## Graphs for FDI inflows EU and Non-EU samples

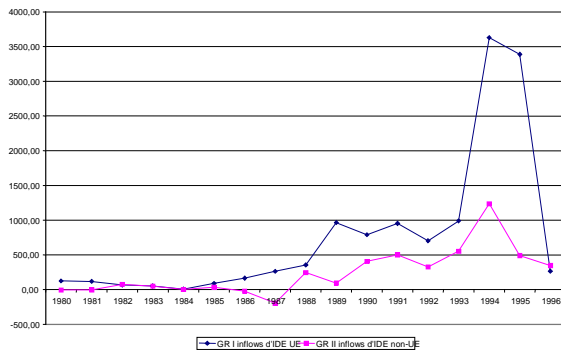
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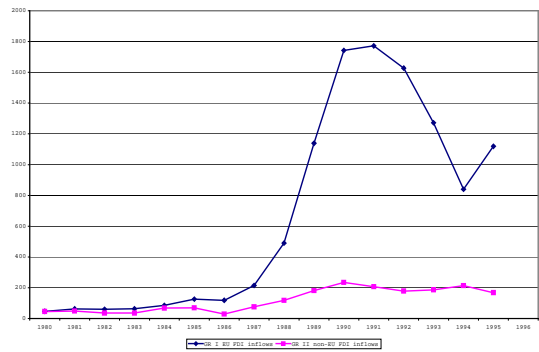
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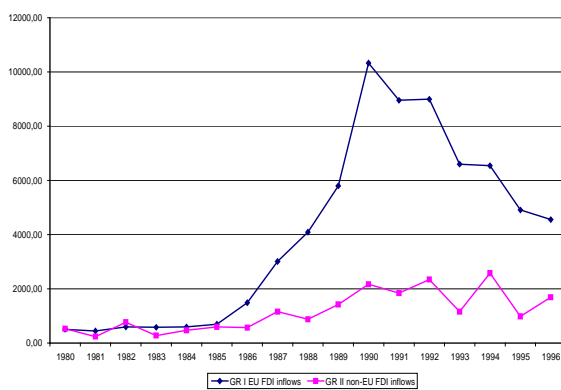
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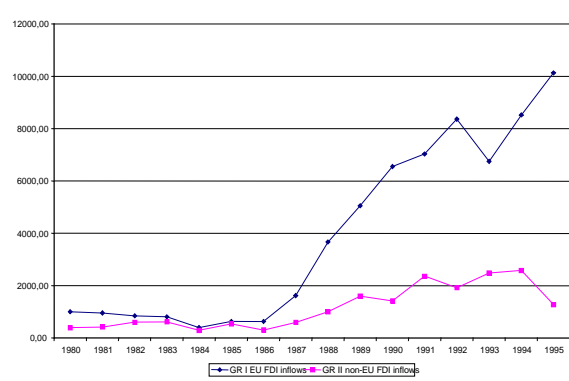
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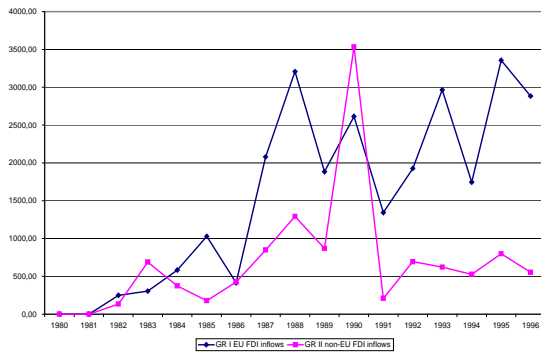
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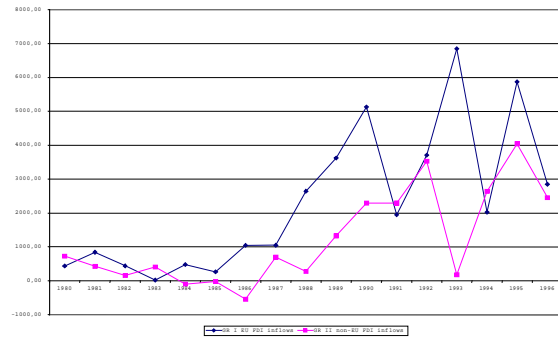
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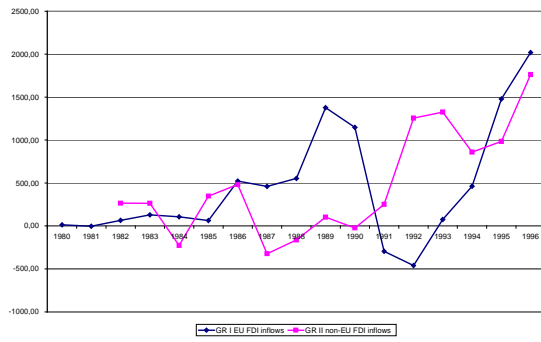
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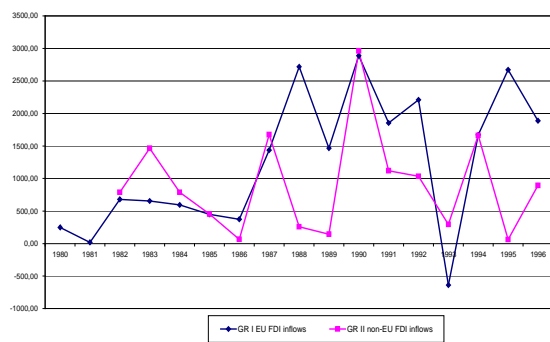
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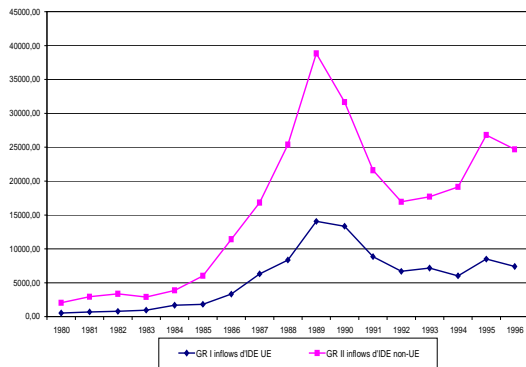
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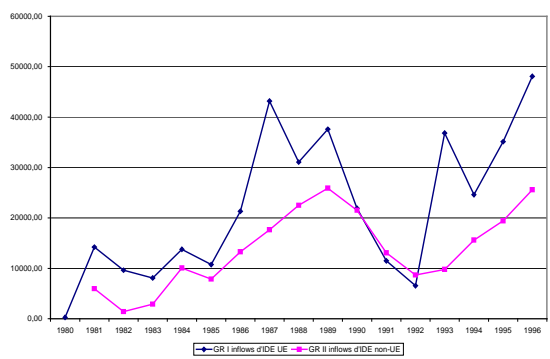
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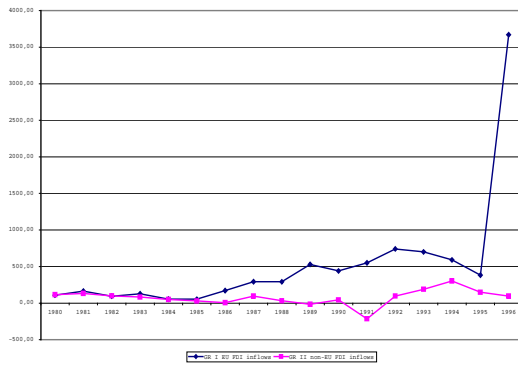
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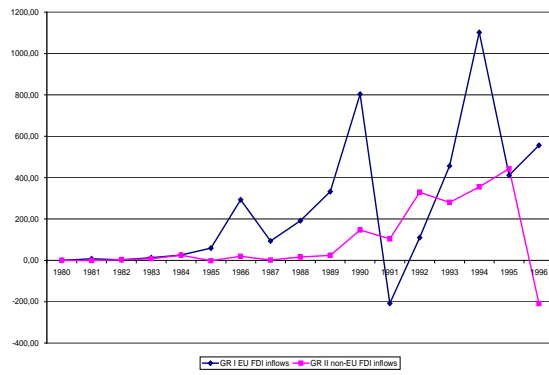
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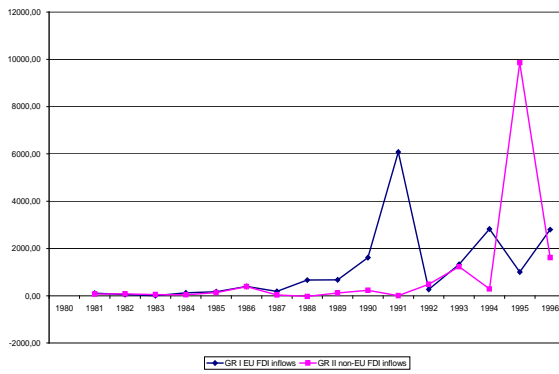
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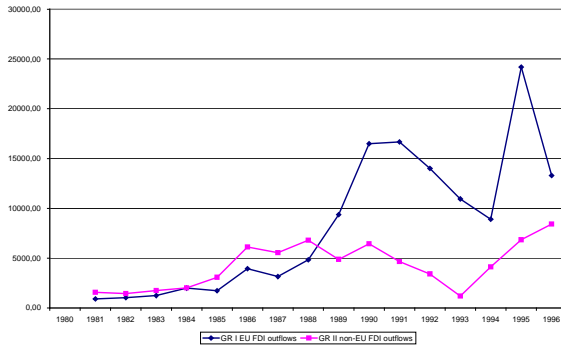


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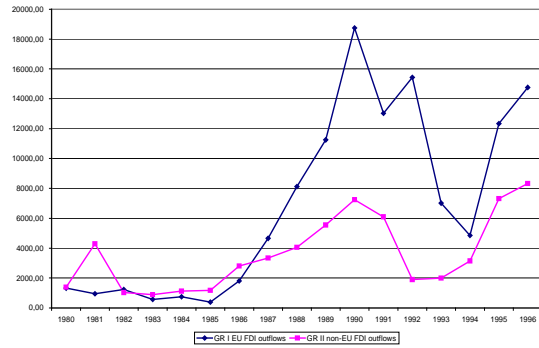


## Graphs for FDI outflows EU and Non-EU samples

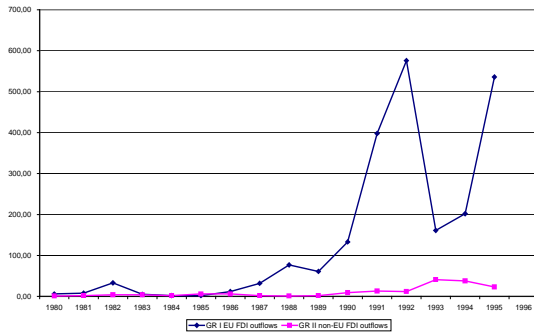
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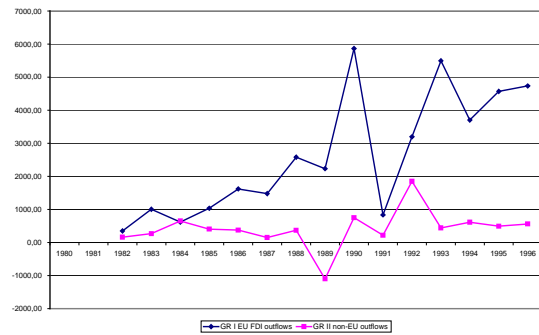
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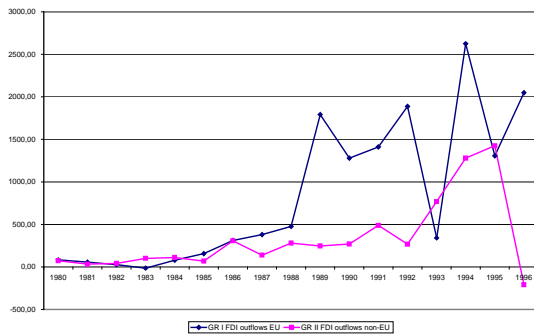
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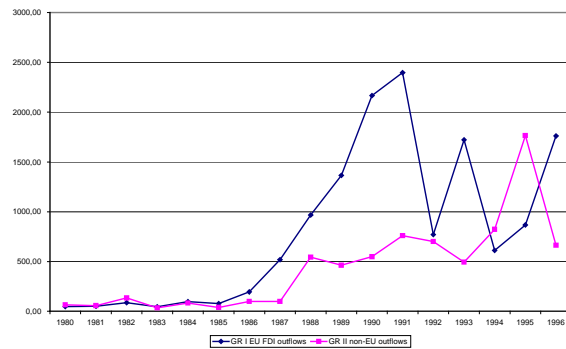
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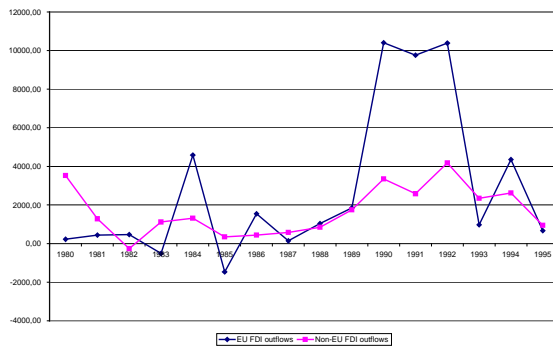
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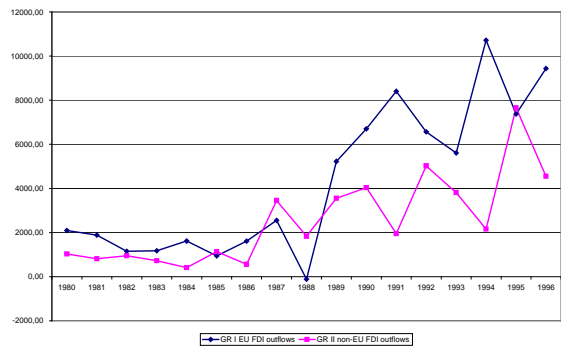
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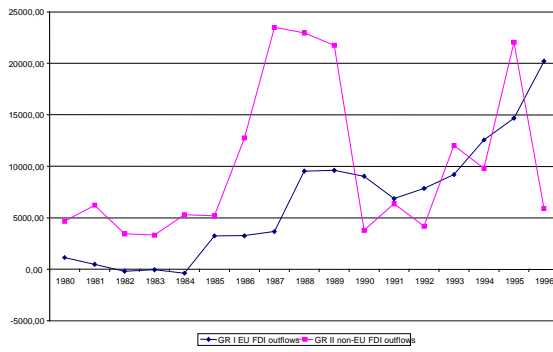
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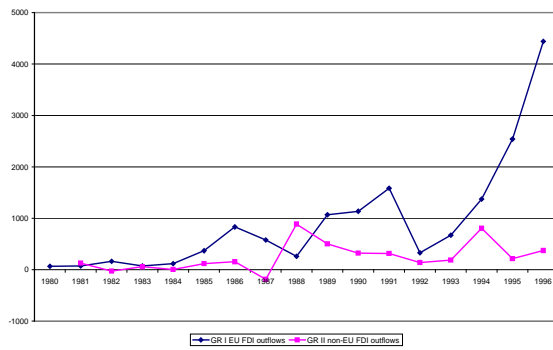
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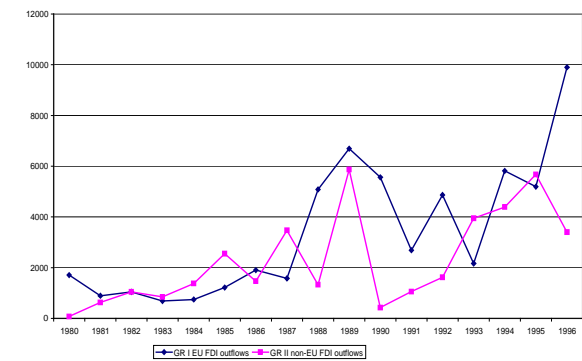
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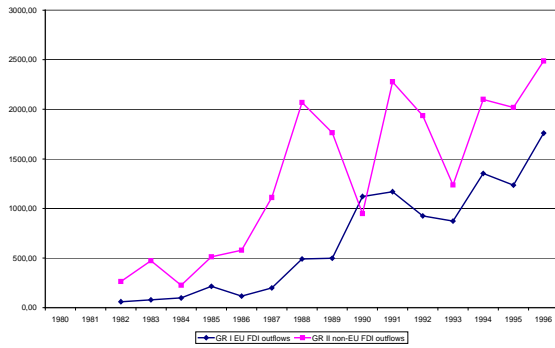
EU and Non-EU FDI outflows Norway



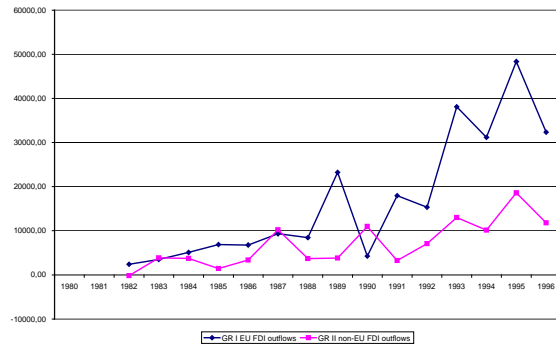
EU and Non-EU FDI outflows Switzerland



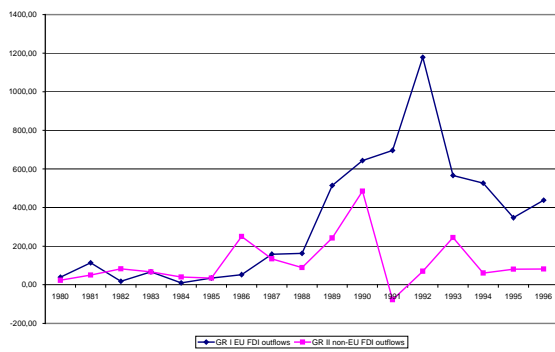
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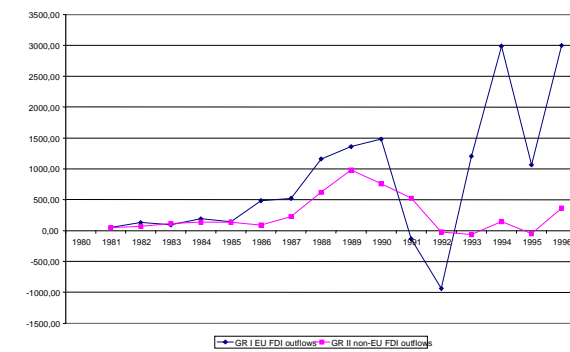
EU and Non-EU FDI outflows USA



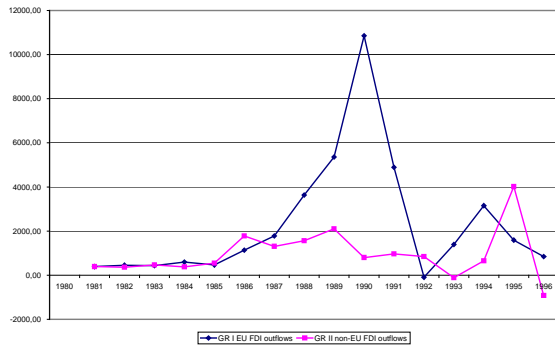
EU and Non-EU FDI outflows Austria



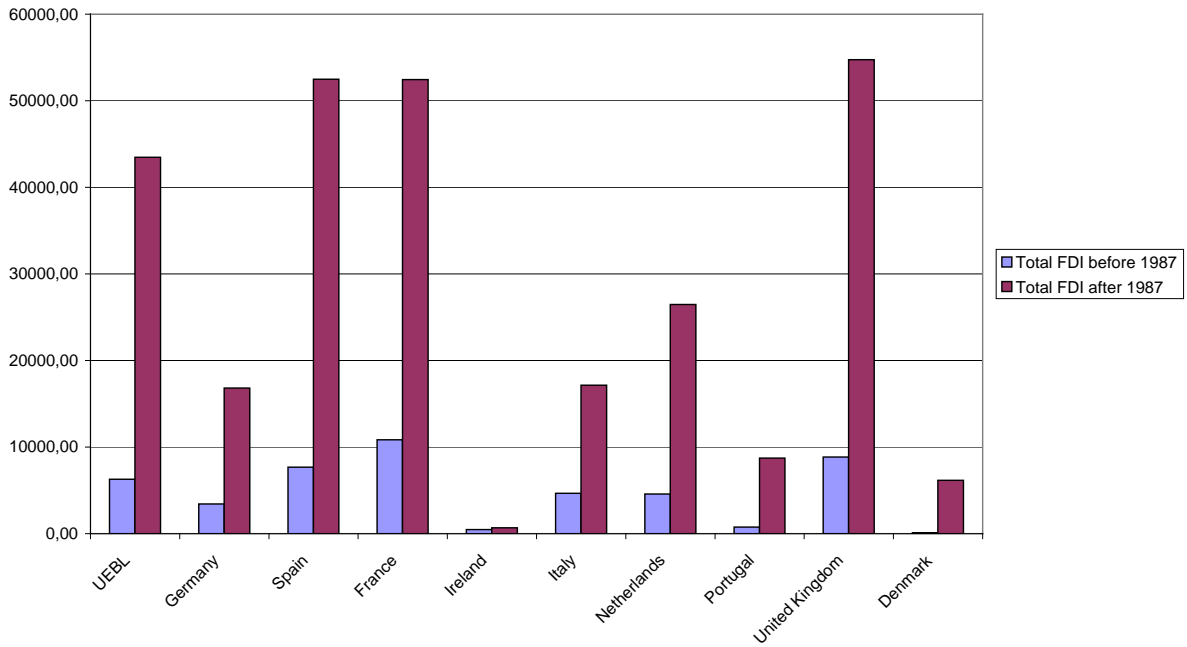
EU and Non-EU FDI outflows Finland



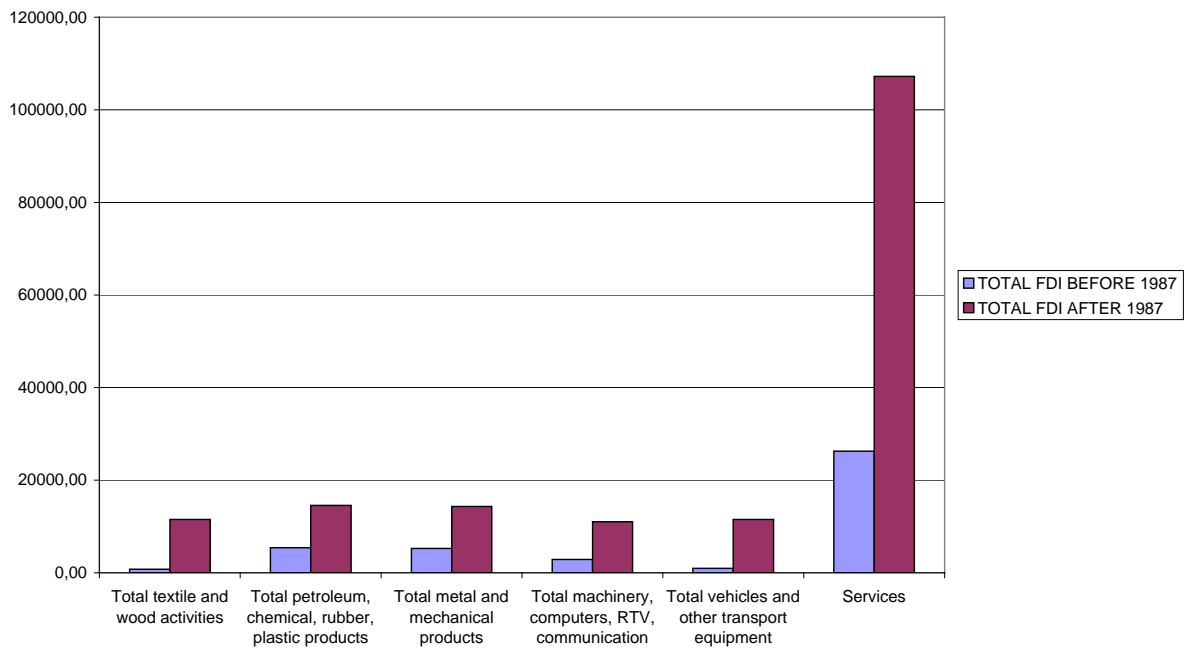
EU and Non-EU FDI outflows Sweden



**Total EU FDI inflows before and after the launch of the Single Market Program**



**Total sectoral FDI inflows before and after the launch of the Single Market Program**



*Table III.1.*

*European Union Sample - Double Log (\*)*

Explanatory Variables	Basic Model = (1)	(1) + Integration Variables = (2)	(1) + Volatility Measures = (3)		
			V1	V2	V3
<b>LGDPCOR</b>	1.221 (7.47)	0.230 (0.85)	0.165 (0.61)	0.203 (0.75)	0.254 (0.94)
<b>LGDPC</b>	0.877 (18.57)	0.841 (18.66)	0.830 (18.35)	0.815 (17.88)	0.835 (18.56)
<b>LR1ALLC</b>	0.058 (1.43)	-0.041 (-0.75)	-0.033 (-0.61)	-0.054 (-1.00)	-0.047 (-0.87)
<b>LREALCOR</b>	2.569 (2.37)	3.014 (2.66)	2.897 (2.56)	2.760 (2.44)	3.271 (2.88)
<b>DISTGAB</b>	-0.0010 (-9.59)	-0.0012 (-12.25)	-0.0013 (-12.44)	-0.0013 (-12.63)	-0.0013 (-12.47)
<b>SPREAD</b>	0.062 (4.16)	0.044 (2.94)	0.041 (2.72)	0.038 (2.53)	0.042 (2.77)
<b>SMPI</b>	-	0.490 (2.68)	0.559 (3.01)	0.586 (3.17)	0.485 (2.65)
<b>SPAINI</b>	-	1.525 (9.24)	1.542 (9.35)	1.540 (9.37)	1.540 (9.34)
<b>SPAINO</b>	-	0.706 (2.06)	0.750 (2.18)	0.706 (2.06)	0.829 (2.39)

Explanatory Variables	Basic Model = (1)	(1) + Integration Variables = (2)	(1) + Volatility Measures = (3)		
			V1	V2	V3
<b>PORTI</b>	-	1.493 (5.74)	1.508 (5.81)	1.606 (6.15)	1.575 (6.01)
<b>PORTO</b>	-	0.325 (0.77)	0.398 (0.94)	0.507 (1.19)	0.495 (1.15)
<b>NIVN</b>	-0.00028 (-1.88)	-0.000091 (-0.64)	-0.000073 (-0.51)	-0.000048 (-0.34)	-0.000056 (-0.40)
<b>ETCHN</b>	-	-	0.106 (2.07)	-	-
<b>CVNIVN</b>	-	-	-	7.349 (3.19)	-
<b>ST5AV</b>	-	-	-	-	3.444 (2.21)
<b>R<sup>2</sup></b>	0.64767	0.68772	0.68908	0.69093	0.68928
<b>Adjusted R<sup>2</sup></b>	0.64193	0.68100	0.68208	0.68397	0.68227
<b>Number of observations</b>	999	999	999	999	999
<b>F-statistic fixed effects model</b>	F(9,982)=19.724	F(9,977)=13.128	F(9,976)=13.240	F(9,976)=13.465	F(9,976)=13.472
<b>H-statistic random effects model</b>	$\chi^2(7)=18.167$	$\chi^2(9)=28.217$	$\chi^2(10)=30.412$	$\chi^2(9)=30.180$	$\chi^2(10)=27.131$

(\* ) The numbers in parenthesis represent the t-statistics associated with the corresponding coefficients.

*Table III.2.*

*Non-European Union Sample - Double Log (\*)*

Explanatory Variables	Basic Model = (1)	(1) + Integration Variables = (2)	(1) + Volatility Measures = (3)		
			V1	V2	V3
<b>LGDP</b>	0.551 (2.21)	0.413 (1.29)	0.359 (1.12)	0.380 (1.18)	0.306 (0.94)
<b>LGDP</b>	0.816 (15.78)	0.796 (15.13)	0.801 (15.29)	0.798 (15.19)	0.798 (15.20)
<b>LR1ALLC</b>	-0.066 (-1.42)	-0.159 (-2.43)	-0.175 (-2.67)	-0.153 (-2.33)	-0.163 (-2.49)
<b>LREALCOR</b>	3.775 (2.78)	3.590 (2.60)	4.141 (2.98)	3.695 (2.67)	3.680 (2.66)
<b>DISTGAB</b>	-0.00014 (-3.20)	-0.00014 (-3.30)	-0.00014 (-3.27)	-0.00014 (-3.23)	-0.00014 (-3.25)
<b>SPREAD</b>	-0.023 (-1.25)	-0.018 (-0.92)	-0.0099 (-0.52)	-0.014 (-0.75)	-0.015 (-0.78)
<b>SMPI</b>	-	0.151 (0.76)	0.160 (0.81)	0.142 (0.71)	0.158 (0.79)
<b>SPAINI</b>	-	-0.143 (-0.78)	-0.152 (-0.83)	-0.141 (-0.77)	-0.155 (-0.84)
<b>SPAINO</b>	-	-	-	-	-

Explanatory Variables	Basic Model = (1)	(1) + Integration Variables = (2)	(1) + Volatility Measures = (3)		
			V1	V2	V3
<b>PORTI</b>	-	0.628 (1.88)	0.612 (1.84)	0.573 (1.70)	0.632 (1.89)
<b>PORTO</b>	-	-	-	-	-
<b>NIVN</b>	-0.00093 (-4.36)	-0.00092 (-4.32)	-0.00096 (-4.50)	-0.00093 (-4.36)	-0.00093 (-4.37)
<b>ETCHN</b>	-	-	-0.174 (-2.91)	-	-
<b>CVNIVN</b>	-	-	-	-3.830 (-1.49)	-
<b>ST5AV</b>	-	-	-	-	-2.812 (-1.99)
<b>R<sup>2</sup></b>	0.60342	0.60575	0.60971	0.60679	0.60761
<b>Adjusted R<sup>2</sup></b>	0.59633	0.59726	0.60083	0.59784	0.59868
<b>Number of observations</b>	855	855	855	855	855
<b>F-statistic fixed effects model</b>	F(8,839)=28.148	F(8,836)=25.955	F(8,835)=26.871	F(8,835)=26.189	F(8,835)=26.543
<b>H-statistic random effects model</b>	$\chi^2(7)=10.049$	$\chi^2(8)=13.721$	$\chi^2(8)=14.551$	$\chi^2(8)=13.945$	$\chi^2(8)=14.705$

(\* ) The numbers in parenthesis represent the t-statistics associated with the corresponding coefficients.

**Table III.3.**  
**European Union Sample - Double Log (\*)**

Explanatory Variables	(1) + Integration Variables = (2)	(1) + Volatility Measures = (3)		
		V1	V2	V3
<b>LGDPCOR</b>	-0.102 (-0.51)	-0.104 (-0.52)	-0.043 (-0.21)	-0.071 (-0.35)
<b>LGDPC</b>	0.883 (16.77)	0.869 (16.46)	0.858 (16.13)	0.880 (16.73)
<b>LRIALLC</b>	0.059 (1.13)	0.065 (1.24)	0.044 (0.83)	0.049 (0.92)
<b>LREALCOR</b>	2.951 (2.79)	2.839 (2.69)	2.763 (2.61)	3.132 (2.95)
<b>DISTGAB</b>	-0.0010 (-10.34)	-0.0010 (-10.59)	-0.0011 (-10.67)	-0.0011 (-10.49)
<b>SPREAD</b>	0.023 (1.54)	0.021 (1.37)	0.019 (1.30)	0.023 (1.53)
<b>SMP 1</b>	2.227 (11.12)	2.273 (11.32)	2.248 (11.25)	2.233 (11.16)
<b>SMP 2</b>	0.178 (0.76)	0.264 (1.12)	0.263 (1.12)	0.194 (0.83)
<b>SMP 3</b>	0.948 (2.87)	0.957 (2.90)	0.970 (2.94)	0.933 (2.82)
<b>SMP 4</b>	0.826 (3.86)	0.832 (3.90)	0.835 (3.91)	0.838 (3.92)
<b>SMP 6</b>	0.247 (1.05)	0.255 (1.08)	0.265 (1.12)	0.232 (0.98)

Explanatory Variables	(1) + Integration Variables = (2)	(1) + Volatility Measures = (3)		
		V1	V2	V3
<b>SMP 7</b>	1.421 (6.32)	1.469 (6.52)	1.437 (6.41)	1.404 (6.24)
<b>SMP 9</b>	1.124 (5.17)	1.092 (5.03)	1.051 (4.82)	1.024 (4.57)
<b>SPAINI</b>	1.368 (4.64)	1.390 (4.72)	1.367 (4.65)	1.377 (4.67)
<b>SPAINO</b>	0.704 (2.20)	0.741 (2.32)	0.692 (2.17)	0.800 (2.46)
<b>PORTI</b>	1.662 (6.60)	1.696 (6.74)	1.772 (6.97)	1.736 (6.81)
<b>PORTO</b>	0.367 (0.92)	0.425 (1.07)	0.487 (1.22)	0.491 (1.22)
<b>NIVN</b>	0.000010 (0.07)	0.000036 (0.25)	0.000045 (0.31)	0.000037 (0.25)
<b>ETCHN</b>	-	0.116 (2.38)		-
<b>CVNIVN</b>	-	-	5.877 (2.68)	-
<b>ST5AV</b>	-	-	-	2.745 (1.80)
<b>R<sup>2</sup></b>	0.72892	0.73049	0.73091	0.72982
<b>Adjusted R<sup>2</sup></b>	0.72138	0.72271	0.72314	0.72202
<b>Number of observations</b>	999	999	999	999
<b>F-statistic fixed effects model</b>	F(9,971)=18.456	F(9,970)=18.699	F(9,970)=18.634	F(9,970)=18.575
<b>H-statistic random effects model</b>	$\chi^2(10)=35.239$	$\chi^2(9)=35.666$	$\chi^2(11)=34.695$	$\chi^2(9)=36.061$

(\*) The numbers in parenthesis represent the t-statistics associated with the corresponding coefficients.

SMP1 =Single Market (SM) effect for Belgium and Luxembourg, SMP2=S M effect for Germany, SMP3= S M effect for Spain, SMP4=S M effect for France, SMP6=S M effect for Italy, SMP7=S M effect for the Netherlands and SMP9=S M effect for Portugal.

**Table III.5.**  
**Non-European Union Sample - Double Log (\*)**

Explanatory Variables	(1) + Integration Variables = (2)	(1) + Volatility Measures = (3)		
		V1	V2	V3
<b>LGPCOR</b>	0.112 (0.42)	0.075 (0.29)	0.071 (0.27)	0.044 (0.16)
<b>LGPC</b>	0.866 (13.61)	0.873 (13.77)	0.869 (13.65)	0.868 (13.64)
<b>LR1ALLC</b>	-0.025 (-0.38)	-0.037 (-0.57)	-0.018 (-0.27)	-0.027 (-0.41)
<b>LREALCOR</b>	3.697 (2.82)	4.249 (3.23)	3.783 (2.89)	3.755 (2.87)
<b>DISTGAB</b>	-0.00015 (-3.44)	-0.00014 (-3.40)	-0.00014 (-3.37)	-0.00014 (-3.40)
<b>SPREAD</b>	-0.029 (-1.46)	-0.023 (-1.15)	-0.026 (-1.33)	-0.028 (-1.39)
<b>SMP 1</b>	1.175 (4.99)	1.124 (4.78)	1.164 (4.95)	1.171 (4.98)
<b>SMP 2</b>	-0.447 (-1.54)	-0.501 (-1.73)	-0.459 (-1.58)	-0.453 (-1.56)
<b>SMP 3</b>	0.592 (1.54)	0.648 (1.69)	0.601 (1.57)	0.584 (1.52)
<b>SMP 4</b>	0.089 (0.36)	0.051 (0.21)	0.081 (0.33)	0.086 (0.35)
<b>SMP 6</b>	-0.858 (-2.80)	-0.836 (-2.74)	-0.845 (-2.76)	-0.823 (-2.68)

Explanatory Variables	(1) + Integration Variables = (2)	(1) + Volatility Measures = (3)		
		V1	V2	V3
<b>SMP 7</b>	1.102 (4.13)	1.066 (4.01)	1.095 (4.10)	1.089 (4.08)
<b>SMP 9</b>	1.211 (4.76)	1.228 (4.85)	1.219 (4.79)	1.204 (4.73)
<b>SPAINI</b>	-0.318 (-0.94)	-0.379 (-1.13)	-0.323 (-0.96)	-0.319 (-0.95)
<b>SPAINO</b>	-	-	-	-
<b>PORTI</b>	0.385 (1.18)	0.358 (1.10)	0.328 (1.00)	0.389 (1.19)
<b>PORTO</b>	-	-	-	-
<b>NIVN</b>	-0.00033 (-1.44)	-0.00039 (-1.67)	-0.00035 (-1.49)	-0.00036 (-1.53)
<b>ETCHN</b>	-	-0.169 (-2.93)	-	-
<b>CVNIVN</b>	-	-	-3.689 (-1.50)	-
<b>ST5AV</b>	-	-	-	-1.911 (-1.41)
<b>R<sup>2</sup></b>	0.64363	0.64728	0.64459	0.64448
<b>Adjusted R<sup>2</sup></b>	0.63333	0.63665	0.63389	0.63376
<b>Number of observations</b>	855	855	855	855
<b>F-statistic fixed effects model</b>	F(8,830)=29.652	F(8,829)=30.658	F(8,829)=29.971	F(8,829)=29.794
<b>H-statistic random effects model</b>	$\chi^2(8)=15.499$	$\chi^2(9)=16.271$	$\chi^2(9)=16.723$	$\chi^2(8)=16.641$

(\*) The numbers in parenthesis represent the t-statistics associated with the corresponding coefficients.

SMP1 =Single Market (SM) effect for Belgium and Luxembourg, SMP2=S M effect for Germany, SMP3= S M effect for Spain, SMP4=S M effect for France, SMP6=S M effect for Italy, SMP7=S M effect for the Netherlands and SMP9=S M effect for Portugal.

*Table III.7.*

*Sector Results for the Manufacturing Industry - Double – Log (\*)*

Explanatory Variables	Basic Model = (1)	(1) + Integration Variables = (2)	(2) + Exchange Rate = (3)	(3) + Volatility Measures = (4)			
				V1	V2	V3	V4
<b>LVA11</b>	2.975 (2.87)	2.195 (1.99)	1.844 (1.43)	2.836 (1.95)	2.192 (1.63)	1.857 (1.39)	2.197 (1.69)
<b>LVA12</b>	1.778 (2.18)	1.409 (1.53)	1.474 (1.15)	1.820 (1.37)	1.540 (1.17)	1.502 (1.15)	2.122 (1.60)
<b>LVA13</b>	2.400 (3.22)	2.330 (3.04)	2.169 (2.44)	2.495 (2.58)	2.306 (2.45)	2.102 (2.30)	2.361 (2.61)
<b>LVA14</b>	0.821 (0.50)	1.042 (0.60)	1.032 (0.45)	1.559 (0.66)	1.385 (0.58)	0.621 (0.26)	1.545 (0.66)
<b>LVA15</b>	0.849 (1.99)	0.603 (1.18)	1.051 (1.81)	0.876 (1.41)	0.975 (1.63)	1.088 (1.80)	0.973 (1.68)
<b>LFBCFUN1</b>	1.393 (1.27)	-0.733 (-0.48)	-0.225 (-0.14)	-1.488 (-0.77)	-1.112 (-0.62)	-0.123 (-0.06)	-0.463 (-0.28)
<b>LFBCFUN2</b>	-0.926 (-1.17)	-1.398 (-1.57)	-1.286 (-1.14)	-0.969 (-0.79)	-1.234 (-1.06)	-1.502 (-1.22)	-1.423 (-1.26)
<b>LFBCFUN3</b>	0.459 (0.65)	0.358 (0.50)	0.583 (0.76)	0.562 (0.69)	0.583 (0.73)	0.342 (0.42)	0.603 (0.77)
<b>LFBCFUN4</b>	0.415 (0.55)	0.655 (0.81)	0.869 (1.06)	0.942 (1.11)	0.792 (0.94)	0.917 (1.10)	0.820 (0.98)
<b>LFBCFUN5</b>	-0.466 (-2.29)	-0.515 (-2.46)	-0.608 (-2.67)	-0.787 (-2.87)	-0.687 (-2.63)	-0.625 (-2.53)	-0.701 (-2.89)
<b>LWAGESL1</b>	-3.008 (-2.33)	-0.797 (-0.46)	-1.463 (-0.81)	-1.018 (-0.53)	-0.926 (-0.49)	-1.616 (-0.79)	-1.544 (-0.85)
<b>LWAGESL2</b>	0.217 (0.19)	0.705 (0.48)	0.199 (0.11)	-0.114 (-0.06)	0.206 (0.12)	0.281 (0.16)	-0.266 (-0.15)

Explanatory Variables	Basic Model = (1)	(1) + Integration Variables = (2)	(2) + Exchange Rate = (3)	(3) + Volatility Measures = (4)			
				V1	V2	V3	V4
<b>LWAGESL3</b>	-1.618 (-1.95)	-1.750 (-2.08)	-2.248 (-2.45)	-2.375 (-2.18)	-2.303 (-2.31)	-2.012 (-2.08)	-2.469 (-2.60)
<b>LWAGESL4</b>	0.064 (0.04)	-0.610 (-0.34)	-1.011 (-0.47)	-1.364 (-0.61)	-1.172 (-0.53)	-0.713 (-0.32)	-1.429 (-0.66)
<b>LWAGESL5</b>	0.924 (1.78)	0.908 (1.74)	0.612 (1.09)	1.150 (1.65)	0.838 (1.30)	0.589 (0.96)	0.808 (1.39)
<b>SPREAD1</b>	-0.425 (-2.48)	-0.491 (-2.67)	-0.440 (-2.30)	-0.429 (-2.22)	-0.437 (-2.25)	-0.472 (-2.15)	-0.448 (-2.33)
<b>SPREAD2</b>	-0.181 (-1.43)	-0.212 (-1.66)	-0.147 (-0.96)	-0.201 (-1.23)	-0.170 (-1.05)	-0.137 (-0.80)	-0.197 (-1.27)
<b>SPREAD3</b>	0.077 (0.61)	0.073 (0.54)	0.082 (0.57)	0.089 (0.60)	0.083 (0.56)	0.151 (0.91)	0.094 (0.63)
<b>SPREAD4</b>	-0.258 (-1.65)	-0.236 (-1.50)	-0.196 (-1.03)	-0.185 (-0.93)	-0.203 (-1.05)	-0.269 (-1.25)	-0.166 (-0.84)
<b>SPREAD5</b>	-0.044 (-0.27)	-0.022 (-0.13)	0.087 (0.49)	0.164 (0.85)	0.115 (0.62)	0.071 (0.34)	0.093 (0.52)
<b>SMP1</b>	-	1.559 (2.03)	1.582 (1.94)	1.805 (2.10)	1.768 (2.08)	1.545 (1.60)	1.614 (1.98)
<b>SMP2</b>	-	0.895 (1.62)	1.051 (1.48)	0.861 (1.18)	1.010 (1.39)	1.092 (1.49)	0.926 (1.30)
<b>SMP3</b>	-	-0.012 (-0.03)	0.056 (0.11)	-0.0081 (-0.02)	0.022 (0.04)	0.091 (0.17)	0.081 (0.16)
<b>SMP4</b>	-	-0.164 (-0.29)	-0.052 (-0.08)	-0.204 (-0.31)	-0.059 (-0.09)	0.025 (0.04)	-0.027 (-0.04)
<b>SMP5</b>	-	0.067 (0.12)	0.136 (0.24)	-0.034 (-0.06)	0.043 (0.07)	0.129 (0.22)	-0.0054 (-0.0090)
<b>LNIVN1</b>	-	-	-0.926 (-0.54)	-1.213 (-0.69)	-0.980 (-0.57)	-0.910 (-0.49)	-1.067 (-0.62)

Explanatory Variables	Basic Model = (1)	(1) + Integration Variables = (2)	(2) + Exchange Rate = (3)	(3) + Volatility Measures = (4)			
				V1	V2	V3	V4
<b>LNIVN2</b>	-	-	-1.573 (-0.77)	-1.775 (-0.85)	-1.600 (-0.77)	-1.524 (-0.73)	-1.559 (-0.76)
<b>LNIVN3</b>	-	-	-1.256 (-0.90)	-1.082 (-0.77)	-1.185 (-0.84)	-1.306 (-0.89)	-1.303 (-0.92)
<b>LNIVN4</b>	-	-	-1.714 (-1.08)	-1.640 (-1.02)	-1.783 (-1.10)	-1.657 (-0.98)	-1.927 (-1.18)
<b>LNIVN5</b>	-	-	-2.607 (-1.74)	-2.129 (-1.38)	-2.384 (-1.55)	-2.731 (-1.71)	-2.508 (-1.67)
<b>ETCHN1</b>	-	-	-	-0.535 (-1.15)	-	-	-
<b>ETCHN2</b>	-	-	-	0.439 (0.82)	-	-	-
<b>ETCHN3</b>	-	-	-	0.012 (0.04)	-	-	-
<b>ETCHN4</b>	-	-	-	-0.027 (-0.07)	-	-	-
<b>ETCHN5</b>	-	-	-	-0.506 (-1.15)	-	-	-
<b>CVNIVN1</b>	-	-	-	-	-19.383 (-1.20)	-	-
<b>CVNIVN2</b>	-	-	-	-	6.759 (0.36)	-	-
<b>CVNIVN3</b>	-	-	-	-	0.280 (0.02)	-	-
<b>CVNIVN4</b>	-	-	-	-	6.025 (0.40)	-	-
<b>CVNIVN5</b>	-	-	-	-	-11.181 (-0.64)	-	-

Explanatory Variables	Basic Model = (1)	(1) + Integration Variables = (2)	(2) + Exchange Rate = (3)	(3) + Volatility Measures = (4)			
				V1	V2	V3	V4
DANIVN1	-	-	-	-	-	-0.011 (-0.15)	-
DANIVN2	-	-	-	-	-	0.022 (0.36)	-
DANIVN3	-	-	-	-	-	0.043 (0.84)	-
DANIVN4	-	-	-	-	-	-0.033 (-0.59)	-
DANIVN5	-	-	-	-	-	-0.0037 (-0.06)	-
ST5AV1	-	-	-	-	-	-	-11.512 (-0.68)
ST5AV2	-	-	-	-	-	-	-41.813 (-2.03)
ST5AV3	-	-	-	-	-	-	2.337 (0.17)
ST5AV4	-	-	-	-	-	-	6.310 (0.33)
ST5AV5	-	-	-	-	-	-	-13.989 (-0.84)
<b>R<sup>2</sup></b>	0.48212	0.50772	0.52245	0.53429	0.53042	0.52708	0.54220
<b>Adjusted R<sup>2</sup></b>	0.39094	0.39993	0.39582	0.38761	0.38252	0.37813	0.39801
<b>Number of observations</b>	168	168	168	168	168	168	168
<b>F-statistic fixed effects model</b>	F(5,142)=16.434	F(5,137)=11.632	F(5,132)=9.472	F(5,127)=9.402	F(5,127)=9.069	F(5,127)=9.045	F(5,127)=9.675
<b>H-statistic random effects model</b>	$\chi^2(5)=15.731$	$\chi^2(5)=13.071$	$\chi^2(5)=12.980$	$\chi^2(5)=14.300$	$\chi^2(5)=13.400$	$\chi^2(5)=12.775$	$\chi^2(5)=13.231$

(\*) The numbers in parenthesis represent the t-statistics associated with the corresponding coefficients.

The variables with "1" in their denomination refer to the total textile and wood activities sector, the variables with "2" refer to the total petroleum, rubber, chemical and plastic products sector, the variables with "3" refer to the total metal and mechanical products sector, the variables with "4" refer to the total machinery, RTV, computers and communication sector and the variables with "5" refer to the total vehicles and other transport equipment sector.

The variables preceded by "L" refer to the log of the variables in question.

**Table III.8.**  
**Sector Results for services - Double – Log (\*)**

Explanatory Variables	Basic Model = (1)	(1) + Integration Variables = (2)	(2) + Exchange Rate = (3)	(3) + Volatility Measures = (4)			
				V1	V2	V3	V4
<b>LVA</b>	1.987 (3.60)	2.069 (3.66)	1.947 (3.46)	2.003 (3.51)	1.894 (3.33)	1.911 (3.37)	1.956 (3.45)
<b>LFCFUN</b>	-0.951 (-2.63)	-0.948 (-2.61)	-0.893 (-2.48)	-0.915 (-2.53)	-0.845 (-2.31)	-0.854 (-2.34)	-0.895 (-2.47)
<b>LWGWO</b>	0.019 (0.50)	0.024 (0.62)	0.029 (0.76)	0.031 (0.80)	0.028 (0.73)	0.028 (0.74)	0.031 (0.79)
<b>SPREAD</b>	-0.26 (-1.42)	-0.309 (-1.59)	-0.343 (-1.77)	-0.380 (-1.89)	-0.317 (-1.61)	-0.326 (-1.67)	-0.316 (-1.54)
<b>SMP</b>	-	-0.381 (-0.74)	0.366 (0.54)	0.474 (0.68)	0.330 (0.49)	0.301 (0.44)	0.446 (0.63)
<b>LNIVN</b>	-	-	3.627 (1.68)	4.412 (1.80)	3.157 (1.41)	3.528 (1.62)	3.779 (1.71)
<b>DANIVN</b>	-	-	-	-0.033 (-0.69)	-	-	-
<b>ETCHN</b>	-	-	-	-	-0.239 (-0.81)	-	-
<b>CVNIVN</b>	-	-	-	-	-	-11.411 (-0.72)	-
<b>ST5AV</b>	-	-	-	-	-	-	5.742 (0.43)
<b>R<sup>2</sup></b>	0.25823	0.26382	0.29182	0.29661	0.29835	0.29704	0.29371
<b>Adjusted R<sup>2</sup></b>	0.18710	0.18202	0.20206	0.19613	0.19811	0.19662	0.19281
<b>Number of observations</b>	81	81	81	81	81	81	81
<b>F-statistic fixed effects model</b>	F(3,73)=3.197	F(3,72)=3.359	F(3,71)=2.922	F(3,70)=3.052	F(3,70)=3.094	F(3,70)=3.028	F(3,70)=2.847

Explanatory Variables	Basic Model = (1)	(1) + Integration Variables = (2)	(2) + Exchange Rate = (3)	(3) + Volatility Measures = (4)			
				V1	V2	V3	V4
<b>H-statistic random effects model</b>	$\chi^2(3)=6.093$	$\chi^2(3)=6.414$	$\chi^2(3)=6.363$	$\chi^2(3)=6.654$	$\chi^2(3)=6.451$	$\chi^2(3)=6.390$	$\chi^2(3)=6.364$

(\*) The numbers in parenthesis represent the t-statistics associated with the corresponding coefficients.  
The variables preceded by "L" refer to the log of the variables in question.

