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Foreign Direct Investment-Led Growth Hypothesis: Evidence from the Greek Economy

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Abstract: In this paper, authors explore the Foreign Direct Investment-Led Growth hypothesis for the Greek economy in the Post-War era. In doing so, they engage in testing the cointegration of the series and explore the causal dimension between Foreign Direct Investment and GDP growth through Granger Causality tests and VAR models. The empirical findings cast serious doubts on the FDI-led growth hypothesis permeating the existing academic literature.

Keywords: FDI-led growth hypothesis, causality tests, policy implications

JEL Classification: F200, F210

Introduction

Foreign Direct Investment (FDI) is alleged to be the predominant source of external financing for developing countries (Calderon et al., 2002; Aitken and Harrison, 1997); however, the developed countries remain the prime destination of FDI, accounting for more than three-quarters of global inflows (UNCTAD, 2001). Stocks and flows of FDI have grown rapidly across the OECD area since the mid-1980s, with a marked acceleration since 1995 (Jansen and Stokman, 2004). Another striking characteristic of the global FDI inflows is that they grew faster than worldly GDP and international trade (Jansen and Stokman, 2004; Wong and Adams, 2002).

FDI inflows and their impact on economic development across countries has been the subject for intense analysis, theoretical and empirical. The rapid integration of production and financial markets in current world economic activities led many analysts to argue that FDI has been one of the core features of this process, to view

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FDI as a major indicator of globalization and, moreover, to consider it as a kind of panacea for every economic problem in the emerging market economies (Wong and Adams, 2002; Mencinger, 2003; Baliamoune-Lutz, 2004).

FDI flows are spread unevenly across countries. Even in European Union, which is alleged to represent one of the most integrated regions in the world, FDI flows are not uniformly distributed across the countries. Greece, for example, had no major increase in the ratio of inward stock to GDP between 1980 and 2002, unlike Spain and Portugal, which experienced significant increases (FDI on-line magazine, 2004). Thus, within the FDI empirical literature much research has been undertaken in an attempt to understand the driving forces behind the observed differences of FDI inflows worldwide (Cho, 2003, 2002; Sahoo and Mathiyazhagan, 2003; Obwona, 2001; Balasubramanyam et al., 1996). Some of these studies try to account for the majority of the factors that are alleged to affect FDI decisions, while other focus on the role of specific factors such as political risk, labour standards or governance infrastructure. (Li, 2003; Baniak et al, 2002; Cho, 2002; Globerman and Shapiro, 2002; Montfort, 2002; Lim, 2001). However, there is no consensus between analysts on which are the important determinants of FDI mainly because there are different types of FDI, which are affected by different factors and because of the lack of data on some of the determinants, as well (Lim, 2001).

Another type of research within the FDI literature attempts to investigate the impact of foreign capital on the growth performance of the host countries (Makki and Somwaru, 2004; Li, 2003; Lim, 2001; Fortanier and Maher, 2001; Moudatsou, 2001; Lensink and Morrisey, 2000). In their studies, Iliopoulos (2003) and Montfort (2002) suggest that FDI promotes the introduction of high-level technology and managerial know-how, it facilitates international co-operation and it reduces production costs. As a result, the host country improves its overall productivity, which in turn boosts industrial and economic development of the nation. Cho (2002) asserts that FDI serves as a mean of transferring productive technology, skills, innovative capacity and managerial practices between locations and international marketing networks. Moreover, large multinationals have the resources to invest in technology, which is widely recognized as the catalyst that can stimulate economic growth, productivity and industrialization. Barrios et al (2002) in his work examines these efficiency spillovers that derive from FDI activities.

In the present research, we try to examine to what extent FDI inflows affected the growth rate of the Greek economy during the Post-War Era. We are especially interested in looking upon the causality between FDI and GDP growth in Greece.

The Case of Greece

There is a general consensus in Greece that the adoption of the law 2687/53 regarding the attraction of foreign capital in 1953 along with the strategy for the reconstruction of the country after the World-War II and the Civil War helped significantly the country to increase its capital inflows during the period 1955-1980[1]. The policy efficiency adopted by the Greek since early 1950's in terms of encouraging inward FDI has been also emphasized by Barrios et al. (2002) who argue that tax relieves and institutional changes allowed free capital movements and especially full profit repatriation. During the whole period, U.S. was the leading source of capital inflows (87.1%). The sectoral distribution of foreign capital was 80% of FDI in the manufacturing sector, while the transportation sector absorbed 10%, mainly through the Olympic Airways. Another significant characteristic of FDI during the first period was its major contribution to the establishment of new industrial units (Vaitsos and Giannitsis, 1987).

Mardas and Varsakelis (1996) maintain that the FDI activity slowed down in late 1970's and early 1980's, possibly due to high level of state intervention and to unstable economic environment, like high inflation rates and volatile exchange rates of this period. According to Bosworth and Kollintzas (2001), Greece was considered to be an unattractive market for foreign capital during the 1970's and 1980's, because of its large fiscal deficits, its high rates of inflation and its highly constrained labour market. Lantouris et al (2000) conclude that, overall, the growth rate of inward FDI flows in Greece has been positive throughout the post-war years with a mere exception during the periods 1974-1975 and 1980-1984, whereas, Kaskarelis (1993) argues that a characteristic feature of capital formation, especially in Greek manufacturing, is that periods of high rates of investment followed by intervals of absolute retreat or significant slowdown.

The liberalization of product and financial markets along with the effort of Greek authorities to privatize a large number of state-owned enterprises and control macroeconomic imbalances has boosted FDI inflows in the 1990s (OECD 2002, OECD, 2001), since privatisation programs act as a signal of authority's commitment to private ownership (Obwona, 2001). Nevertheless, Greece has not gained significant advantages as far as FDI is concerned, in comparison with other EU members (FDI on-line magazine, 2004). Greece stands out both for the consistently small role of FDI and for the fact that there was no boost to FDI after EU accession. According to Bosworth and Kollintzas (2001) the low inflow of foreign direct investment into Greece might be viewed as an indicator of the impact of European Union accession on external perceptions of economic opportunities in Greece. The lag of attracting foreign direct investment has been also emphasized by Iliopoulos (2003) who, nevertheless, maintains that a gradual upturn is evident, which is

possibly initiated by the serious prospects for growth and the stable macroeconomic environment.

With respect to possible determinants of FDI inflows in Greece, few studies have been conducted. The empirical findings of Mardas and Varsakelis (1996) showed that FDI decisions in Greece are not affected by the nature of industrial sector (high-tech or traditional) or unit labour costs. On the other hand, they found a positive relationship between public procurements and FDI, suggesting that the application of such a policy enforced some multinationals to establish domestic affiliates in order to exploit monopolistic advantages in public procurement market. Thus, they conclude that the main motive for foreign firms, which enter the Greek market, is not to exploit its comparative advantage but its monopolistic or oligopolistic advantage offered by the market. A study by Enders and Sandler (1996) examines the impact of terrorist incidents on net FDI flows in Spain and Greece and their empirical findings for the case of Greece showed that terrorism led to a persistent negative influence on FDI and on the stock of foreign-owned capital. More specifically, they found that an average year's worth of terrorism limited FDI by 11.9% annually.

The FDI-Led Growth Hypothesis in Greece

Prior to embarking on the empirical investigation it should be stressed that the majority of the academic studies providing evidence in favour of the FDI-led growth hypothesis, have been conducted for developing countries, just a few for EU member states, and hardly any for Greece. It is therefore imperative that a thorough investigation of the underlying hypothesis to be conducted in an attempt to shed some light on the validity of the FDI-led Growth hypothesis.

Our econometric methodology consists of the following steps: First we check the series to determine the order of integration by applying standard augmented Dickey-fuller (ADF) and Phillips Perron tests. Then, we engage in testing the cointegration of the series, before an exploration of the causal dimension through Granger Causality tests and VAR techniques takes over. For the econometric analysis we use time series data for Greece for the years 1954-2003. The following time series form the platform on which the empirical investigation is based[2]:

- y : Real Gross Domestic Product
- f : Real Foreign Direct Investment
- p : % change in Consumer Price Index

Unit Roots and Cointegration

Table 1 summarises the ADF and Phillips Perron (PP) tests for identifying the order of the integration of our variables[3]. A quick inspection of the table indicates that for all variables the null hypothesis can not be rejected. In order to specify the order of integration of the non-stationary variables, we repeat the unit root tests on the first differences of each time series, the results of which are documented in the same table. Table 1 suggests that we can reject the null hypothesis for all variables. Therefore according to the ADF test, and PP we can treat the underlying time series as I(1) variables[4].

Table 1: Unit Root Tests

	Augmented Dickey-Fuller Test				Phillips-Perron Test			
Variable	Levels		First difference		Levels		First difference	
	With trend	No trend	With trend	No trend	With trend	No trend	With trend	No trend
y	-2.62	-2.88*	-4.551***		-1.988	-2.041	-5.911***	-6.110***
f	-1.453	-1.434	-4.232***	-4.624***	-1.879	-1.532	-7.512***	-7.670***
p	-1.628	-1.803	-5.920***	-5.884***	-1.933	-1.875	-6.751***	-6.777***

Notes: * indicates significance at 10%
** indicates significance at 5%
*** indicates significance at 1%

Table 2: Johansen Cointegration Test (*y, f, p*) (1954 – 2003)

Eigenvalue	L R	5% CV	1% CV	r
0.353	34.545	29.68	35.65	None *
0.267	14.527	15.41	20.04	At most 1
0.006	0.260	3.76	6.65	At most 2

(*) denotes rejection of the hypothesis at 5% significance level

Given that we treat the variables as I(1) processes, it becomes possible to use cointegration methodology in order to test whether there is a long run relationship between the variables in question (Engle and Granger, 1987). There are different ways to test for cointegration. In this study, we adopt the multivariate approach to cointegration. More specifically, we use the Johansen procedure to test whether there is a cointegrating relationship between GDP, FDI and inflation in the period 1954 – 2003 and the results are provided in Table 2.

In view of the results presented in Table 2, it becomes rather apparent that over the scrutinized period the Johansen procedure rejects the null hypothesis of no cointegration. Bearing in mind the nature of the Johansen procedure and the problems arising from it (i.e. estimation of various structural and nuisance parameters are required) we proceeded to utilizing a non-parametric test proposed by Breitung (2002) in an attempt to skirt such a potential problem. The rationale behind the cointegration rank is akin to Johansen's approach.

Table 3: Breitung's Cointegration Test (*y, f, p*) (1954 – 2003)

H0	H1	Test Statistic	10% cv	5% cv	p-values
R = 0	r > 0	482.35	355.32	413.24	0.0381*
R = 1	r < 1	225.67	345.62	379.23	0.3221
R = 2	r < 2	67.34	152.23	183.63	0.3762

(*) denotes rejection of the hypothesis at 5% significance level. The simulated p-values are based on 1000 replications of Gaussian random walks with length n = 40.

On the basis of the results reported in Table 3, the hypothesis of no cointegration can not be rejected and therefore reinforces the evidence already obtained by the Johansen test.

A Temporal Investigation

Table 4 shows how the growth rates of both GDP and FDI behaved over the period 1954 to 2003. The purpose of this task is to get an indication as to the extent to which one variable peaks first through time.

Table 4: GDP Vs. FDI (1954 to 2003)

Time Periods	Period Averages	
	GDP (growth rate)	FDI (growth rate)
1954-1963	6.1	45.27
1964-1973	7.41	37.26
1974-1983	2.66	3.45
1984-1993	1.67	5.35
1994-2003	3.24	66.47

A close look at the table above suggests that both variables seem to be fluctuating rather randomly in a sense that GDP peaks first and then FDI follows suit, which stands at stark contrast to what one would probably expect i.e. GDP to be responding to FDI's movements.

Trying to Establish a Direction of Causality

The pairwise Granger causality test is a legitimate way of testing formal hypothesis regarding the relationship between two variables as well as provide inferences about their temporal priority[5] i.e. which one leads which over time. It is important to note that the statement "x Granger causes y" does not imply that y is the effect or the result of x. Granger causality measures precedence and information content but does not by itself indicate causality in the more common use of them. The test is carried out by running bivariate regressions of the form

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \ldots\ldots\ldots + \alpha_l y_{t-1} + \beta_1 x_{t-1} + \ldots\ldots\ldots + \beta_l x_{t-1}$$
$$x_t = \alpha_0 + \alpha_1 x_{t-1} + \ldots\ldots\ldots + \alpha_l x_{t-1} + \beta_1 y_{t-1} + \ldots\ldots\ldots + \beta_l y_{t-1}$$

for all possible pairs of (x,y) series in the group. The reported F-statistics are the Wald statistics for the joint hypothesis

$$\beta_1 = \ldots\ldots = \beta_l = 0$$

for each equation. The null hypothesis is therefore that x does not Granger-cause y in the first regression and that y does not Granger-cause x in the second regression.

Table 5: Pairwise Granger causality test on the temporal relationship between GDP and FDI in Greece

Null Hypothesis	Obs	F-Statistic	Probability
FDI does not Granger Cause GDP	48	0.08255	0.77519
GDP does not Granger Cause FDI		1.98819	0.16540
FDI does not Granger Cause GDP	47	0.20103	0.81867
GDP does not Granger Cause FDI		0.47995	0.62216
FDI does not Granger Cause GDP	46	0.31666	0.81323
GDP does not Granger Cause FDI		0.43446	0.72954

On the basis of the results generated by the Granger causality test there is hardly any evidence suggesting that GDP Granger cause FDI and vice versa. Technically speaking, the fact that the null hypothesis is accepted in all cases, suggests that even if we exclude the variables in question from the regression no statistical information will be lost. Following the preceding empirical analysis it can be argued that the emerging evidence points towards a rather blurred picture as to which variable leads which.

VAR Analysis

Arguably, the determination of both GDP and FDI involves a string of other factors that can have a profound impact on both variables. Inflation has been widely used as a key variable that conditions both variables and therefore it has been deemed appropriate that we incorporate the latter into our investigation. To this effect, we develop a VAR[6] model that consists of three endogenous variables: GDP, FDI and the inflation rate.

Table 6: Variance decomposition of responses to innovations in a three-variable VAR system

Greece	% Variance Decomposition GDP			% Variance decomposition FDI		
Periods	GDP	FDI	INF	GDP	FDI	INF
1	100.0	0.00	0.00	0.48	99.5	0.00
2	95.7	0.01	4.30	1.93	85.8	12.2
3	87.5	0.64	11.8	3.03	76.1	20.7
4	77.4	1.84	20.6	3.62	73.0	23.3
5	67.4	3.16	29.3	3.99	71.8	24.1

Our primary focus while dealing with the VAR approach will be on discussing the decomposition of the variance of the variables in the system, at various horizons. By subjecting all endogenous variables in the VAR model to standard deviation shocks we can obtain information about the relative significance of each random innovation to the variable in the VAR. In other worlds, for each period the resulting simulated error, in each endogenous variable, is decomposed into the error due to its own innovations, and the error[7] due to innovations in the endogenous variables. The significance of this task rests in the magnitude of the percentage of the variance of each endogenous variable. High percentage of variance over a long period implies that the variable is largely exogenous to the system. In contrast, a high percentages of

variance that declines fairly quickly with time, implies that the variable is significantly conditioned by the variables in the system[8].

Table 6 provides a summary of the variance decomposition of both GDP and FDI, conditioned by the other endogenous variable, for periods from one to five lags. The evidence obtained points to a rather balanced picture since both the contribution of GDP's innovation to FDI's variance, as well as the contribution of FDI's innovation to GDP's variance, are of the same magnitude. On the basis of the preceding analysis one could probably argue that the generated evidence casts serious doubts on the FDI-led growth hypothesis permeating the existing academic literature. In particular, it could be argued that the macroeconomic relationship between those variables has to be carefully re-investigated.

Concluding Remarks

Countries seek for FDI to help them grow and develop; their national policies are designed to attract FDI and increase benefits from it (UNCTAD, 2003). Several empirical analyses focus their research in defining the proper economic environment for the host country in order to attract FDI inflows. Similarly, the FDI-led growth hypothesis has been investigated in an effort to define to what extent capital inflows help an economy to grow through various channels, such as advancement in the production process.

Our findings for the Greek economy suggest that for the period under investigation there is cointegration between GDP and FDI which implies that there is a long run relationship between the two variables. These is evidenced from our Johansen procedure and the utilized non-parametric test proposed by Breitung (2002). However, on the basis of the results generated by the Granger causality test there is hardly any evidence suggesting that GDP Granger cause FDI and vice versa. Technically speaking, the fact that the null hypothesis is accepted in all cases, suggests that even if we exclude the variables in question from the regression no statistical information will be lost. Based on the VAR analysis, it can be argued that the emerging evidence points towards a rather blurred picture as to which variable leads which. The evidence obtained points to a rather balanced picture since both the contribution of GDP's innovation to FDI's variance, as well as the contribution of FDI's innovation to GDP's variance, are of the same magnitude.

On the basis of the preceding analysis one could probably argue that the generated evidence casts serious doubts on the FDI-Led Growth hypothesis permeating the existing academic literature. In particular, it could be argued that the macroeconomic relationship between those variables has to be carefully re-investigated since the impact of foreign capital on economic growth has many policy implications and the

validity of policy guidelines, which emphasize the importance of FDI for growth and stability, depends on the empirical findings with regard to the causality between FDI and growth (Shan et al., 1997). Carkovic and Levine (2002) argue that when these empirical findings do not indicate any positive impact of FDI on growth, then this would suggest a reconsideration of the rapid expansion of tax incentives, infrastructure subsidies and other measures that countries have adopted to attract FDI. Increased attention needs to be given also to the overall role of growth and the quality of growth as a crucial determinant of FDI along with the quality of human capital, infrastructure, institutions and legal framework (Shan et al., 1997).

NOTES

[1] In accordance to international standards, the criterion for defining FDI in Greece is 10 percent ownership by a nonresident investor, regardless of whether the investor has an effective voice in management. Enterprises in which the nonresident investor owns less than 10 percent but has an effective voice in management are not included. No value threshold is used to identify direct investment enterprises, and unincorporated enterprises are not treated differently from incorporated enterprises.

[2] Small case letters denote logarithms. Appendix provides the plots of the time series (in first difference logarithmic transformation) used in our analysis for the entire time span. It should also be stressed that the main data provider was the IMF and the Central Bank of Greece.

[3] The time plots of the variables examined could be indicative of whether a time series follows a deterministic or stochastic trend, however, we run the tests both with a constant and a linear trend and a constant alone because the visual inspection of these plots can be misleading sometimes. In most of the time series examined, the results are rather identical for both cases, which provides us with more rigid conclusions. Taking into account the time plots of the above series we thus, have chosen to include both a trend and an intercept in our test equation. As both ADF and PP tests provided us with similar results we can conclude on the stationarity or non-stationarity of the above time series.

[4] It should be stressed that for the ADF tests, the lag length is based on the SIC, while for the PP test bandwidth selection is based on Newey-West.

[5] This becomes feasible, by regressing X on its own values as well as lags of Y and then reversing the test with Y this time your dependent variable.

[6] For more on VAR models see Sims (1980), Campbell (1991).

[7] The sum of the variances of all endogenous variables must add up to 100.

[8] We should emphasize that the order according to which all variables have been included in the VAR system is of great importance. For the first variable the only one period ahead variation is its own innovation; hence the high percentage (100%). In our experiment GDP has been chosen as the first variable.

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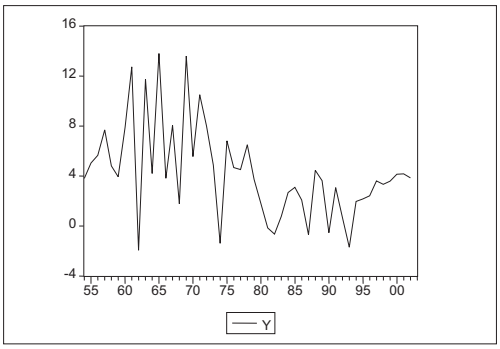
APPENDIX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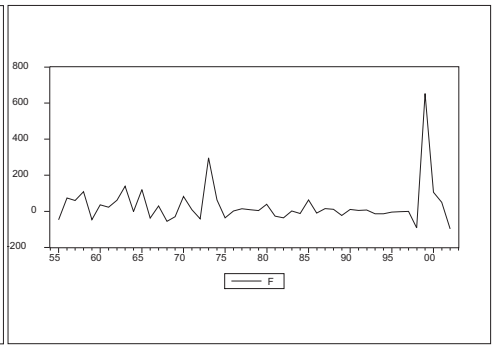
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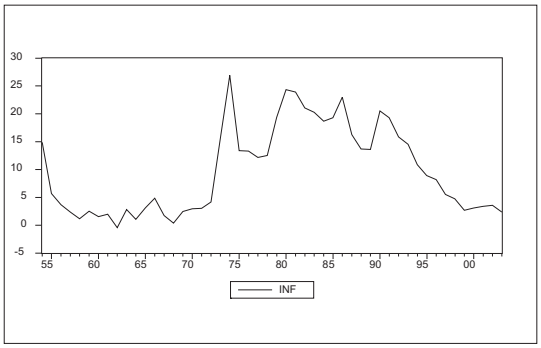
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