FOREIGN DIRECT INVESTMENT AND ECONOMIC GROWTH EVIDENCE FROM 14 EUROPEAN UNION COUNTRIES

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ABSTRACT

This study represents an attempt to address the causal-order between inward FDI and economic growth in 14 European Union countries.
The inflows of FDI to developed host countries raise the question of how these inflows affect their economies and what is the interaction between FDI and growth. While there is considerable evidence on the link between FDI and Economic Growth , the causality between them has not been investigated in a reasonable procedure.
Three possible cases are investigated in this paper 1) Growth-driven FDI, is the case when the growth of the host country attracts FDI 2) FDI-led growth , is the case when the FDI improves the rate of growth of the host country and 3) the two way causal link between them.
According theory the reasons which affect an MNE to choose as a host country a developed are much different those of choosing a developing one. Generaly speaking when a MNE decides to establish a subsidiary to a developed country the aim is to access the big and developed market of it , while by investing in a less developed country tries to take advantage of the low-cost production factors, or to get access to real resources. Since European countries belong to the developed group we expected that teir growth level should attracts FDI , that is the causation should be from GDP to FDI.
The empirical results support the hypothesis of GDP -driven FDI for 4 out of the 14 investigated countries (Italy, Finland, Spain and Ireland) That means that the economic growth of these countries and their development level have a significant impact on investment decisions of multinational firms. The results seem reasonable for the economies of Italy and Spain. For Ireland and Finland because they are small economies the rate of growth does seem to be so attractive for FDI . There must be additional reasons for FDI inflows which are not included in this analysis.
The hypothesis of FDI driven growth (FDI could stimulate their growth) is supported in 8 cases (Belgium, Denmark , Greece, Germany, France, Netrherlands, Austria, Portugal and, UK). At first sight this finding is against our expectations since their economies are of the most advanced in Europe and so the size of their GDP andits growth should cause the FDI infloes. A plausible explanation could be the following: Since these countries according to UNCTAD data (as is referred below) absorb the bulk of international inward direct investmet , FDI could be a very important factor in improving the growth of those countries. Finally there was no causality between FDI and GDP for

JEL Classification, F21, F23,O52 Keywords: Foreign Direct Investment, Economic Growth, Cointegration, Error-correction models and Causality.

1. INTRODUCTION

The phenomenon of economic growth is complex and the lines of causation frequently go both from supposed causes to growth and from growth to the supposed causes. Furthermore , the various factors that are thought to explain growth are themselves interrelated. These problems face all studies attempting to throw light on whether, in what way and to what extent a particular factor or group of factors affect growth.The search for explanations of growth has been pursued in several different ways.The United Nations Comparison Programme began in 1970 to provide real income and price comparisons across countries, including developing countries. For the most part they asked what combination of initial country characteristics, such as per capita income, capital formation, education of the labor force and openness to trade or flows of FDI explained the growth of aggregate real income . One problem with the interpretation of these studies is the difficulty to determine the direction of causation. Was one economy growing rapidly than another because its level of capital formation was higher or the rate its capital formation was higher because the economy was growing faster? About FDI and Growth what is fairly certain , without any necessary implications as to causation, is that high growth rates and large inflows of FDI tend to go together. That is explicit in studies of the post-World War II years.

While international production through FDI has been growing rapidly and has come to assume an important role in the globalization process , its significance , quantitative as well as qualitative, is not the same for all countries. UNCTAD[1] data on regional distribution of FDI inflows show that the developing countries receive a smaller proportion of FDI The share of developed[2] countries in FDI inflows was ranked from 63.4% in 1995 to 71.5% in 1998 while for the developing ones the relative percentages ranked from 32.3% to 25.8%[3]. Among the developed countries European Union as an area accepts the biggest share of FDI inflows (this ranked from 35.1% in 1995 to 35.7% in 1998) . This means that FDI should play a very important role for its economies .

<u>Let us now see briefly what FDI offers to a host country and how it affects growth?</u>

FDI comprises a bundle of assets,some proprietary to the investors and some others not. The proprietary assets are what the literature terms the “ownership advantages” of MNEs.These give MNEs an edge over other firms and allow them to overcome the transaction costs of operating across national boundaries. Non-proprietary assets –finance, capital goods, intermediate inputs and the like- can be obtained from the market at least in part. Proprietary assets can only be obtained from the firms which create them. MNEs are naturally reluctant to sell

[1] UNCTAD: United Nations Conference on Trade and Development

[2] Developed countries: European Union , Other Western Europe, United States, Japan, Other developed countries

[3] World Investment Report 1999, UN

their most valuable assets to unrelated firms that can become competitors or could leak to others that have not paid for it. The assets that the FDI comprises are:

Capital: FDI brings in investible financial resources to host countries In distinction to other sources of capital , MNEs invest in long-term projects, taking risks and repatriating profits only when the projects yield returns.

Technology: Especially developing host countries tend to lag in the use of technology. MNEs can bring modern technologies some of them not available to those countries without FDI , and they can raise the efficiency with which existing technologies are used.

Market access: MNEs can provide access to export markets. The growth of exports itself offers benefits in terms of technological learning , realization of scale economies, competitive stimulus etc.

Employment skills and management techniques: They can offer great competitive benefits

While MNEs offer potential for accessing these assets in a package,this does not mean that simply opening to FDI is the best way of benefiting from them. There are market failures in the investment process and divergences between MNEs and national interests.This means that governments may have to intervene in FDI process to attract or promote specific types of FDI or to regulate and guide it.

To return to the question posed above there are many channels through which FDI affect growth.

Inward FDI may increase host country's productivity and exports and in turn, productivity growth may indirectly affect exports. Another channel through which the FDI affects growth is the increase in host country's trade. There is a great deal of evidence that foreign-owned firms (MNEs) trade more in general (with they parent-companies and others) than the locally-owned firms. MNEs or their affiliates generally enjoy larger share of home and host country imports and exports than they do of output; this is partly explained because they are concentrated in trade-intensive sectors and partly because their trading propensity in any given sector tends to be greater than that of indigenous firms. It is likely therefore, that high shares of foreign ownership , or large inflow of FDI will increase the importance of trade, thus affecting growth indirectly. Capital formation may be affected by FDI inflows , because they are a source of financing

Also, host country's institutional characteristics, such as legal system, enforcement of property rights and the extent of corruption, that have been suggested as explanations for different growth rates are likely to influence also the extent of FDI and capital formation.

The reasons which affect an MNE in choosing as a host country a developed country are much different from those of choosing a developing one. Generally speaking when a MNE decides to establish a subsidiary to a developed country the aim is to access the big and developed market of it , while by investing in a less developed country tries to take advantage of the low-cost production factors or to get access to real resources.

So the links of FDI and growth seem to be different for countries of different stage of growth. The European countries belong to developed group even though they are not of the same level of development So we expected that the growth of those countries will atract FDI , that is, there will be a causation from GDP to FDI. This study reperesents an attempt to address the causal-order between inward FDI and economic growth in 14 European Union countries.

1.1 The investment-development path

The notion of an investment -development path puts forward the idea that the outward and inward FDI position of a country is systematically related to its economic development relative to the rest of the world.. It suggests that countries tend to go through five different stages of development and that these stages can usefully be classified according to the propensity of those countries to be outward and/or inward investors (Dunning and Narula 1994, World Investment Report 1995,. pp237, UN). This propensity , in turn, rests on the extent and pattern of the ownership -specific advantages of each country's indigenous firms, its location advantages and the extent to which indigenous and foreign firms choose to utilize their ownership-specific advantages jointly with the country's location-bound endowments through an internalization of the cross-border markets for these advantages , rather than by some other organizational route. According to the authors the five different stages in terms of per capita income and the related position on the investment- development path are:

Stage1. At very low levels of income, countries possess few location specific advantages(except of natural assets) to attract FDI and also they possess no firm with such ownership specific advantages to go multinational.

Stage 2. As the per capita income increases , the attractiveness of economy to be recipient of FDI increases due to growing internal markets, improvement of infrastructure etc. Also improve the ownership advantages of indigenous firms, especially when are encouraged by government, to invest abroad.

Stage 3. At that stage , as per capita income increases further , there is a gradual decrease in the growth on inward FDI while there is an increase in the rate of growth of outward FDI

Stage 4. With further increases in per capita income , the country's outward investment stock equals or exceeds that of inward .

Stage 5. At still higher levels of income both inward and outward FDI are likely to continue to increase. This is the position that a number of developed countries are now approaching.

2.HYPOTHESES OF LINKS BETWEEN FDI AND ECONOMIC GROWTH

Here are examined three possible types of relationships : 1) Growth-driven FDI, is the case when the growth of the host country attracts FDI 2) FDI-led growth , is the case when the FDI improves the rate of growth of the host country and 3) the two way causal link between them.

First of all a multinational enterprise (MNE) is defined in literature as an enterprise that having specific ownership characteristics, controls and manages production establishments -plants-located in different countries

Before we proceed to analyze the three cases, we have to distinguish between vertical , horizontal and diversified multinational enterprises .

Vertical MNEs are those whose different stages of production procedure are located in different countries. By this type of organization the firm tries to access the source of cheap raw materials or low labor cost. That is, vertical FDI is induced by factor price differentials.

Horizontal MNEs are those whose's production take place in different countries to produce the same product for local markets. This kind of FDI is induced by market accesses rather than by factor prices.

Diversified MNEs are those whose plants' outputs are neither vertically nor horizontally related to one another. This type of organization can be partly explained by the parent's effort to utilize its R&D discoveries and certain other influences as well.

We'll focus mainly on the above two types of organization in relation to growth. It is supposed that:

Vertical FDI first improves the production conditions and economic performance in host country. The better economic performance of the host country may attract more FDI especially of the horizontal type, since the better infrastructure of host country and the accumulation of qualified human capital and market size (due to increased growth) offer a favor environment for the MNEs. Under those conditions there are greater opportunities for making profits, and this results in more FDI inflows. This is the case of growth-driven FDI.

On the other hand, there is a contribution of FDI to host economies' growth. The growth theories have identified the factors that play role in promoting economic growth as follows:

Savings and investment (classical models), technical progress (neo-classical models), R&D, human capital, accumulation and externalities (new growth theory). FDI, has been integrated into theories of economic growth and there is a «gains-from-FDI» approach besides to «gains-from- trade» approach. To the extent that FDI adds to the existing capital stock, it may have growth effects similar to that of domestic investment. FDI may improve exports and help the access of domestic enterprises to international markets. Moreover there will be spillover effect through the diffusion of the transferred technology. The technology and productivity of local firms may be improved as FDI creates backward and forward linkages and foreign firms provide technical assistance to their local suppliers and customers.

3. GAUSALITY BETWEEN FDI AND GROWTH

The most interesting economic scenario suggests a two-way causal link between FDI and host economic growth. Countries with fast economic growth, generate more demand for FDI and offer opportunities for making profits. On the other hand, inward FDI flows may enhance growth through positive direct and indirect effects on variables that affect growth. So , firstly we expect a bi-directional causality between FDI and growth.

3.1 The theoretical framework

Before we proceed to causality tests, we need to ensure that our variable series are stationary individually or in case they are not, if they are «cointegrated» that is, if they move together in the long run. In that case, a linear combination of them is stationary.
To determine the stationarity of series, unit-root tests are applied by using the Augmented Dickey-Fuller procedure (ADF-1981) .
The ADF test consists of running a regression of the first difference of the series against the series lagged once, lagged difference terms and optionally a constant (and a time trend)
In a bi-variate model the regression is:

ÄÕ$_t$=á$_0$ +á$_1$ Õ$_{t-1}$ + Ó á$_{1+i\,é}$ÄÕ$_{t-1}$ + å$_t$ (i=1......n) (1)

Y_t is the variable under consideration, Ä is the first-difference operator and á$_1$ is the parameter of interest. The output of ADF-test consists of the t-statsistic on á$_1$. If that coefficient is significantly different from zero then the null hypothesis of non -stationarity is rejected in favor of hypothesis of stationarity.

A large negative t-statistic rejects the unit -root (non -stationarity) hypothesis. (The reported t-statistic does not have the standard t-distribution)
If the non-stationarity hypothesis is not rejected at the levels of variables then we try the test on the differences of the initial series. If the series are integrated of order d, that is if each one becomes stationary after differencing it d-times, then we can examine the cointegration among the series.
For the cointegration test was used the Johansen procedure. If the series are cointegrated, an Error-Correction Model (ECM) is used to examine the «causality» since in case of non-stationary (cointegrated) series the standard Granger causality tests are invalid. (The causality has been traced by «Granger causality test». According to Granger's Approach (1969) a variable Y is «caused» by X if Y can be predicted better from both past values of Y and X, than from past values of Y alone).

But is there any relationship between Granger causality and cointegration? The answer to this question has been discussed in Granger (1988). Cointegration is concerned with long-run equilubrium. Granger causality is concerned with short-run equilibrium. These two different concepts can be considered in an error correction model (ECM). Suppose that Xt and Yt are both I(1) variables and they are cointegrated such that Zt=Xt-âYt is I(0). When X-âY =0 can be considered as a long-run (steady- state) equilibrium, Zt can be interpreted as the extent to which the system is out of equilibrium
The system of ECM for two cointegrated series (Xt and Yt) may be generated as follows:

$$Ä×_t=á_0+â_0 Æ_{t-1} + \underset{i=1...p}{Ó}ã_{0i}Ä×_{t-1}+\underset{i=1...q}{Ó}ä_{0é}ÄÕ_{t-é}+å_{0t} \quad (2)$$

$$ÄY_t=á_1+â_1 Æ_{t-1} + \underset{i=1...p}{Ó}ã_{1i}×_{t-1}+\underset{i=1...q}{Ó}ä_{1é}ÄÕ_{t-é}+å_{1t} \quad (3)$$

Where Z_{t-1} =(X_{t-1} - ñ$Õ_{t-1}$) is the error correction term and one of $â_0$, $â_1$ is different than zero
In an ECM we can find that $ÄX_t$ or $ÄY_t$ or both must be Granger caused by Z_{t-1} which is itself a function of X_{t-1} , Y_{t-1}. Thus either X_t is caused by Y_{t-1} or Y_t by X_{t-1}.
This implies that for a pair of series to have an attainable equilibrium, there must be some Granger causation between them to provide the necessary dynamics.
Thus, including the error correction term in the model there is generating an additional channel through which the temporal causality can be investigated. That is, there are two possible sources of causation for Xt and Yt in an ECM: lagged Xt and Yt (the traditional Granger test) and the error term Z_{t-1}. Changes in Xt , for instance, might be Granger-caused by Yt either through Zt , which is

itself a function of linear combination of Xt and Yt, or lagged values of the other variables , or both.
So, inferences concerning causality between Xt and Yt are based on the statistical significance of coefficients in the above equations (2) and (3). For example in equation (2) , if both b_0 and d_0 are statistically significant then Y Granger causes X, otherwise Y does not Granger-cause X.
<u>We should note that if (both) the lagged $ÄX_t$ and $ÄY_t$ have nonzero coefficients then there is causality in both directions</u>

4. THE MODEL AND THE EMPIRICAL RESULTS

The data used for this study concern 14 European Union countries and are referred to the annual inflows of FDI as percentage to GDP (GDP was measured at market current prices in billion euros and FDI was measured in current prices, in million euros) and the variable for growth was the GDP as annual percentage ratio at 1995 market prices. Details for the data sources and construction of the variables are given in the appendix. The choice of using GDP ratio instead of GDP seems reasonable since GDP ratio is closer to the sense of «growth»
Plots of the two time series for each of 14 economies (see the diagrams in the appendix), in which FDI series are on the left and the GDP ratio on the right, shown that both series seems to trend in a relatively constant rate, in most countries under consideration and this implies that the two series in most cases tend to move together.

4.1 Unit-root tests for stationarity and cointegration tests

The first stage in testing for cointegration between a set of variables is to determine the order of integration of individual time series that is, to determine how many times a variable require to induce stationarity. “If a set of variables are cointegrated then there always exists an error correcting formulation of the dynamic model and vice versa (Granger and Engle, 1985)

So we run first the ADF tests for stationarity which are performed under three hypotheses: The series are stationary at levels (no unit root), at differencing once (one unit root) at differencing twice (two unit roots). Table 1 reports the estimates of the $á_1$ in equation (1) and McKinnon (1991) for the rejection of the null hypothesis at 5% significance level.

For Italy , FDI and GDP series are stationary
For Greece, Portugal, Finland and United Kingdom FDI is I(1) and GDP is I(0)
For Belgium, Netherlands, Spain, Ireland, France and Sweden FDI is I(2) and GDP is I(1).
For Denmark, FDI is I(1) and GDP is I (1).
For Germany and Austria FDI is I(2) and GDP is I(0)
So, the conventional Granger -causality test for the short-run relationship was applied in case of Italy since for this country the variables were stationary. The results showed no Granger causality between the series. That is there is no short-run relationship between FDI and GDP for that country.(The results are referred on table 2). The causal inference between FDI and GDP was based on F-statistic and the signs of the causal effects were determined by adding the coefficients on lagged independent variables).

For the rest countries we proceed by converting the series in order to be of the same order having in mind that: According to the relevant theory if two variables X_t and Y_t are both I(1) then their linear combination would be I(0)

In such cases an error correction mechanism could give the long run relationship. In the general case that X_t is I(b) and Y_t is I(d) the linear combination of them will be I(b) were b<d. (band d are integration orders of individual series)
On table 2 we have the integration order of individual series for all countries under investigation.
After converting the variables we used Error Correction Models to check for causality between FDI and GDP .

Important notices:

For Germany,Greece, Spain, Austria, , Portugal, Sweden and United Kingdom even though the individual series of GDP and FDI were of different order of integration, when the Johansen cointegration test was applied to initial data , indicated 1 cointegrating equation.

The long-run causality between FDI and GDP was investigated with the equations below. (see part 3.1)

$$\text{Ä×}_{t}=\text{á}_{0}+\text{â}_{0}\,\text{Æ}_{t-1}+\underset{i=1...p}{\text{Óã}_{0i}}\text{Ä×}_{t-1}+\underset{i=1...q}{\text{Óä}_{0é}}\text{ÄÕ}_{t-é}+\text{å}_{0t} \quad (2)$$

$$\text{ÄY}_{t}=\text{á}_{1}+\text{â}_{1}\,\text{Æ}_{t-1}+\text{Óã}_{1i}\text{×}_{t-1}+\text{Óä}_{1é}\,\text{ÄÕ}_{t-é}+\text{å}_{1t} \quad (3)$$

i=1...p i=1...q

Where Z_{t-1} =(X_{t-1} - ñÕ$_{t-1}$) is the error correction term and one of â$_0$, â$_1$ is different than zero

X_t stands for FDI/GDP variable and

Y_t stands for GDI ratio

The estimates of ECM, in terms of t-statistics for error correction terms and the other variables are reported in tables 4 and 5.

In table 4 the variables were converted in order to be of of the same order of integration.

In table 5 the variables of the above six countries are at the levels.

For those countries the results of table 5 are different of those of table 4.

As final results for them I accepted the results of table 5, since by taking the first differences of initial variables we lose information about their long run relationship. For the rest seven countries, since there was no cointegration on levels of initial variable , we have to accept the results of table 4 in which we used the first and second differences where it was necessary (specifically for the FDI). The final results are presented on appendix table 6.

2) For the countries whose variables were not cointegrating at the levels I run the Granger causality test to check for the short-run relationship. The results are presented on appendix table 7. The null hypothesis of no Granger causality can not be rejected (at 5% significance level) except the case of one country, Ireland, were the causalitry runs from GDP to FDI. The ECM for that country supports the same direction in the long run also.

5. Final results

FDI causes GDP in cases of the following countries: Belgium, Denmark , Germany, Greece, France, Netrherlands, Austria, Portugal and, UK

GDP causes FDI in cases of the following countries: Italy, Finland, Spain and Ireland

There **was no causality** between FDI and GDP for Sweden .

5.CONCLUDING REMARKS

This study represents an attempt to address the causal-order between inward FDI and economic growth in 14 European Union countries.

Ôhe role of FDI in host economies has been on debate in academic and policy circles for long time The hypothesis of growth-driven FDI and FDI -led growth are developed on the basis of decisions of multinationals to choose the host country. The reasons which affect an MNE to choose as a host country a

developed are much different those of choosing a developing one. Generally speaking when a MNE decides to establish a subsidiary to a developed country the aim is to access the big and developed market of it , while by investing in a less developed country tries to take advantage of the low-cost production factors or to get access to real resources. So the links of FDI and growth seem to be different for countries of different stage of growth. The European countries belong to developed group even though not all of them are on the same development level. So we expected that the growth of those countries would attract FDI , that is, causation from GDP to FDI.
The estimates support the hypothesis of GDP -driven FDI for 4 out of the 14 investigated countries (Italy, Finland, Spain and Ireland)
That means that the economic growth of these countries and their development level have a significant impact on investment decisions of multinational firms. The results seem reasonable for the economies of Italy and Spain. For Ireland and Finland because they are small economies the rate of growth does seem to be so attractive for FDI . There must be additional reasons for FDI inflows which are not included in this analysis.

The hypothesis of FDI driven growth (FDI could stimulate their growth) is supported in 8 cases (Belgium, Denmark , Germany, France, Netrherlands, Austria, Portugal and, UK) . This finding is against our expectations since their economies are of the most advanced in Europe and so the size of their GDP and its growth should attract FDI inflows. A plausible explanation could be the following: Since these countries ,according to UNCTAD data (as was referred before) absorb the bulk of international inward direct investment, FDI could be a very important factor in improving the growth of their economies.
Finally there was no causality between FDI and GDP for Sweden

DATA APPENDIX

FDI inflows series from 1970-1980 were taken from various issues of Balance of Payments of International Monetary Fund, in US dollars. From 1981-1999 FDI inflows were taken from Eurostat through direct information from FDI department, in euros. The series in US dollars were converted in euros at official exchange rates. Then the FDI series for each country were divided by GDP series (Gross Domestic product in current market prices in million euros, Source: European Economy, 1999)
The annual percentage change series of GDP at annual currency and 1995 market prices were taken from European Economy , 1999.
The «Econometric Views» is the statistical progamme which was used for the estimations and tests on the series.

TABLE 1.ADF TEST FOR UNIT ROOTS

	H_0=non stationarity for FDI			H_0 = non stationarity of GDP		
	Levels	First difference	Second difference	Levels	.First difference	Second difference
BELGIUM	1.331	-0.2359	-3.093*	-2.832	-5.037*	
(N=24)	(-3.00)	(-3.011)	(-3.019)	(-3.003)	(-3.001)	
DENMARK	0.767	-5.682		2.973	-4.936*	
(N=24)	(-3.003)	(-3.011)		(-3.003)	(-3.001)	
GERMANY	0.610	-0.400	3.741*	-4.186*		
(N=28)	(-2.9798)	(-2.985)	(-2.9798)			
GREECE	-1.131	-4.195*		-3.912*		
(N=23)	(-3.014)	(-3.011)		(-3.011)		
SPAIN	-1.903	-2.690	-3.815*	-2.117		-3.145*
(N=24)	(-3.003)	(-3.011)	(-3.019)	(-3.003)		(-3.011)
FRANCE	0.6470	-2.548	-4.513*	-2.489		-3.940*
(N=24)	(-3.003)	(-3.011)	(-3.019)	(-3.003)		(-3.011)
IRELAND	1.832	-0.052	-3.541*	-1.870		-5.039*
(N=25)	(-2.996)	(-3.003)	(-3.011)	(-2.996)		(-3.003)
ITALY	-3.401*			-3.478*		
(N=29)	(-2.975)			(-2.975)		
NETHERLANDS	0.911	1.619	-4.284*	3.062		-4.004
(N=19)	(-3.052)	(-3.065)	(-3.081)	(-3.052)		(-3.065)
AUSTRIA	1.108	-2.468	-5.120*	4.155*		
(N=29)	(-2.975)	(-2.979)	(-2.985)	(-2.975)		
PORTUGAL	-2.922	-3.740*		-4.174*		
(N=29)	(-2.975)	(-2.979)		(-2.975)		
FINLAND	-1.276	-3.740*		-4.101*		
(N=29)	(-2.975)	(-2.979)		(-2.975)		
SWEDEN	1.804	-1.715	-3.900*	-2.750		-3.790*
(N=20)	(-3.052)	(-3.065)	(-3.080)	(-3.640)		(-3.050)
UK	-1.755		-6.280*	-4.233*		
(N=32)	(-2.962)		(-2.966)	(-2.96)		

Note: FDI indicates the ratio FDI inflows /GDP (at 1995 market prices) and GDP, annual percentage change (national currency). McKinnon (1991) critical values are in parentheses (5% significance level). (*) indicates significance at 5% level.

TABLE 2 -COINTEGRATION ORDER OF FDI AND GDP FOR EACH COUNTRY

COUNTRY	CONVERTED VARIABLES-ESTIMATION METHOD FOR FDI-GDP RELATIONSHIP
BELGIUM : FDI -> I(2) GDP-> I(1)	D(FDI), GDP / ERROR CORRECTION MODEL (ECM)
DENMARK: FDI->I(1) GDP-> I(1)	FDI, GDP / ECM
GERMANY : FDI->I(2) GDP ->I(0)	D(FDI,2), GDP /ECM
GREECE: FDI->I(1) GDP->I(0)	D(FDI) , GDP / ECM
SPAIN : FDI->I(2) GDP->I(1)	D(FDI), GDP / ECM
FRANCE: FDI->I(2) GDP->I(1)	D(FDI), GDP / ECM
IRELAND : FDI->I(2) GDP->I(1)	D(FDI) , GDP / ECM
ITALY : FDI->I(0) GDP->I(0)	GRANGER CAUSALITY TEST
NETHERL: FDI->I(2), GDP-.I(1)	D(FDI) , GDP / ECM
AUSTRIA: FDI-> I(2) , GDP->I(0)	D(FDI,2) ,GDP / ECM
PORTUGAL : FDI-> I (1) , GDP->I(0)	D(FDI), GDP / ECM
FINLAND: FDI->I(1) , GDP->I(0)	D(FDI), GDP/ECM
SWEDEN : FDI-> I(2) , GDP ->I(1)	D(FDI), GDP /ECM
UK : FDI->I(1), GDP->I(0)	D(FDI), GDP /ECM

Granger causality test for ITALY

Null Hypothesis	Obs	F-stat	Probability
Ital GDP does not Granger cause Ital FDI	27	0.6586	0.527
Ital FDI does not Granger cause Ital GDP		0.4150	0,6653

The Null Hypothesis can not be rejected at 5% significance level

TABLE 3. COINTEGRATION RESULTS (JOHANSEN TEST)

COUNTRY	LAG INTERVALS (IN PAIRS)			NUMBER OF COINTEGRATING EQUATIONS
BELGIUM	1	to	5	1
DENMARK	1	to	3	2
GERMANY	1	to	1	2
GREECE	1	to	1	2
SPAIN	1	to	2	2
FRANCE	1	to	4	1
IRELAND	1	to	5	1
ITALY	1	to	1	2
NETHERLANDS	1	to	1	1
AUSTRIA	1	to	1	2
PORTUGAL	1	to	1	2
FINLAND	1	to	1	2
SWEDEN	1	to	3	1
UK	1	to	1	2

Note: Because the cointegration make sense only in cases of variables with the same order of integration , in cases where this was not valid the variables after taking the first or second differences were converted of the same order, and then , was applied the Johansen cointegration test.

BY CHECKING **THE COINTEGRATING RELATION ON THE LEVELS** OF THE VARIABLES EVEN NO PAIR OF THEM WAS OF THE SAME ORDER OF INDEGRATION , FOR ALL COUNTRIES , EXCEPT ITALY , AD DENMARK WE FOUND THE FOLLOWING RESULTS:

COUNTRY	LAG INTERVALS (IN PAIRS)	NUMBER OF COINTEGRATING EQUATIONS
GERMANY	1 to 1	1
GREECE	1 to 1	1
SPAIN	1 to 1	1
AUSTRIA	1 to 1	1
PORTUGAL	1 to 1	2
SWEDEN	1 to 1	2
UK	1 to 1	2

FOR THE REST COUNTRIES :

BELGIUM	NO COINTEGRATING EQUATION		
FRANCE	“	“	“
IRELAND	“	“	“
NETHERLANDS	“	“	“
FINLAND	“	“	“

TABLE 4. ERROR CORRECTION MODEL ESTIMATES CAUSALITY BETWEEN FDI AND GDP

ALL VARIABLES ARE OF THE SAME ORDER OF INTEGRATION (AFTER DIFFERENCING)

	FDI EQUATION		GDP EQUATION		CAUSAL INFERENCE
COUNTRIES	Error term	$D(GDP)_{t-1}$	Error term	$D(DFDI))_{t-1}$	
BELGIUM	0.1720 (0.7710)	-0.0002 (-0.2395)	-188.007 * (-2.113)	61.6091 (0.3980)	FDI causes GDP
D ENMARK	0.08915 (0.7863)	-0.00020 (-0.1539)	68.7375 * (2.6742)	-56.4763 (-1.09664)	FDI causes GDP
GREECE	-1.8188 * (-5.92851)	0.000681* (2.32866)	-541.1033* (-2.5214)	453.0721* (2.6609)	CAUSALITY OCCURS IN BOTH DIRECTIONS
GERMANY	-2.6909* (-3.4883)	0.00013 (0.3577)	751.1533 (1.9956)	-543.6341 (-1.8637)	GDP causes FDI
SPAIN	-1.7510 * (-3.8430)	-0.00098 (-1.5780)	-156.0284 (-0.7433)	-163.0921 (-1.37973)	GDP causes FDI
IRELAND	-0.16031* (-2.9292)	-0.0019 (-1.01610)	8.2337 (1.0636)	-4.9339 (-0.16810)	GDP causes FDI
FRANCE	-0.5695 (-1.4576)	0.0002 (0.3684)	388.6265* (2.2222)	-364.5903 * (-2.2448)	FDI causes GDP
ITALY	-0.7477 * (-2.6363)	0.0001 (0.8707)	-557.1900 (0.8707)	469.7651 (1.16001)	GDP causes FDI
NETHERL	0.6440 (0.9421)	1.42E-05 (0.0041)	161.4949* (4.8727)	-138.4321 * (-4.20738)	FDI causes GDP
AUSTRIA	-3.1617 * (-4.3427)	0.0004 (1.4869)	-173.2589 (-0.4076)	54.9011 (0.1566)	GDP causes FDI
SWEDEN	-0.0933 (-0.8066)	0.0018 (0.5504)	31.8158 * (3.8306)	-2.3898 (-0.2822)	FDI causes GDP
UK	0.0135 (1.5306)	-0.0043 (1.2183)	-2.0918* 23.7835 (-3.7783)	* (2.2977)	FDI causes GDP
FINLAND	-2.5545 * (-2.8260)	0.0026 (1.7219)	-162.2733 (-1.33790)	148.0452 (1.2530)	GDP causes FDI
PORTUGAL	-1.4796* (-3.9977)	-0.0007 (-1.6899)	329.6288 (1.8829)	-53.1582 (-0.4024)	GDP causes FDI

NOTES: Numbers in parentheses are t-statistics. (*) indicates significance at 5% level . $D(GDP)_{t-1}$ means first differences of that variable while $D(DFDI)_{t-1}$ means second difference of that variable .

TABLE 5. ERROR CORRECTION MODEL ESTIMATES CAUSALITY BETWEEN FDI AND GDP

ALL THE VARIABLES ARE ON THE LEVELS (EVEN THOUGH THERE ARE OF DIFFERENT ORDER OF INTEGRATION)

	FDI EQUATION		GDP EQUATION		CAUSAL INFERENCE
COUNTRIES	Error term	$D(GDP)_{t-1}$	Error term	$D(FDI))_{t-1}$	
GREECE	-0.1800 (-0.6027)	-4.32E-05 (-0.1024)	-506.1442* (-4.5689)	411.2973* (3.1007)	FDI causes GDP
GERMANY	0.0289 (0.3118)	0.0005 (1.040)	104.9969* (2.4068)	31.4634 (0.1621)	FDI causes GDP
SPAIN	-0.6082 (-6.1147)	-0.0020 (0.6583)	62.5428 (0.9232)	-21.1489 (-0.20892)	GDP causes FDI
AUSTRIA	-0.0014 (-0.19572)	0.0002 (0.78729)	-14.6273 * (-3.0797)	-84.6678 (-0.7075)	FDI causes GDP
PORTUGAL	-0.01365 (-0.8844)	-4.35E-05 (-0.0934)	29.5708* (4.5090)	185.1243 (1.8363)	FDI causes GDP
SWEDEN	0.3130 (1.1612)	-0.0050 (-0.7858)	-20.6127 (-1.4944)	32.0269 (0.8493)	NO CAUSALITY
UK	0.01353 (1.5306)	-0.0043 (-1.2183)	-2.09183 * (-3.7783)	23.7835 (2.2977)	FDI causes GDP

NOTES: Numbers in parentheses are t-statistics. (*) indicates significance at 5% level. $D(GDP)_{t-1}$ and $D(FDI)_{t-1}$ mean first differences of these variables.

TABLE 6. ERROR CORRECTION MODEL ESTIMATES
CAUSALITY BETWEEN FDI AND GDP
FINAL RESULTS

	FDI EQUATION		GDP EQUATION		CAUSAL INFERENCE
COUNTRIES	Error term	$D(GDP)_{t-1}$	Error term	$D(DFDI))_{t-1}$	
BELGIUM	0.1720	-0.0002	-188.007 *	61.6091	FDI causes GDP
	(0.7710)	(-0.2395)	(-2.113)	(0.3980)	D
DENMARK	0.08915	-0.00020	68.7375 *	-56.4763	FDI causes GDP
	(0.7863)	(-0.1539)	(2.6742)	(-1.09664)	
GREECE	-0.1800	-4.32E-05	-506.1442*	411.2973*	FDI causes GDP
	(-0.6027)	(-0.1024)	(-4.5689)	(3.1007)	
GERMANY	0.0289	0.0005	104.9969*	31.4634	FDI causes GDP
	(0.3118)	(1.040)	(2.4068)	(0.1621)	
SPAIN	-0.6082	-0.0020	62.5428	-21.1489	GDP causes FDI
	(-6.1147)	(0.6583)	(0.9232)	(-0.20892)	
IRELAND	-0.16031*	-0.0019	8.2337	-4.9339	GDP causes FDI
	(-2.9292)	(-1.01610)	(1.0636)	(-0.16810)	
FRANCE	-0.5695	0.0002	388.6265*	-364.5903 *	FDI causes GDP
	(-1.4576)	(0.3684)	(2.2222)	(-2.2448)	
ITALY	-0.7477 *	0.0001	-557.1900	469.7651	GDP causes FDI
	(-2.6363)	(0.8707)	(0.8707)	(1.16001)	
NETHERL	0.6440	1.42E-05	161.4949*	-138.4321 *	FDI causes GDP
	(0.9421)	(0.0041)	(4.8727)	(-4.20738)	
AUSTRIA	-0.0014	0.0002	-14.6273 *	-84.6678	FDI causes GDP
	(-0.19572)	(0.78729)	(-3.0797)	(-0.7075)	
SWEDEN	0.3130	-0.0050	-20.6127	32.0269	NO CAUSALITY
	(1.1612)	(-0.7858)	(-1.4944)	(0.8493)	
UK	0.0135	-0.0043	-2.0918*	23.7835 *	FDI causes GDP
	(1.5306)	(1.2183)	(-3.7783)	(2.2977)	
FINLAND	-2.5545 *	0.0026	-162.2733	148.0452	GDP causes FDI
	(-2.8260)	(1.7219)	(-1.33790)	(1.2530)	
PORTUGAL	-0.01365	-4.35E-05	29.5708*	185.1243	FDI causes GDP
	(-0.8844)	(-0.0934)	(4.5090)	(1.8363)	

NOTES: Numbers in parentheses are t-statistics. (*) indicates significance at 5% level . $D(GDP)_{t-1}$ means first differences of that variable while $D(DFDI)_{t-1}$ means second difference of that variable .

TABLE 7. GRANGER CAUSALITY TEST FOR SHORT-TERM RELATIONSHIP IN THE CASES OF NON-COINTEGRATING VARIABLES (AT THE LEVELS)

Country	Null Hypothesis	Obs	F-stat	Probability	CAUSALITY
BELGIUM	GDP does not Granger cause FDI	22	0.47654	0.6289	NO CAUSALITY
	FDI does not Granger cause GDP		0.94178	0.4093	
FRANCE	GDP does not Granger cause FDI	22	3.0815	0.072	NO CAUSALITY
	FDI does not Granger cause GDP		0.2318	0.796	
IRELAND	GDP does not Granger cause FDI	23	4.5477	0.0252	GNP CAUSES FDI
	FDI does not Granger cause GDP		0.1269	0.08816	
NETHERLANDS	GNP does not Granger cause FDI	17	0.6125	0.5580	NO CAUSALITY
	FDI does not Granger cause GDP		0.7966	0.4732	
FINLAND	GDP does not Granger cause FDI	27	1.555	0.2335	NO CAUSALITY
	FDI does not Granger cause GDP		0.0395	0.9612	

The Null Hypothesis can not be rejected at 5% significance level in case of IRELAND were GDP Granger cause FDI

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