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***The Investment Development Path Hypothesis: Evidence  
from the Portuguese Case – A Panel Data Analysis.***

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# **The Investment Development Path Hypothesis: Evidence from the Portuguese Case – A panel Data Analysis.**

**(First Draft)**

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## **ABSTRACT**

Looking at the transformations that took place in the world economy after Second World War, as a result of liberalization, deregulation and market opening process, one of the most striking features was the significant expansion of Foreign Direct Investment. So, the main purpose of this paper is to discuss the positioning of Portugal – a small open economy in the extreme west of Europe - in this context.

Our analysis is based on the Investment Development Path (IDP) theory, according to which the inward and outward investment position of a country is tied with its economic development.

In the present research, this hypothesis is estimated empirically for Portugal and other 25 countries in different stages of development, using fixed-effects panel data models. Generally, our results find support for IDP paradigm, although it is impossible to capture all the stages predicted theoretically, given the lack of heterogeneity between the most countries of our sample and the relatively short time period considered.

**Keywords:** Foreign Direct Investment, Multinational Enterprises, Investment Development Path, Portugal

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## **1. Introduction**

The main purpose of this paper is to analyse the Net Outward Investment (NOI) position of Portugal, in the period 1990-2005 at an aggregate level.

In this study, we have as methodological reference the Investment Development Path hypothesis, introduced by Dunning (1981) and further developed, among other authors, by Dunning and Narula (1996). The basic argument of this particular theoretical approach is that, with an increasing economic development, a country's NOI faces different stages, from an initial one – where the country is a net inward receiver of Foreign Direct Investment – to a matured one - where the country becomes a net outward investor. This evolution is supposed to be the result of firm-specific assets accumulation that allows them to engage in outward direct investment.

The paper is structured as follows: section 2 presents the theoretical background of this study, which includes a detailed description of the main features of its five stages of development and the limitations of the idealized pattern that originate a new approach to the model. Section 3 briefly reviews the most important empirical works carried out to test the validity of the Investment Development Path paradigm. Section 4 presents data and the fixed effects panel data models we used to test the relationship among the 26 countries' NOI and its level of development, paying special attention to the Portuguese economy. At the end the paper presents the conclusions and limitations of the study.

## **2. The Theoretical model – Investment Development Path**

### **2.1 Original model**

One of the latest developments in the analysis of Foreign Direct Investment (FDI) is the Investment Development Path (IDP) theory, that was originally introduced by Dunning in 1981 and thereafter refined by this author and others (Dunning 1986, 1988, 1993, 1997;

Dunning and Narula 1996; Narula 1996; Durán and Úbeda 2001, 2005), maintaining its basic philosophy.

According to this theoretical approach, the FDI develops through a path that expresses a dynamic and intertemporal relationship between an economy's level of development, proxied by the Gross Domestic Product (GDP) or GDP *per capita*, and the country's net outward investment (NOI) position, defined as the difference between outward direct investment stock and inward direct investment stock.

The IDP is in line with the eclectic paradigm of international production (Dunning 1979, 1988, 1993), or Ownership-Location-Internalisation (OLI) paradigm, which for the last two decades has remained the most influential analytical framework for multinational enterprises (MNEs) and FDI.

The basic assumption of the OLI paradigm is that a firm will engage in international production when three related conditions are satisfied at the same time.

Firstly, the investing firms must possess certain specific advantages (ownership advantages) to counteract the advantage of domestic firms and the high costs of operating in a foreign and unknown environment. These advantages are normally intangible and can be exploited by the firm abroad, such as the privileged access to markets, raw materials or other inputs, high knowledge of their human resources, or a broader access to financial markets

Secondly, the host country should have specific advantages (locational advantages) that influence where the MNE will invest, such as the access to a high income market, low transport and telecommunications costs, a large endowment of factors scarce in the home country or a positive attitude towards foreigners. They are connected to relative advantages between home country and potential host countries, as if they didn't exist the firm would opt to develop its activity in its own country and export its products to external markets.

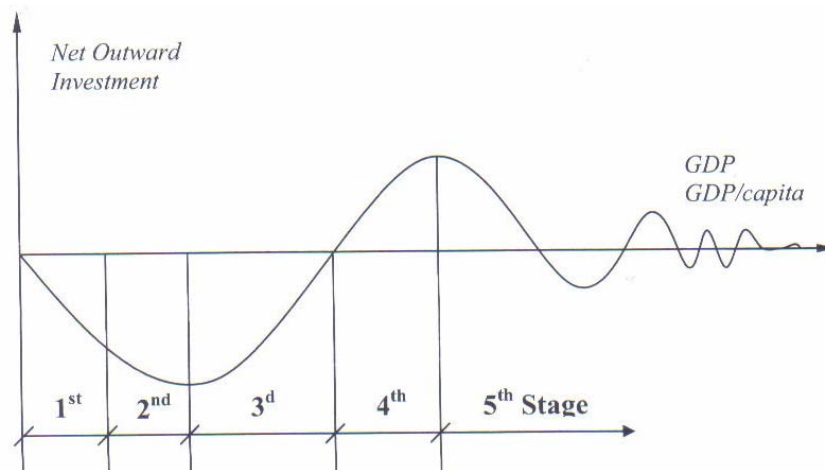
Thirdly, the OLI paradigm predicts that, in case of missing or imperfect external markets, the MNE prefers to get directly involved in external production, rather than licensing foreign firms to distribute their proprietary assets or simply exporting its products to foreign markets. Many are the reasons that can bring a firm to internalize its activities, such

as scale economies, risk and uncertainty reduction, or reduction of transaction and coordination costs resulting from the existence of externalities (Coase, 1937; Williamson, 1975; Buckley and Casson, 1976).

From IDP derives a main hypothesis: as a country develops, a structural change occur in the conditions faced by domestic and foreign companies, affecting FDI inflows and outflows which, in turn, changes the country's economic structure.

According to this theoretical framework, five development phases emerge, represented on Graph 1 below. Along these stages the ownership, internalisation and locational advantages of a country's firms - compared to those of other economies- change, making a country evolve from a position of inward to outward direct investor.

**Graph 1: The pattern of the Investment Development Path**



Source: Dunning and Narula (1996)

The 1<sup>st</sup> stage of the IDP refers to the least developed countries, that face a negative NOI position, because they are net FDI receivers, they mostly take advantage of the country's natural resources. On the other hand outward FDI is negligible or non-existent.

Countries that are at this stage of development normally have insufficient locational advantages, due to limited domestic market (low *per capita* income), workforce poor level of education, inappropriate infrastructure, and even political and/or economic instability. As a result, both inward and outward investments are extremely limited, and the MNEs prefer to access these countries through trade as well as to enter into non-equity relationships with local firms.

At this stage of pre-industrialisation, a country owns few created assets and only high natural-asset countries can attract a significant amount of FDI (*natural-resource-seeking FDI*).

The Government's role in this stage consists mainly in providing basic infrastructure and the upgrading of the economy's human capital, through educational and training programs, as well as implementing import-substitution and export-promotion policies, which affect the structure of local markets and industries.

The 2<sup>nd</sup> Stage is a natural development of the first one. The NOI position decreases because of an increased inflow of FDI, even faster than the GDP growth, while outward investment remains low or negligible.

Indeed, as a country develops, the improvement of its locational advantages leads to a growth of inward FDI, specially in primary commodities and natural resources, as well as in industries that are intensive in physical capital and low-qualified work, i.e. sectors whose endowment of created assets<sup>1</sup> are scarce.

This opening up of the home market to foreign investors allows the construction of more and better infrastructures, which are technologically beneficial for training and qualification of local work, and the emergence of a national industry more intensive in resources. There is also an increased integration of domestic firms in MNE's production chain, as well as a learning-by-doing and know-how transmission process to local firms. This allows these firms to create or upgrade their ownership advantages, which induces the emergence of outward FDI directed to adjacent countries in order to find new markets (*market-seeking FDI*) and, to a lesser extent, *strategic asset-seeking FDI* in high-income countries may appear.

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<sup>1</sup> They differ from natural assets, because while these refer to physical assets of a country, such as natural resources, climate or geographical situation, the created assets imply a previous use of resources for an improvement of the development degree of a country. They are intangible, gathering technological or human capital resources.

However government policies may influence this trend, through incentives or tariffs, being the competitiveness of the local firms at this stage is still very low and the outward FDI remain extremely low but larger than in the previous stage.

The third stage of this Investment Development Path includes the so-called emerging countries. They exhibit a growing NOI position, due to an increased rate of growth of outward FDI and a gradual slowdown in inward FDI.

This intermediate stage shows an increase in the economy's income *per capita*, an acceleration of industrialization and a bigger specialization of demand oriented towards superior quality products. Competition in the domestic market rises as the ownership advantages of the inward investors diffuse through the local industry. As a result the domestic firms start developing their own advantages.

At the same time, the erosion of comparative advantages in labour-intensive activities and the possibility of producing scale economies (in result of the larger internal market and upgraded domestic innovatory capacity) lead to a shift of inward FDI towards horizontal FDI (i.e. associated with market access and/or efficiency considerations).

There is also an increase in the country's created assets, as a result of increasing expenses on education/training of workers and research and development (R&D), associated to a transference of knowledge by MNEs, that allows a knowledge accumulation in domestic firms, producing an increase of their competitiveness.

Although the ownership advantages of local firms are increasingly associated to the property of intangible assets, so less depending on government policies, the role of the government is still relevant and oriented towards a reduction of market failures and inefficient industries, as well as towards promoting an increasing integration of local and foreign companies, which minimize the delocalization risks.

The main objectives of the incentives given (for example, fiscal incentives) are to attract FDI in activities in which local companies do not have competitive advantages, as well as to stimulate domestic firms to exploit their own advantages in new markets.

These countries are still net receivers of direct investment, but their direct investment abroad is quite significant too, specially in countries at lower stages in the IDP (in order to explore the market and to build export platforms to other regions and places). However, we can also see them investing in developed countries, in order to acquire capacities and assets.

According to the initial (theoretical) approach, stage four of IDP is distinguished by a shift to a positive NOI position, as outward FDI stock exceeds inward FDI stock.

This happens because domestic firms' ownership-advantages develop, which allows them not only to compete locally with foreign firms but also to expand their activity abroad. These increased investments abroad are motivated by the search of new markets and cheap labour force (*efficiency-seeking FDI*) in countries located at lower stages of development. The acquisition of strategic assets (*strategic-asset-seeking FDI*) in high-level countries, assuming either the form of mergers & acquisitions, strategic alliances or other cooperation agreements with firms located in host markets is also a consideration.

At this stage, the country location advantages, traditionally associated to cheap labour force and natural resources, began to be based mainly on created assets (sophisticated markets, qualified labour, technological capacity of the more dynamic sectors, development of economies of agglomeration). The production processes are more capital-intensive, reflecting a lower cost of capital compared with the cost of labour.

Main foreign investors in the 4<sup>th</sup> stage economies are countries with identical development levels, whose FDI flows are mainly oriented towards rationalization projects and the search of strategic assets. However, there is some inward direct investment from countries at lower stages of development, which is likely to be of a market-seeking, trade-related and asset seeking nature.

Concerning the role of the government, it has to ensure competition among national and foreign companies and to suppress the existing market failures, although it starts developing a strategic intervention to support infant industries.

More recently, empirical evidence has showed that some fourth-stage countries, like Ireland and New Zealand -that have a developed country profile in terms of GDP *per capita*, level of structural development and economic and social infrastructure- still face low outward FDI intensities that sustain a negative NOI position. This is the result of their fewer endowment and generation of knowledge, or technologically-intensive intangible assets (Durán and Úbeda, 2001). The distinguishable feature of this type of countries – called late investors (i.e., recently industrialised or developed countries) – is not a negative sign of their NOI position but an exponential growth in their stock of direct investment abroad over a continued period of time.

Finally, in the 5<sup>th</sup> stage of IDP, proposed by Dunning in 1986, we find the most advanced countries, such as U.S.A., Japan or United Kingdom, which NOI positions tends to fluctuate around zero, but reflecting high levels of inward and outward FDI.

This is the result of the growing similarity between developed countries' economic structures (in terms of factor endowment, technologies and labour qualification), the NOI stock becoming irrelevant. This means that the countries' NOI will vary between a positive and a negative position, depending on the evolution of exchange rates and economic cycles, as well as on the firms' individual strategies.

As a consequence, FDI depends less and less on the characteristics of the home and host countries, which are similar, and more on the localization strategies of MNEs. So, the countries' capacity to attract and to invest abroad depends lastly on its endowment of created assets, and so the inward and outward FDI flows vary according to the technological and organizational capacities of each country.

At this stage, there is almost complete internalisation of transaction costs inside the multinational, instead of transactions through the market. This makes the relationship between the international investment position of an economy and its level of development lesser stable, as noted by Dunning and Narula themselves (1996), and the role of governments achieves a strategical dimension, increasingly behaving as oligopolist with MNEs and with other governments.

In synthesis, we can say that locational advantages, including appropriate government policies and basic infrastructures, are particularly relevant in the first three stages of the Investment Development Path, once the economies here included are mainly FDI receivers. On the other hand, the existence of a favourable institutional framework, which helps the development of ownership advantages in local firms, the increasing international mobility of operations and the accumulation of technological and knowledge-intensive assets, seem to constitute the acceleration factor of direct investment abroad and of the progression towards a fourth and fifth stages of development.

In this context, it's also relevant to refer a paper of Dunning, Kim and Lin (2001) having Korea and Taiwan as case study, where the IDP concept was extended. These authors argue that there is a link between trade and FDI and introduce a parallel concept of Trade Development Path (TDP). According to them the growth of trade and FDI are positively correlated with Gross National Product *per capita* and with the created asset intensity of products.

## **2.2 Reconfigurations of the model**

Dunning and Narula (1996) concluded that, in an increasingly globalised world-economy and as the national boundaries of firms have blurred, the IDP idealised pattern changed considerably since the 1980s.

In this new context, three methodological problems have been identified in the former analysis and to solve them a new approach was proposed.

- *Firstly*, it was observed that the net outward investment FDI stock ( $\text{NOI} = \text{Outward FDI stock} - \text{Inward FDI stock}$ ) does not constitute an appropriate indicator to analyze the effect of structural changes on inward and outward FDI, and its use produces some statistical problems.

In fact a net FDI position close to zero is a characteristic of countries in both the first stage of IDP (receiving very little FDI) and fifth (with high levels of inward and outward FDI). On the other hand, an increase on the net position of FDI, usually interpreted as increased

competitiveness of the economy, can also be due to a disinvestment process in the country (a significant decrease of inward FDI stock) in response to a deterioration of its investment environment.<sup>2</sup>

These two problems can be overcome in the statistical analysis using inward and outward FDI stocks separately and in both absolute and relative terms, in addition to the net position of FDI stock (NOI). This change is expressed in a new representation of the Investment Development Path, proposed by Durán and Úbeda (1999) and shown on Graph 2 below, where the bisection represents the net investment position.

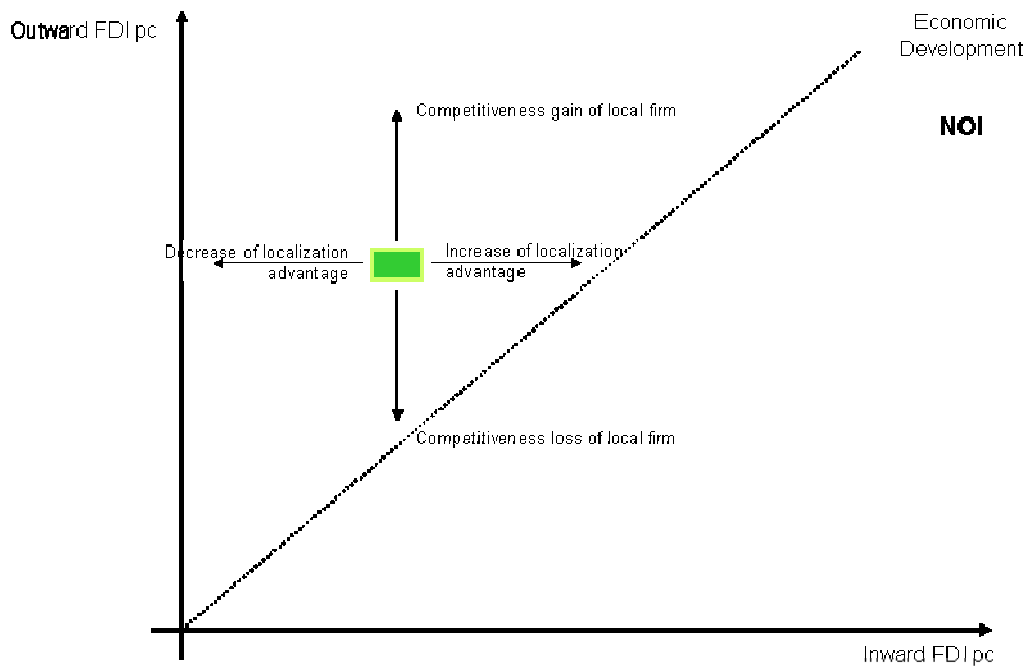
Countries above the bisection have a positive NOI stock and below that line have a negative NOI stock. This representation allows a better interpretation of countries' FDI dynamics.

In this new framework, a horizontal movement to the right means an improvement on localization advantages, and a movement in the opposite sense means a loss on localization advantages. From the point of view of NOI position, the first case can be interpreted as a decrease of competitiveness and the second case as a gain of competitiveness. The improvement of competitiveness of an economy is measured by the vertical ascendant movement from a certain point, independent of the horizontal movements.

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<sup>2</sup> See Buckley and Castro (1998) about Portuguese economy in the period after 1993

**Graph 2: New graphic representation of the Investment Development Path**



Source: Úbeda (1999)

Dúran and Úbeda also propose Graph 3 below, trying to show the positioning of countries along the different stages proposed by IDP approach. So, the countries in first and second stages are situated along the axis which represents the inward FDI, those in the third stage are characterized by increasing volumes of direct investment abroad, while those in the last stages are around the bisection. In this representation, it is also relevant to distinguish between late investor countries (Lall, 1996) -which present relatively low inward and outward FDI stocks for its level of development- and those of the triad (U.S.A., European Union and Japan).



ownership advantages of MNEs became more 'transaction-advantages' than 'asset-advantages' as they result from the multinationality *per se* of the firms, i.e. their capacity to gain, to expand and to efficiently coordinate geographically dispersed created assets (Dunning 1983, 1988; Dunning and Narula, 1996).

This means that it is not the structure of the IDP itself that needs to be questioned, but its nature that changed and became idiosyncratic, i.e. country-specific. Each country tends to follow their own path and the speed and direction of movements along IDP stages depends on a sort of idiosyncratic elements (like the existence of natural resources, the geographical and cultural distances from home economies, the size of the country, the economic system or the development model), that influence its economic structure and the inward and outward FDI flows.

- *Thirdly*, the econometric models were not considered an adequate tool for testing IDP.

In fact, to assess IDP empirically for a set of countries the quadratic equation suggested by Dunning (1981) was used:  $NOI_i = \alpha GDP_i + \beta GDP_i^2$ , where the variable to be explained (the dependent variable) is the net volume of a country's direct investment (NOI) and the explanatory variable is the country's GDP, both variables been standardized for the corresponding population.

However, some statistical inconsistencies were detected in this model (Narula, 1996): the quadratic equations show different forms if the sample of countries varies<sup>3</sup> and problems of heteroscedasticity arise, as developing countries show a greater variance of errors.

Given these limitations of the econometric model, an alternated multivariate analysis was proposed, combining three complementary tools. A factor analysis to test if there is (or not) a relationship between the degree of economic development and inward and outward FDI stocks; a cluster analysis to countries groups along the different stages of IDP based on

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<sup>3</sup> Dunning and Narula (1996) show a J form of their quadratic equations, in which the relationship between GDP *per capita* and NOI *per capita* has a positive sign, while Tolentino (1993) obtains an inverted J form

their structural similarities and a non-parametric test to show statistically that the differences in the volume of inward, outward and NOI stocks at different stages are consistent with the theory (Durán and Ubeda, 2001).

### **3. Empirical studies**

During the last two decades, several econometric and descriptive studies have been made in order to test if the postulated relationship between a country's international investment position and its level of development can be empirically confirmed.

Two alternative ways have been considered.

One way is a “cross-section” analysis, whose use poses a methodological problem, since it is a statistical tool which seeks to determine the relationship between the level of development and the volumes of inward and outward FDI to a set of countries in a given period of time, thus contrasting with the dynamical nature of the Investment Development Path. The other is to focus on one country's NOI position either vis-à-vis all countries of the world or countries (regions of the world) that represent its main partners for FDI. These studies incorporate, in a varying degree, geographical factors into the analysis of the IDP and NOI positions of a given country with other groups of countries/regions or other specific countries, being longitudinal by nature.

In 1986, Dunning analysed 25 developing countries' NOIs, concluding that the ownership advantages of their MNEs derive from the owning of individual or unique assets, which distinguishes them from those of developed countries that result from internalizing a series of separate overseas activities, avoiding transaction costs of the market.

Pichl, in 1989, showed on the basis of FDI flows of 18 countries, that small and highly developed countries have a higher share of inward FDI in GDP than large countries. This points to an efficiency-type of FDI, while outward FDI is not dependent on country-size but explained by firm-specific attributes and by the level of economic development.

On the other hand, Tolentino's study in 1993 is particularly important because it tested the NOI of 30 countries, for the periods 1960-1975, 1976-1984 and 1960-1984, on a cross-sectional and longitudinal basis, using FDI flow data.

It was used the equation  $NOI = \alpha + \beta GDP_t + \gamma GDP_t^2 + \mu_t$ , proposed by Dunning in 1981, where NOI is net outward investment position, GDP is real gross domestic product and  $\mu$  is a regression error term. In this quadratic specification, the negative sign of the coefficient on *GDP* and the positive sign on the  $GDP^2$  coefficient (which are both statistically significant), provided evidence of a U or J-shape relationship between a country's economic development and its net outward position. Their results were consistent with the IDP theory for the first and third periods, but it was obtained an inverted J-form between 1976 and 1984, concluding that the structural change that occurred during the period surveyed was sufficiently large to nullify the relationship between NOI and GDP *per capita*.

Dunning and Narula (1994) applied the IDP model to explain the level and structure of US-Japanese FDI. They highlighted the difference between natural and created assets and proposed two modifications to the original model: first, the inclusion of macro-organisational policy variables and secondly, the importance of acquisitions of ownership advantages, where the latter suggests that a negative NOI position points to a strength of an industry, rather than a weakness.

Narula (1996) analysed FDI stock data of 40 developing countries for years 1975 and 1988, based on the quadratic equation used by Tolentino. However, his results contradict Tolentino's results, confirming in both periods the U or J-shape relationship predicted by the IDP concept (first, the NOI position decreases though with further development increases again), probably because he used FDI stock data instead of flow data.

In 1996, Dunning and Narula estimated the same equation used by Narula (1996), using cross-section data of 88 developed and developing countries for years 1980 and 1992. Their

results generally confirm the IDP, although the small countries present an above average NOI in earlier stages, as the lack of economies of scale inhibits inward FDI and stimulate domestic firms to international markets in order to improve their production scale.

Buckley and Castro's study (1998) for Portugal used time series data and proposed a new relationship between NOI and GDP based on empirical evidence for 1943-1996. They suggest regressing NOI on  $GDP^3$  and  $GDP^5$  because of the better performance of projecting higher growth rate of inward FDI than of GDP at the first stage of IDP. So, the original quadratic equation was replaced by a polynomial one:  $NOI = \alpha + \beta GDP_t^3 + \gamma GDP_t^5 + \mu_t$ , which according to the authors better fits the characteristics of the Portuguese development model. It represents a function where the dependent variable grows very slowly at the early stages. Only at a second stage it grows faster than the independent variable, but soon slowing down and eventually reaching a minimum – the U-turn that corresponds to the transition between stages 2 and 3 when the country becomes a net investor.

The behaviour of Portuguese economy was very close to those predicted by the theoretical model, although it was found empirical support for the idiosyncratic nature of the IDP. They suggest that, beyond a country's level of development, non-economic factors like the governmental policy and some external political events, such as joining to EFTA and European Union, the 1974 Revolution, the fall of Berlin wall and the political changes in Central and Eastern European, affected significantly the levels of inward FDI in Portugal.

Bellak (2000) analysed Austrian IDP for the period 1990-1999, founding that its NOI position does not reflect the high level of development of the country in terms of GDP and largely varies according to industry-type and type of partner country. These results suggest, given the small domestic market size, the determining factors of the IDP seem to be the geographical and the industrial structure of domestic industries and the policies pursued, rather than the general level of development.

More recently, we can highlight Barry, Görg and McDowell's study, in 2003, based on Irish-US FDI flows for 1980-1999. They found empirical support for the IDP, although Irish MNEs do not follow the standard pattern, as its FDI outflows are disproportionately horizontal and concentrated in non-traded sectors.

Boudier-Bensebaa (2004) made an econometric test of the IDP for Central and Eastern European countries (CEECs), concluding that its net investment position has become more and more negative over the 1990-2002 period, but CEECs' GDP has not steadily grown and sometimes even decreased. This evolution disturbs the relationship idealised by the theory, confirming its idiosyncratic nature.

Finally, in 2005, Vavilov concluded that IDP is less significant for resource-rich countries, specially the major petroleum producing and exporting countries, where the time lags between different stages are much longer than predicted by theory.

In general terms, the most recent tests of this hypothesis tend to analyse IDP for a particular country with respect to its total FDI flows and stocks or by introducing a breakdown of the world by region, country or industry sector, in detriment of the cross-section studies across countries, which reveals itself incapable of capturing the dynamics and the structural changes inherent to the economic development process, due to lack of data.

## **4. Our study**

### **4.1 Data**

Following most of the previous research carried out to test the IDP, in our study FDI stocks data have been used to estimate NOI and GDP has been used to proxy level of development. NOI was calculated according to UNCTAD's data on inward and outward FDI Stocks, data on GDP is derived from United Nations and data on population from Eurostat.

Our sample is composed of 26 countries (whose statistics are shown in Table 1 below) located in different stages of development: U.S.A., Japan, Republic of Korea and 23 European Union countries. We have considered Belgium and Luxembourg together and we excluded Ireland from the study, because this country is an "outlier" when its IDP is

compared to the idealized pattern. As mentioned before, although Ireland have a fourth-stage country profile in terms of GDP *per capita*, level of structural development and economic and social infrastructure, it is a net FDI receiver and still faces low outward FDI intensities that sustain a negative NOI position.

**Table 1: Country statistics (1990-2005)**

Country	Variable	Obs	Mean	Std. Dev.	Min	Max
Austria	noi	16	-3494.20	4278.91	-7888.76	5898.50
	gdp	16	218030.80	39741.32	164988.00	306065.00
Belg-Luxem	noi	16	-43131.15	32173.30	-126004.30	-15446.00
	gdp	16	282209.80	55111.93	215359.00	407283.00
Cyprus	noi	16	-1583.16	2324.37	-5730.00	810.51
	gdp	16	9631.31	3125.75	5777.00	16723.00
Czech	noi	15	-20138.13	18649.83	-55219.60	-1815.80
	gdp	16	61270.50	26473.00	27156.00	122345.00
Denmark	noi	16	2384.53	5176.80	-9599.77	16536.23
	gdp	16	175836.70	35825.58	135839.00	258718.00
Estonia	noi	15	-2683.33	3204.23	-10306.00	40.40
	gdp	16	6249.50	2591.61	4094.00	12762.00
Finland	noi	16	15200.44	9763.06	4875.69	29915.47
	gdp	16	132512.90	27603.95	87280.00	193155.00
France	noi	16	99113.56	91207.57	12694.90	252337.90
	gdp	16	1507279.00	269013.40	1238260.00	2126578.00
Germany	noi	16	212215.10	156796.70	40350.00	464508.30
	gdp	16	2186010.00	321775.90	1707359.00	2794856.00
Greece	noi	16	-8531.95	3597.38	-15967.20	-2799.20
	gdp	16	130153.90	40007.98	85931.00	225201.00
Hungary	noi	16	-21178.42	18069.56	-56660.29	-372.16
	gdp	16	55014.81	22911.43	33998.00	109239.00
Italy	noi	16	46749.23	23384.22	186.75	73612.11
	gdp	16	1255826.00	219882.80	1020951.00	1762475.00
Japan	noi	16	236061.40	24921.64	191591.00	285682.00
	gdp	16	4215316.00	545492.60	2995736.00	5206658.00
Korea	noi	16	-7480.60	9808.29	-26721.40	2696.70
	gdp	16	480377.80	141577.70	263776.00	787627.00
Latvia	noi	15	-1576.78	1572.57	-4489.00	216.43
	gdp	16	7954.44	3102.92	4702.00	15244.00
Lithuania	noi	12	-2619.41	2040.55	-5966.02	-320.83
	gdp	16	11841.94	5598.30	6065.00	24864.00
Malta	noi	14	-1539.24	1005.62	-3335.77	-387.85
	gdp	16	3681.81	914.11	2458.00	5573.00
Netherlands	noi	16	66328.80	33193.31	38168.52	177843.30
	gdp	16	421662.30	93806.25	307381.00	624187.00
Poland	noi	16	-26964.19	28852.69	-88658.00	299.00

Country	Variable	Obs	Mean	Std. Dev.	Min	Max
Portugal	gdp	16	155963.60	61178.16	63084.00	290006.00
	noi	16	-16648.53	4614.14	-26317.75	-9671.00
Slovakia	gdp	16	119017.80	30280.10	75278.00	183300.00
	noi	15	-4307.55	5288.53	-14785.87	-58.16
Slovenia	gdp	16	22411.75	9816.74	11422.00	46417.00
	noi	16	-1957.22	1358.53	-4530.21	-407.90
Spain	gdp	16	20410.44	6429.95	12523.00	34030.00
	noi	16	-39680.06	32764.81	-80190.63	14397.01
Sweden	gdp	16	667409.10	183412.40	515237.00	1124612.00
	noi	16	33485.01	6161.64	18444.05	42550.55
UK	gdp	16	260851.90	43305.00	200048.00	357683.00
	noi	16	242140.40	202910.50	23795.32	580888.00
USA	gdp	16	1389134.00	385110.30	962407.00	2198796.00
	noi	16	201065.40	144919.60	35610.00	537692.00
	gdp	16	8636925.00	2102277.00	5757200.00	12500000.00

## 4.2 Model and Results

In this paper, fixed-effects panel data models are used to estimate the relationship between a country's international investment position (*noi*) and its level of development (*gdp*).

This approach has several advantages to traditional cross-section or time-series models. Time-series models require a large amount of observations in order to capture the pattern of the investment development path throughout its five stages. With cross-section models we can avoid this problem if we have countries in all of these stages. However estimates from these models are generally inconsistent due to omission of unobservable variables correlated with *gdp*.

The model we used can be describe by,

$$noi_{it} = g(gdp_{it}) + \gamma d_t + \eta_i + \varepsilon_{it}$$

where  $noi_{it}$  and  $gdp_{it}$  are the values of *noi* and *gdp* for country  $i = 1, \dots, 26$  in time-period  $t = 1990, \dots, 2005$ ,  $g(gdp_{it})$  is defined by

$$g(gdp_{it}) = \beta_0 + \beta_1 gdp_{it} + \beta_2 gdp_{it}^2$$

or,

$$g(gdp_{it}) = \beta_0 + \beta_1 gdp_{it} + \beta_2 gdp_{it}^2 + \beta_3 gdp_{it}^3$$

where  $d_t$  is a temporal dummy,  $\eta_i$  a country specific effect and  $\varepsilon_{it}$  a disturbance term.

The regression has been run for the entire sample over the period 1990-2005, and we estimated four models according to different specifications of  $g(gdp_{it})$  and the inclusion of the temporal dummies,  $d_t$ .

The estimation results presented in Table 2 above are consistent with the IDP theory. The coefficients on GDP and on GDP-squared are significant and with the expected sign: the coefficient on GDP is negative and that on GDP-squared is positive. In other words, they provide evidence of the U or J-shape relationship between  $gdp$  and  $noi$  proposed by Dunning. Besides, the inclusion of the cubic term,  $gdp^3$ , does not change this conclusion and gives a better adjustment.

**Table 2: Regression models**

Variables	Model 1		Model 2		Model 3		Model 4	
	Coef	t-value	Coef	t-value	Coef.	t-value	Coef.	t-value
$gdp$	-0.4987	-6.76	-1.0412	-9.10	-0.4237	-3.67	-1.0969	-7.08
$gdp^2$	9.47E-06	6.17	4.0E-05	5.77	8.97E-06	4.94	4.1E-05	5.52
$gdp^3$			-4.58E-10	-4.12			-4.62E-10	-4.08
$d_{1991}$					191.8120	0.43	109.0301	0.25
$d_{1992}$					272.3775	0.61	177.2224	0.41
$d_{1993}$					146.0151	0.34	93.87261	0.23
$d_{1994}$					236.9867	0.56	219.3616	0.54
$d_{1995}$					240.8300	0.53	346.7080	0.80
$d_{1996}$					340.0276	0.76	439.0881	1.04
$d_{1997}$					433.5201	1.06	534.8033	1.37
$d_{1998}$					319.3899	0.79	423.1766	1.10
$d_{1999}$					406.1136	1.00	543.1921	1.42
$d_{2000}$					520.9317	1.17	701.5926	1.61
$d_{2001}$					478.5376	1.06	687.7063	1.57
$d_{2002}$					355.4189	0.72	634.8526	1.36
$d_{2003}$					86.76462	0.15	524.1977	0.98

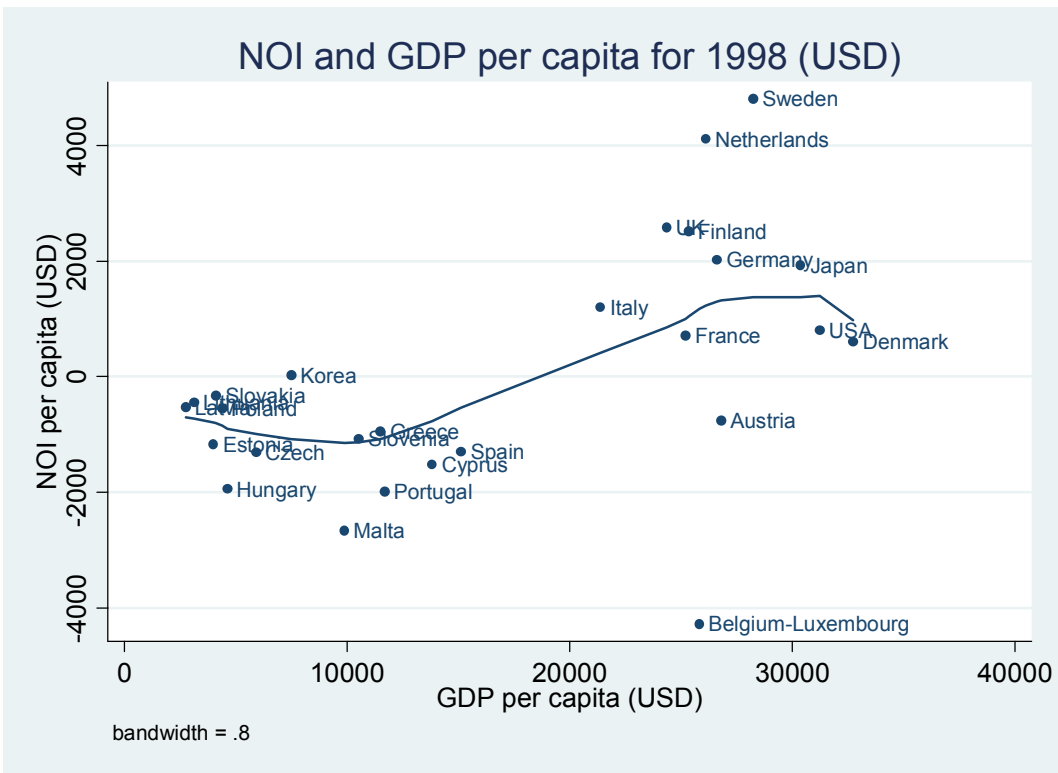
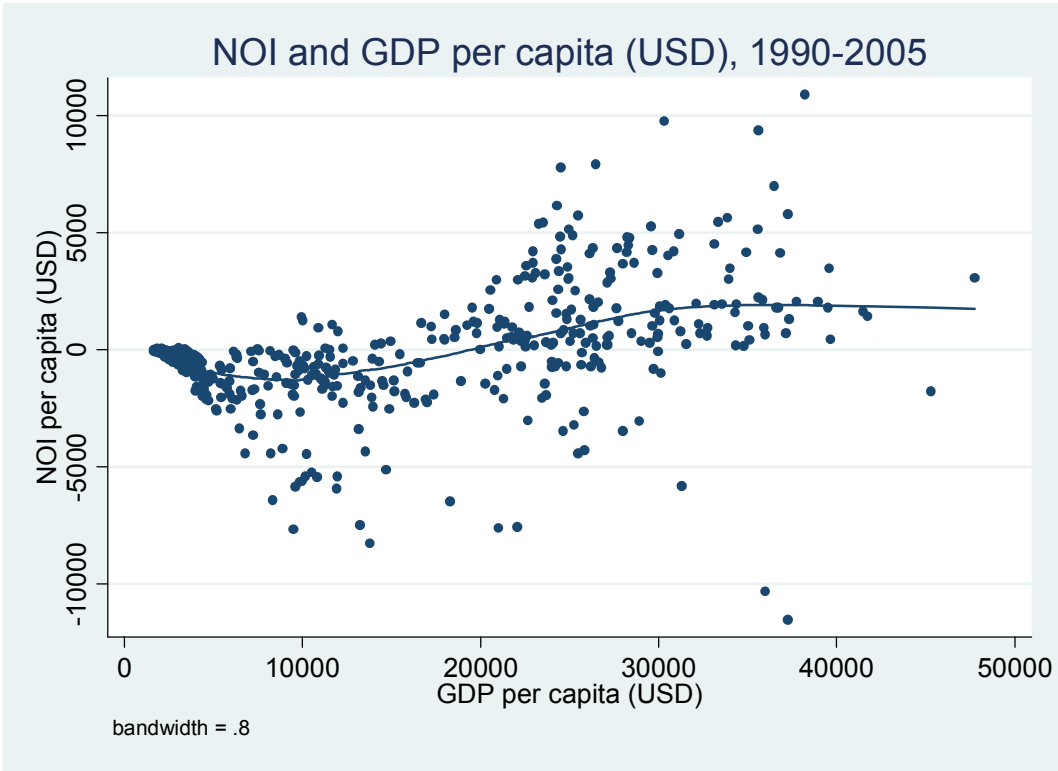
Variables	Model 1		Model 2		Model 3		Model 4	
	Coef	t-value	Coef	t-value	Coef.	t-value	Coef.	t-value
$d_{2004}$					645.1614	-0.88	138.3106	0.21
$d_{2005}$					431.4995	-0.53	553.4344	0.72
<i>const</i>	4691.9840	6.24	6637.4060	10.59	3404.7330	2.76	6855.8260	6.12
$\sigma_{\eta}$	3565.2070		3408.2862		3069.0700		3658.7042	
$\sigma_{\varepsilon}$	1484.1958		1410.4234		1492.1554		1422.7715	
$\rho$	0.8522		0.8538		0.8088		0.8686	
<i>R square</i>	0.1645		0.2475		0.1890		0.2647	
<i>F stat</i>	22.86		64.11		3.94		8.21	

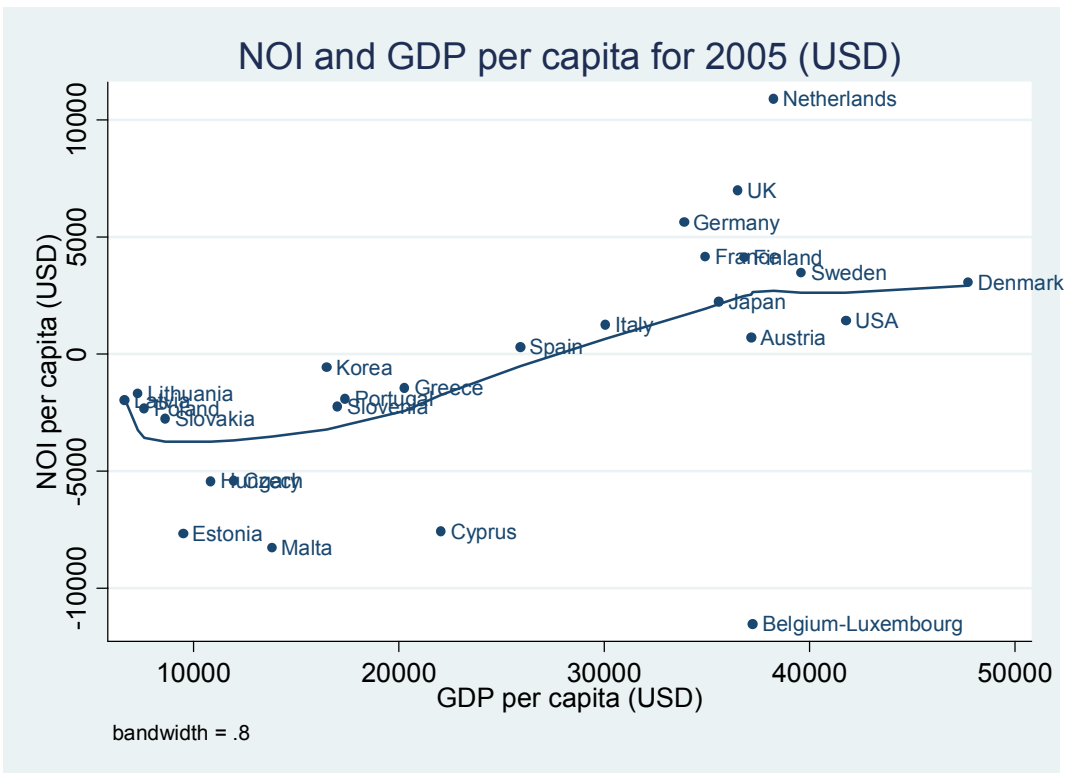
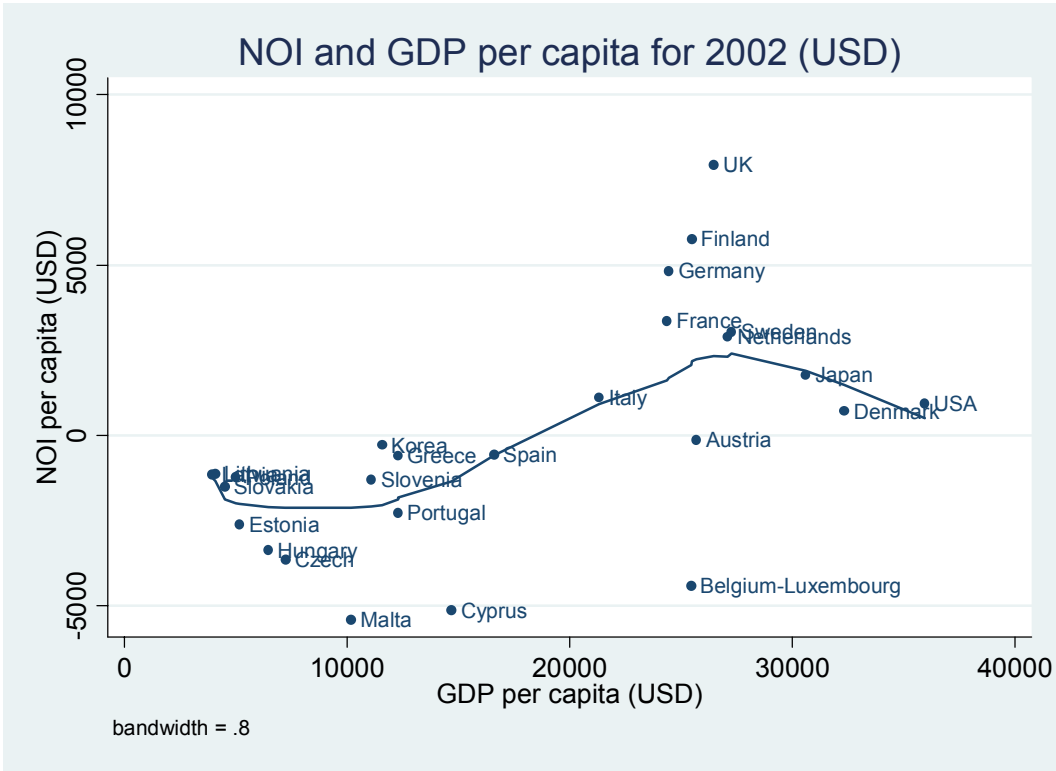
Note:  $\rho$  is the fraction of the variance due to the individual specific effects,  $\eta_i$

The graphs below are scatterplots, where dots are pairs of NOI and GDP values. In order to try catching some connection between the mentioned variables, we perform a non-parametric adjustment, using the lowless procedure.

The 1<sup>st</sup> graph includes all the countries in the period 1990 through 2005, while the 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> are cross-sections for the years 1998, 2000 and 2005, respectively.

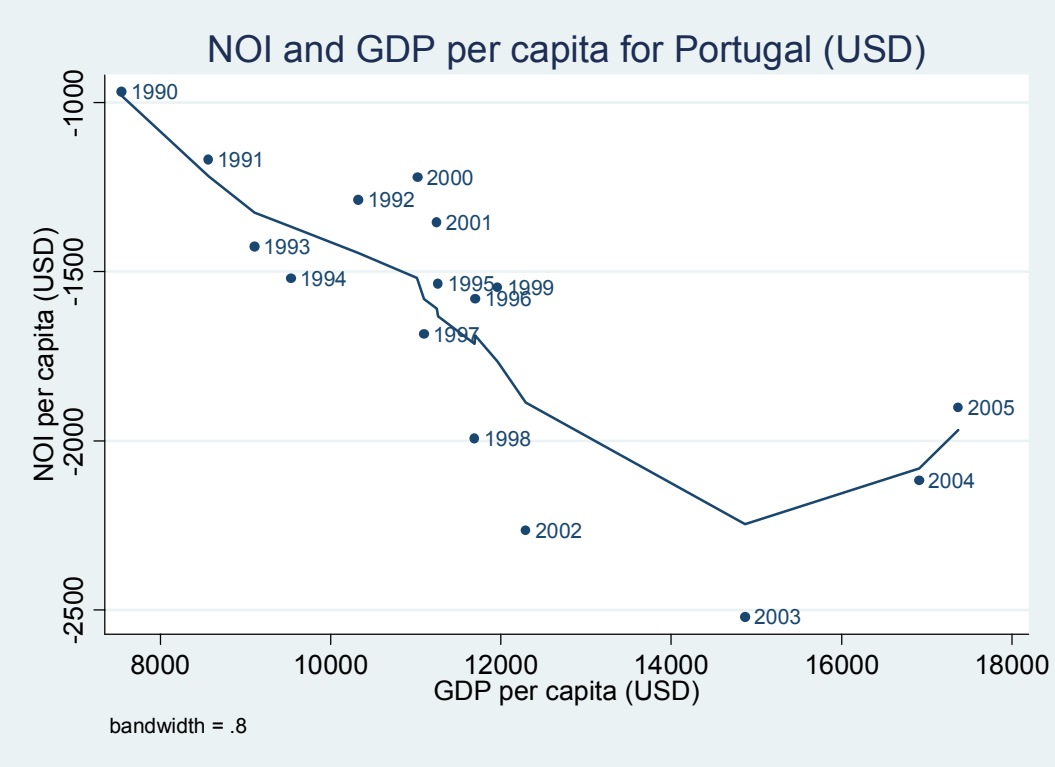
The main conclusion to retain from any of these graphs is about the existence of a relationship between the NOI and GDP values, as predicted by the theory. Therefore, higher developed countries in our sample are located in a higher position over the line, contrarily to what occurs, mostly, in Central and Eastern Europe countries.

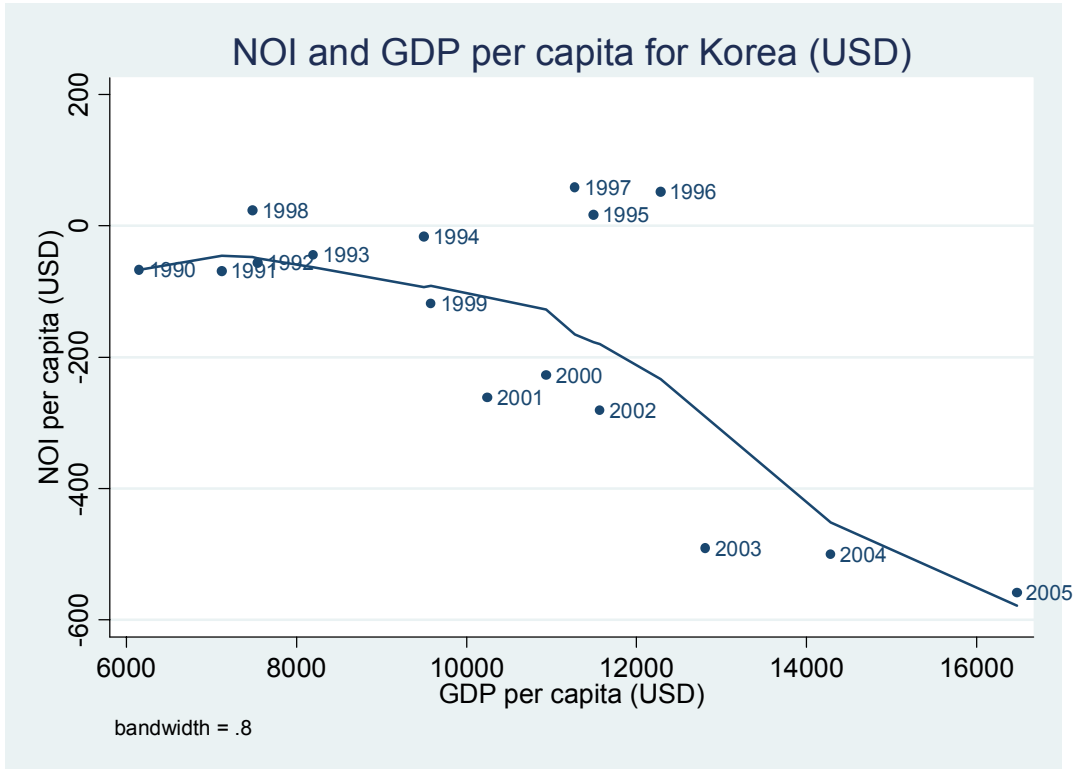




As for the 2 graphics below, they are temporal, representing the pair's (noi and gdp) evolution between 1990 and 2005, in Portugal and Korea.

The analysis of both allows us to conclude that the countries behave accordingly to the theory. However, it is possible to detect, in the Portuguese economy, an inflection point in the curve, starting in 2003, and also that Korea appears to be in earlier stage of IDP.





## 5. Conclusions

From a conceptual point of view, most of the current research's results provide support to the Investment Development Path theory introduced by Dunning (1981) that relates a country's international investment position to its level of development.

This means that generally the countries represented in our study follow the pattern idealised by IDP: a U or J-shape relationship between GDP and NOI. However, it is quite relevant to note that Ireland is an outlier. I.e. a point which lies far from the line, and thus has a large residual value, because it is a net FDI receiver, evidenced on the fact that there is a difference of about 15 percent between its GDP (that measures the total amount of goods and services that are produced within a country's geographic borders) and its GNP (that is the value of goods and services produced by citizens of a country).

Concerning to the Portuguese economy, its behaviour during the period 1990-2005 verifies the theory and there is an inflection on the curve's shape after 2003. This evolution needs further research in order to find if it expresses an ascending country's evolution in the international investment flows and an improvement of its competitive profile. It could also

have important policy implications, requiring a favourable legislative and institutional environment and an active government role promoting Portuguese firms' internationalisation.

From a methodological point of view, we can detect some limitations in this study. In fact, it is impossible to capture all the stages predicted theoretically, given the lack of heterogeneity between the most countries of our sample, specially the EU-15. On the other hand, the number of observations and the short time period considered makes the results and conclusions partly questionable, as well as there are no FDI data on industry (or sector) level that would allow us to conduct a more detailed study.

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