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MARKET SEEKING THROUGH FOREIGN DIRECT INVESTMENT IN GREECE, SPAIN AND PORTUGAL PRIOR TO THEIR ACCESSION TO THE EUROPEAN COMMUNITY

A. GKARTZONIKAS* C. NIKAS**

Abstract

Economic theory considers Market Seeking among the main and most common motives for Foreign Direct Investment. Export oriented firms obstructed by tariff and non-tariff barriers may decide to “jump over the barriers” by means of FDI.

Greece, Spain and Portugal share a number of common characteristics before their accession to the European Community. Being economically and politically isolated from the rest of Europe they desperately needed foreign capital in order to continue their development process.

This paper tests the market seeking hypothesis for the FDI to these three countries. The mainstream belief that FDI was attracted by the market demand in these countries, since exporting to them was very difficult due to their protective practices prior to the EC membership.

JEL Classification: N240, F210, F230

Keywords: Greece, Spain, Portugal, FDI, market seeking, econometric investigation

1. Introduction

The wider European economic space includes a plethora of countries, each one displaying its individual political, cultural, social and economic characteristics. This variability however does not cast away the possibility of grouping certain countries on the basis of common characteristics. The Southern European countries, also known as the “Mediterranean” ones are a typical example. The present paper investigates the determining factors of Foreign Direct Investment (FDI henceforth) in three of these countries, namely Greece, Spain and Portugal before their accession to the European Community (E.C. henceforth), in the 1980s. Their particular characteristics and mainly their protected domestic markets are examined as the factors that attracted FDI during the period from the late 1950s to the early 1990s.

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The process of economic development in these countries is inaugurated in the second half of the 20th century. The Second World War influenced these three countries to a larger or lesser extent. The implications of the war were quite severe for Greece where the four-year triple (German, Italian and Bulgarian) occupation followed by a civil war until the late 1940s. Spain and Portugal, although neutral during the War, were also influenced. Consequently by the mid 1950s where the Western European economies had fully recovered, the level of economic development in the three Mediterranean countries was very low and the progress of industrialization negligible. The limited domestic investment expenditure implied that the three countries desperately needed foreign investment stimuli.

Another, equally important, common characteristic of the three Mediterranean countries was that they were governed by dictatorial regimes until the mid 1970s. This led to economic isolation and exclusion from the process of economic integration that was taking place in Western Europe during that period (Tsoukalis, 1981, p. 32). . A remarkable coincidence is that democracy was restored in all three within a period of a year (1974-5).

Another common characteristic of the three countries examined is that until the outbreak of the economic crisis in the mid-1950s they enjoyed fast economic growth. This, coupled with the increasing contribution of manufacturing in the formation of GDP and employment led many authors to speak of “economic miracles” similar to the Japanese one (Donges, 1982, p.77).

In all three cases the attraction of investment from abroad, especially in the form of FDI was considered essential for the continuation of economic growth. The dictatorial regimes were placing emphasis on internal autarky and import substitution in order to protect domestic production. As a result the three Mediterranean countries displayed a slow opening to international trade accompanied by high tariff barriers.

Another interesting common characteristic these countries shared was referring to the composition and structure of the labor force. Unskilled workers pre-dominated and this was accompanied by a relatively low labor cost. This coupled with the fact that, at least until the late 1950s, they had not exploited their natural resources, provided potential investors a very strong motive namely, abundant and low cost exploitable human and other resources.

After the collapse of the dictatorial regimes, the three countries named full accession to the European Community their first priority objective. Some progress had been made towards this direction by Greece (an association agreement in 1961 which “froze” during the dictatorship) whereas the two Iberian countries had to start from scratch after the restoration of the democracy. This

is the main reason the accession of Greece to the E.C. took place in 1981, while Spain and Portugal had to wait until 1986. Full membership to the E.C., provided, among other things for the liberalization of trade as well as capital flows (at least vis-à-vis the other E.C. member-states). One should keep in mind however that the three Mediterranean countries were consciously following since the 1950s policies aiming at the attraction of FDI by revising and improving their legislative and regulatory frameworks (Tsoukalis, 1981, p. 99).

The structure of the paper will be as follows: The typology of FDI's will serve as the theoretical framework for the motives and targets of a potential investor when assessing an (FDI) destination country. This will enable us to clarify the alternative hypotheses we are going to test. A brief analysis of the three economies in that period will highlight their need for FDI attraction. The FDI flows during that period will be analyzed for every country individually. The empirical part will enable the testing of the alternative hypotheses. In the concluding paragraph the main findings and conclusions will be summarized.

2. FDI typology

Economic theory identifies and classifies FDI's on the basis of certain criteria. These criteria are related to the motives and the ultimate objectives of the potential investors, as well as the potential role a certain FDI project would play in the context of the multinational firm's strategic planning. Considering the motives-objectives of the potential investor, FDI's could be classified as follows (Cohen, 2007):

A) Resource seeking FDI:

In the case of the FDI's that take place on the basis of the resource seeking motive, the main objective of the multinational investing firm is the exploitation of abundant and low-cost production factors and resources in foreign countries. The basic signal for the decision to invest to be taken is the geographic location of the country where investment is considered to take place, the existence of productive resources as well as exogenous factors such as the climate. Secondly, the infrastructure and transportation network, easy access to productive resources as well as the prevailing economic and socio-political conditions are also taken into account. Regarding this type of FDI's there is one important factor to take into account. The resource seeking type of FDI's was adopted and used extensively by large multinationals specializing mainly in the agricultural and the manufacturing sectors of the economy and took place primarily in less developed countries of the world. On many occasions these led the local public opinion to be quite hostile to the large multinationals on

the grounds of them being considered responsible for the over-exploitation or even the exhaustion of the natural resources of the host country. On the other hand however this type of FDI has been associated with substantial benefits for the host countries including the inflow of foreign exchange and the role these foreign exchange earnings could play on the improvement of the domestic economic welfare level and the infrastructure.

B) Market seeking FDI:

This is the case when a multinational decides to operate a subsidiary in a foreign country in order to extent production and sales to a new market. The basic advantage of this type of FDI is that it is probably the best way for a firm to sell to potential customers of a foreign and new market having (geographical) proximity to the production outlets. This way the (multinational) firm does not have to export the product to the foreign market and undertake all the risks and the costs such an endeavor implies. Furthermore the “personal” presence and involvement of the multinational in the foreign market could enable it to understand faster and better the personal tastes and preferences of the domestic customers. This would enable the firm to adjust its production in order to satisfy the changing tastes and attitudes if it’s clientele. There are also substantial potential benefits for the host country. In fact the market seeking FDI projects provide more dynamic gains than any other FDI type for the host countries. This happens because the multinationals undertaking such investment projects, often transfer production technology as well as marketing and management expertise besides funds and capital equipment. As a result, this type of FDI contribute to both the employment (more job vacancies) and the improvement (on the job training) of the labor force of the host country.

C) Efficiency seeking FDI:

The main objective for the multinational undertaking this type of FDI is cost minimization. This effectively means that the wage level in the host country is relatively low. Low wage level countries are usually found in developing and less developed countries possessing labor surpluses (especially of unskilled labor) that could be absorbed in sectors mainly using low technology or labor- intensive production methods such as footwear and clothes. Besides exploiting the low labor cost, this type of FDI also seeks the harvesting of the advantages from the economies of scale though the minimization of production costs.

D) Strategic asset seeking FDI:

In this type of FDI the objective of the multinational firm is to find, acquire and benefit from a variety of competitive advantages another firm possesses in the host country such as capital equipment, technology, managerial expertise

etc This means that the multinational is not aiming at cost minimization or capturing a new market. What the multinational is aiming at is the acquisition of a competitive advantage through the acquisition of a foreign firm or the elimination of potential competition.

The classification of FDI on the basis of the organization of their activities was firstly presented by Caves (1971, p. 23). According to that FDI could be divided into three categories:

A) Horizontal FDI: In this case the foreign investor aims at the horizontal growth of the multinational through the increase of the level of output of the same (or similar) product produced and sold in the FDI host country. In particular, through horizontal FDI a multinational aims at fully exploiting the monopoly or oligopoly advantages especially when it faces anti-monopolistic regulations in the home market.

B) Vertical FDI: This type of investment includes the production in a foreign country of products in one or more of the initial stages (towards the provision of the raw materials) in the production process. (Backward Vertical FDI) or in one or more of the final stages (towards the consumer) (Forward Vertical FDI) (Dunning, 1970). Such an investment is justified mainly on the grounds of exploiting cheaper and better quality raw materials as well as the minimisation of the international production cost for the firm.

C) Conglomeration FDI: This is essentially a combination of the aforementioned two types of FDI. In other words, the investment in heterogenous activities combine the motives of horizontal and vertical FDI.

3. The Economies of the three countries in the postwar period

3.1 The Greek Economy

The performance of the Greek economy during the period 1950-73 was quite impressive. The high growth rates coupled with relatively low unemployment and inflation, led many authors to go as far as speaking of a “Greek economic miracle”. The occupation of the country (1941-4), devastated the Greek economy and the civil war that followed (1946-9) prevented the reconstruction of the country. Only in the 1950s the country managed to reach the pre-war GDP level. Until the end of the 1950s the Greek governments had managed to stabilize the economy and stimulate economic growth. The economic recovery of the country was facilitated by the inflow of foreign funds through the “Marshall” plan. By the time the “Marshall” plan financing ceased

in 1953, the Greek government responded by devaluing the drachma in order to enhance the competitiveness of the economy and by providing motives in order to attract foreign investment.

After a short period of recession (1959-62) the Greek economy recovered impressively. The availability of capital through the inflow of foreign funds bridged the savings-investment gap of the country and accelerated economic growth. At the same time the European course of Greece marked by the signing of the association agreement with the E.C. led to the gradual opening of the (heavily protected until that point) Greek economy. Economic growth in the period 1962-73 was impressive with smaller value of 5,3% and a peak exceeding 10%. Among the OECD countries only Japan and Spain enjoyed a similar pattern during the 1960s (Nikas, 2006, pp. 109-13). Given the low starting point of the economy in the early 1950s, speaking of an “economic miracle” was by no means an exaggeration.

The imposition of the dictatorship (1967-74) led to the “freezing” of the trade association agreement. The high growth rates, however continued until the outbreak of the economic crisis in 1974. During the period 1975-80 the Greek governments were pursuing two goals, to stabilize the economy and to pull it out of the recession and to achieve the accession of the country to the E.C. The global economic crisis which was generalized after the second oil shock in 1979 and the consequent high inflation rates proved to be a major obstacle regarding the first goal.

The second one however was actually accomplished. The accession Treaty was signed in 1979 and two years later the Greece became the 10th E.C. member-state. The tariff disarmament of the country was completed in the late 1980s six years later, when the transition period expired.

3.2 The Spanish economy

The civil war of 1936-1939 and the dictatorial regime which was imposed by Franco the winner of that war, and lasted until his death in 1975, effectively isolated Spain from the developments in W. Europe in the postwar period. The adoption of the “Stabilization Plan” in 1959 is a turning point in the history of the Spanish economy. The 15 year period until the outbreak of the global economic crisis in 1974 is a period of unprecedented economic growth. The “Spanish Economic Miracle” coincides with the Greek one to be interrupted by the recession following the first oil shock. The “Stabilization Plan” submitted by the Spanish government to the IMF and the OECD identified two main goals: Internally, financial stability through the adoption of measures aiming at

controlling aggregate demand and inflation. Externally, to liberalize trade and increase the inflow of foreign capital (Harrison, 1993, p.18).

Although various authors consider these measures too extreme and strict, they led to the fast growth of the Spanish economy. In the 1960-73 period the Spanish GDP in constant prices was growing at an average annual rate of 7.2%, against a 5% OECD average. The rapid growth was facilitated by the availability of a large pool of underemployed labor force. The industrialization of the country was also facilitated by the cheap (until the end of 1973 at least) imported oil. The expansion of manufacturing was mainly based on sectors like metallurgy, the cement industry and ship-building (Harrison, 1985 pp 144-163 and 182-183 and Lieberman, 1982).

By 1971 economic growth in Spain showed the first signs of deceleration followed by increasing inflation and trade deficits. Things got much worse after the outbreak of the two oil shocks in the mid and late 1970s. At the same period, Spain had to face the process of transition to democracy following the period of instability and uncertainty that followed Franco's death. The lack of a strategic plan in order to combat the crisis was obvious.

Spain started to show signs of recovery in the early 1980s. Although the unemployed exceeded two million in that period, the labor cost was quite high. The restructuring of the economy included the support of the financial institution, the control of inflation and public expenditure and the restructuring of industrial production. By the late 1980s the Spanish economy was growing at rates exceeding 5% per year, keeping inflation below 7%. The trade deficit problem was deteriorating though (Harrison, 1993, p. 222).

On January the 1st 1986 Spain joined the E.C. The pre-accession process was long and difficult. Franco's death eliminated the political obstacle but the economic ones remained. Sectors like agriculture fishing and steel were associated with problems that had to be addressed during the negotiations. Furthermore Spain had to abolish all tariff and non-tariff barriers on goods produced by other E.C. member-states. The though accession also implied substantial benefits. Spanish products got access to a market fourteen times bigger than the domestic one and all obstacles to foreign investors had to be removed. This enabled Spain to become quite attractive for foreign capital.

3.3. The Portuguese Economy

For a period of 48 years (1926-74) Portugal was under dictatorial rule. Until the end of the Second World War Portugal was isolated, both politically and economically. The conservative priorities of the dictators (Gaetano and

Salazar) led them to impose severe restrictions on domestic and foreign investment and consequently to obstruct the development process (Vinhas de Souza, 1995). The adoption of the import substitution strategy also contributed to that end. According to that strategy, Portugal should not depend on imports in order to cover its needs. Instead, the goods should be produced domestically.

The 1960 decisions to co-found EFTA (European Free Trade Association) and to join the OECD determined the course of the Portuguese economy. In spite of the rule of the dictatorial regime, the protected market started to open to the import of industrial (mainly) products. The industrial development of Portugal started in that period. The economic policies employed in the years to follow led to a further opening of the economy. The restrictions on domestic investment were removed and all the industrial sectors gradually opened to the inflow of foreign capital. The country was growing at increasing rates and the per capita GDP increased from 1/3 to 1/2 of that of the developed European nations (Donges, 1982, pp. 332-5).

The 1974-80 period was quite difficult for the Portuguese economy. On April 1974 the military *coup d'etat* which came to be known as the “Revolution of the Roses” restored democracy to the country. The political turbulence and the revolutionary climate came as a result of the combination of the oil crisis and the global recession that followed and led Portugal to a period of economic and social uncertainty. The nationalization of various organizations and the return to a restrictive legislative framework on FDI in addition to the exhaustion of the country because of the colonial wars of the previous decade caused a further deceleration of economic development.

However the re-engineering of the economy in the beginning of 1980 with new policies, allowed the gradual opening of the economy. By 1986 the Portuguese economy had been stabilized and the country joined the E.C. The E.C. accession was of crucial importance for Portugal since it accelerated economic development and many economic changes.

4. The FDI flows in the three countries

4.1. FDI in Greece

The attraction of foreign capital was considered to be the top priority for the Greek policy makers in the early 1950s. To this end the provision of the proper regulatory framework was considered essential. Legislative Act 2687 of 1953 set the bases of this framework by providing for the right to repatriate profits

and protection/ compensation in the event of nationalization (OECD, 1994). One should keep in mind however that this framework was restructured many times in the period between the early 1960s and late 1980s, though the adoption of various laws and amendments. What these changes had in common was the direction towards a more foreign investment friendly environment in order to attract FDI (Nikas, 1988, pp. 3-5). Besides the national legislative framework, Greece signed a number of agreements and treaties referring to FDI when joining international organizations such as the United Nations (1945) the OECD (1961) and the European Community (1981).

Table 1 summarizes the Evolution of the FDI flows to Greece during the period 1954-85. The large annual fluctuations in the growth rates of the flows could be explained on the basis of the relatively small size of the country. A single project could raise the growth rate by as much as 389.32% in one year while the absence of a follow-up could reduce it by 52.79%. The division of the period 1954-85 into five sub-periods with distinct characteristics will enable us to analyze the developments more thoroughly.

- 1954-59: The early years, stabilization and restructuring: During the mid to late 1950s the inflow of FDI was quite limited. The FDI flows displayed impressive ups followed by equally impressive downs. FDI flows as percentages of GDP and Gross Fixed Capital Formation were as low as 0.095 and 0.9 respectively on average. The intensive protection of domestic production from foreign competition kept FDI flows at low levels. Most of the projects materialized during that period were referring to export-oriented projects. The basic sectors these projects referred to were Chemicals-plastics and metallurgy.
- 1960-66: Impressive growth before the dictatorship: Although the size of the FDI flows increased impressively (at a 66.7% average growth rate), they represent a smaller percentage of gross fixed capital formation compared to the previous sub-period because of the overall investment boom and growth of the economy. The main sectors attracting FDI were the manufacturing ones and mainly intermediate products and consumer goods (Petrochilos, 1989, pp. 67-88).
- 1967-74: The dictatorship: Although the colonels tried to attract FDI by providing more incentives, the signs of the forthcoming crisis led to sizeable ups and downs of FDI. Although FDI as a percentage of GDP increased during those years, it stagnated as a percentage of gross fixed capital formation. Chemicals, metallurgy and oil products got the lion's share (Nikas, 2006, pp. 110-3).

Table 1: Greece Time Series data (Current Prices)

Year	FDI in mil \$	FDI rate of growth (%)	FDI as a % of GDP		FDI as a % of Gross Fixed Capital Formation
1954	2,235	-	0.07	1954-59 average 0.095	0.6
1955	1,296	-42.01	0.04		0.3
1956	2,458	89.66	0.06		0.6
1957	3,932	59.96	0.10		0.8
1958	8,184	108.14	0.20		1.4
1959	4,401	-46.22	0.10		0.8
1960	5,976	134.78	0.14	1960-66 average 0.514	0.9
1961	7,345	22.91	0.15		0.7
1962	12,853	74.99	0.26		1.1
1963	30,699	138.85	0.58		2.5
1964	32,732	6.66	0.57		2.3
1965	72,211	120.61	1.16		4.4
1966	48,438	-31.92	0.74		2.8
1967	62,804	29.66	0.91	1967-74 average 0.788	3.8
1968	29,647	-52.79	0.41		0.1
1969	20,746	-30.02	0.26		0.8
1970	40,186	93.70	0.46		1.7
1971	43,816	9.03	0.47		1.6
1972	27,284	-37.73	0.26		0.9
1973	133,508	389.32	1.18		3.9
1974	254,382	90.54	2.36		10.2
1975	151,729	-40.35	1.44	1975-80 average 2.631	6.6
1976	175,000	15.33	1.76		7.9
1977	233,000	33.15	2.33		10.0
1978	283,000	21.46	2.66		11.5
1979	329,000	16.25	2.97		12.2
1980	444,000	34.95	4.63		20.7
1981	317,000	-28.60	4.47	1981-85 average 4.62	21.6
1982	208,000	-34.38	3.49		17.2
1983	180,000	-13.46	3.69		15.0
1984	146,000	-18.88	3.82		20.5
1985	243,000	66.43	7.64		40.0
Average	111,089		1.54		6.12

Sources: a. Nikas, 1988. b. Author's calculations

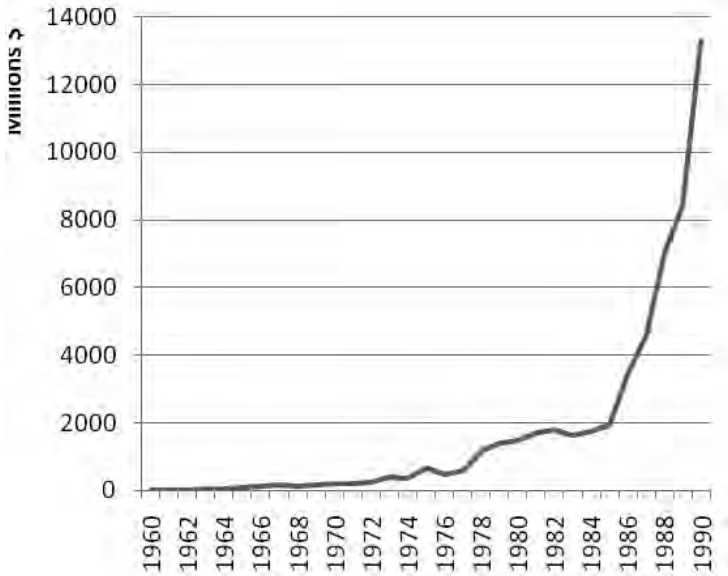
- 1975-80: Democracy restoration and European orbit in period of economic crisis: The restoration of democracy seems to have had a positive impact on FDI. The 1975 new constitution included the protection of foreign capital in its non-revisable provisions. FDI flows increased steadily during the period 1976-1980 and reached 2.63 and 11.48 as percentages of GDP and Gross Fixed Capital Formation respectively on average. The main sectors to benefit were (again) chemicals, metals and oil as well as food and beverages (Petrochilos, 1989, pp. 67-72).
- 1981-85: E.C. Accession: During the early 1980s the hostile attitude of the Greek government towards FDI caused a deceleration of the flows. By the mid 1980s though FDI started to increase again due to the E.C., membership factor, the pressure for deregulation and modernization of the economy and the banking system in particular. What appears as a doubling of FDI flows as percentages of GDP and Gross Fixed Capital Formation though, is mainly due to the fall in GDP since FDI during that period has been falling at a 28.9% average annual rate.

4.2. FDI in Spain

The period to be examined (1960-90) will be divided into three sub-periods on the basis of the performance of the Spanish economy and the progress towards accession to the E.C:

- 1960-73: The restructuring of the legislative framework and the growth of FDI. The “kick off” for the expansion of FDI flows to Spain was provided by the regulatory framework for the restructuring of the Spanish economy known as the “Stabilization Plan”. Generally speaking, this framework provided “generous” incentives and warranties in order to attract foreign capital (Maria del Mar Cebrian Villar, 2004). The memorandum of this plan was put to effect by the Legislative Act of July the 27th 1959 and its amendments. According to the provisions of this Act the foreign capital entering Spain could be freely invested in any enterprise, provided that it represented less than 50% of the firm’s value of assets. In case it exceeded 50%, a permission by the council of ministers was needed (Donges, 1982, p. 115). Also for the first time, the repatriation of dividends, capital and assets created by generated by foreign investments was allowed.

On the other hand, foreign investors were restricted from investing in sectors related to national defense, public utilities, telecommunications mining and banks. Further de-regulation took place through the Legislative Act of

Graph 1: Net Inflows of FDI in Spain 1960-1990

Sources: a) Munoz and Roldan y Serrano (1978), b) OECD Database (<http://stats.oecd.org/Index.aspx>) downloaded 7/1/2013.

April the 18th 1963, which allowed foreign investors up to 100% ownership of firms in Spain in certain sectors without any permission required by the Spanish authorities. Regarding the bulk of FDI flows in that period, they could be considered quite low by the standards of other OECD member-states.

- 1974-85: Recession and preparation for E.C. membership. The so called “Spanish economic miracle” of the period 1960-73 eventually came to an end. Growth rates started to decelerate after the first oil shock in 1973 due to the embargo imposed by the oil exporting countries. The crisis brought the world (and the Spanish in particular) economy to a period of recession accompanied by high inflation rates. The first law specifically referring to FDI was the 3021/74 Regulatory Act on foreign investment. During the period 1974-80, FDI flows to Spain increased modestly due to the global economic crisis. Spain continued to be an attractive destination for foreign capital as in the previous period. However the combination of the global economic crisis and the political instability of the country until the late

1980s, prevented the taking off of FDI inflows. In particular, following the death of Franco in 1975, Spain entered a period of redefining its democratic character. The period 1975-80 was marked by political volatility due to the inability of the Spanish governments to provide an environment of political and economic stability (Tsoukalis, 1981, p. 77). As a result, domestic inflation rates increased and the consequent increase in wages (contrary to the previous period) discouraged foreign investors. However, things gradually started to change after 1980. In an effort to control inflation and wages the Spanish government adopted a number of stabilization measures. This policy, combined with the progress of the E.C. accession process led to an improvement of the performance of the Spanish economy and an increase of the FDI flows to the country. During that period FDI represented 0.7% of the GDP and 3.14% of Spain's gross fixed capital formation against 0.4% and 1.9% respectively in the 1960-73 period (see table 2).

- 1986-90: Accession to the E.C. and expansion of FDI. During these five years most of the FDI Spain attracted in the postwar period took place. The combination of a series of factors such as the E.C. membership, the relatively low labor cost, the tax incentives, the political stability and the overvalued Spanish currency led to an impressive increase of FDI flows to Spain. Following the accession to the E.C. the Royal Act 2077/1986, led to the "Law of Foreign Investment" which redefined the basic principles of the regulatory framework on FDI (Bajo-Rubio and Pueyo 2002).

According to that Law an investment is considered as FDI if the foreign ownership share exceeds 20%. The investments of foreign citizens in Spain are considered as FDI only when they are financed by foreign capital. Three types of investment are identified, namely Foreign Direct Investment, Portfolio Investment and Investment in Property. Finally the end of the transition period led Spain to adopt the E.C. Directive 1988/361 on foreign investment.

These reforms made Spain even more attractive to foreign investors. Bureaucratic obstacles were limited drastically and a number of regulatory restrictions were removed. The breaking up of state monopolies and the extensive privatization program operated as further incentives to foreign investors since they provided tempting investment opportunities. By 1987 Spain ranked 4th among the 12 E.C. member-states as far the attraction of FDI was concerned (Corkill and Harrison, 2004). During that period FDI reached 1.5% of the GDP and 7.6% of Spain's gross fixed capital formation. Both graphs were twice the size of the corresponding ones for 1974-85 (table 2).

Table 2: Spain Time Series data (Current Prices)

Year	FDI in mil \$	FDI rate of growth (%)	FDI as a % of GDP	FDI as a % of Gross Fixed Capital Formation
1960	36,09	-	0.29	-
1961	20,79	-42.38	0.15	-
1962	22,96	10.42	0.14	-
1963	41,3	79.87	0.21	-
1964	78,13	89.17	0.36	-
1965	115,94	48.39	0.46	-
1966	128,61	10.92	0.44	-
1967	174,86	35.96	0.55	-
1968	143.27	-18.06	0.45	-
1969	187.18	30.64	0.51	-
1970	222	18.6	0.55	2.11
1971	202	-9	0.44	1.84
1972	268	32.67	0.46	1.84
1973	390	45.52	0.51	1.9
1974	358	-8.2	0.37	1.33
1975	682,64	90.68	0.61	2.28
1976	477,62	-30.03	0.41	1.64
1977	607,68	27.23	0.47	1.94
1978	1178,16	93.87	0.75	3.28
1979	1396,81	18.55	0.67	3.06
1980	1492,7	6.86	0.66	2.95
1981	1706,77	14.34	0.86	3.89
1982	1782,69	4.44	0.93	4.25
1983	1622,39	-8.99	0.97	4.56
1984	1771,83	9.21	1.06	5.39
1985	1967,8	11.06	1.12	5.55

1960-73
average=
0.3941974-85
average
0.705

3.14

Year	FDI in mil \$	FDI rate of growth (%)	FDI as a % of GDP		FDI as a % of Gross Fixed Capital Formation	
1986	3450,6	75.35	1.41	1986-90 average 1.593	6.82	7.60
1987	4570,7	32.461	1.47		6.73	
1988	7020,57	53.599	1.92		8.1	
1989	8428,38	20.052	2.09		8.34	
1990	13294,25	57.732	2.55		10.08	

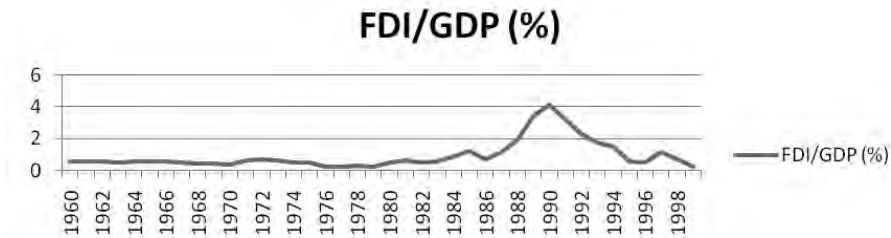
Sources:

a. Munoz et al. (1978). b. OECD Database (<http://stats.oecd.org/Index.aspx>) downloaded 7/1/2013. c. Author’s calculations.

4.3. FDI in Portugal 1945-2000

FDI flows have played a key role in the development of the Portuguese economy. They boosted economic growth and capital formation. They functioned as a tool of modernization of manufacturing and services and improved the international competitiveness of the economy. Finally they deepened its links with other European and non-European countries (Julio Alves and Tavares 2011). For comparability with the other two countries the period will be divided into sub-periods.

- 1945-59: The early postwar years. After World War II and until the late 1950s the political and economic isolation of the country led to relatively small FDI flows. The dictatorial regime of Salazar and its restrictive policies left little room for foreign investment. The same applies to FDI from Portugal to other countries.
- 1960-73: Market Liberalization and FDI growth. 1960 was the turning point for FDI in Portugal. EFTA and OECD participation marked the end of economic isolation and forced Portugal to open up in economic terms and comply with international rules on a wider economic and trade cooperation with other countries. The market liberalization led to an increase of FDI flows at an annual growth rate of 12% during the period 1960-1973. By 1973 FDI flows had reached 100 million US \$ starting from a 20 million level in the early 1960s. It is also remarkable that during the 1960s FDI flows were twenty times higher than in the 1950s. As one can see in table 3 FDI represented 0.5% of the GDP and 2.09% of Portugal’s gross fixed capital formation.

Graph 2: FDI flows in Portugal as a % of GDP 1960-2000

Source: OECD Database (<http://stats.oecd.org/Index.aspx>) downloaded 7/1/2013

- 1974-80: Socio-economic unrest and FDI decline. The events of that period had a negative impact on FDI flows. The FDI projects of the previous periods however were not influenced. The social unrest due to the “revolution of the roses” and the fall of the dictatorial regime, the nationalization of key organizations, the independence of the colonies in Africa and all the political, economic and social changes that took place, reduced the confidence of the foreign investors (Castro 2004). FDI inflows in that period fell dramatically. In 1977 they accounted for 58 million \$ US. Representing only 0.4% of the GDP and 1.4 of gross fixed capital formation (table 3)
- 1981-93: FDI inflows prior and after E.C. accession. During that period the Portuguese governments managed to gradually reverse the situation by establishing a legislative framework that would attract FDIs. Since the beginning of 1980 and until the accession to the E.C, in 1986 FDI flows grew at impressive rates reaching three billion US \$ in 1990. During that period FDI represented 1.6% of the GDP and 18,1% of the gross fixed capital formation of the country. (see table 3). These high FDI flows could also be attributed to the massive privatization program launched in 1988 that allowed foreign investors to participate and the various motives of the E.C. for new investments in sectors such as manufacturing, tourism and agriculture (Donges, 1982, pp. 114-8).
- 1994-2000: FDI until the millennium. The period of fast growth and huge FDI flows was followed by a relative deceleration of FDIs since the mid 1990s. This fall could be attributed to the completion of the privatization program. Also the fall of the Communist system meant that new investment opportunities would arise in the emerging markets of Eastern Europe (Castro, 2004).

Table 3: Portugal Time Series data (Current Prices)

Year	FDI in mil \$	FDI rate of growth (%)	FDI as a % of GDP	FDI as a % of Gross Fixed Capital Formation		
1960	18	-	0.56	1960-73 average 0.543	-	2.09
1961	20	0.11	0.58		-	
1962	20	0	0.54		-	
1963	21	0.05	0.53		-	
1964	23	0.09	0.54		-	
1965	26	0.13	0.55		-	
1966	30	0.15	0.58		-	
1967	29	-0.03	0.5		-	
1968	30	0.03	0.47		-	
1969	30	0	0.43		-	
1970	29	-0.03	0.37		1.47	
1971	56	0.93	0.63		2.34	
1972	73	0.3	0.67		2.29	
1973	96	0.31	0.66	2.26		
1974	106	0.1	0.63	1974-80 average 0.422	2.22	1.424
1975	115	0.08	0.62		2.19	
1976	63	-0.45	0.32		1.18	
1977	58	-0.07	0.28		0.97	
1978	66	0.13	0.29		0.96	
1979	78	0.18	0.3		1.05	
1980	165	1.11	0.52		1.67	

Year	FDI in mil \$	FDI rate of growth (%)	FDI as a % of GDP	FDI as a % of Gross Fixed Capital Formation	
1981	183	0.1	0.59	1981-93 average 1.630	1.77
1982	156	-0.14	0.53		1.57
1983	155	-0.0064	0.59		1.86
1984	220	0.41	0.9		3.53
1985	294	0.33	1.13		4.75
1986	273	-0.07	0.73		3.04
1987	516	0.89	1.11		4.18
1988	992	0.92	1.84		6.45
1989	1808	0.82	3.12		11.25
1990	2902	0.6	3.85		14.1
1991	2548	-0.12	2.98		11.48
1992	2218	-0.12	2.15		8.72
1993	1534	-0.3	1.68		7.28
1994	1270	-0.17	1.33	1994-5 average 0.965	5.74
1995	685	-0.46	0.6		2.548

Sources:

a. OECD Database (<http://stats.oecd.org/Index.aspx>) downloaded 7/1/2013

b. Author's calculations

5. The determinants of FDI in Greece, Spain and Portugal: A literature review

In this section we will review the previous empirical investigations on the determinants of FDI in the three Mediterranean countries. In particular:

5.1. Greece

The empirical study of the factors determining FDIs to Greece has been the subject of research by a plethora of Greek as well as foreign scholars. Petrochilos (1989, pp. 78-90) concludes that FDI flows to Greece have been

determined by the market size (measured by GDP), the tariff protection, the discount rate and political stability. Apergis and Katrakilidis (1998, pp. 729-44), pointed out that the uncertainty regarding inflation has been a major obstacle to FDI inflows to the country. Narula and Porteli (2004), have established the importance of the institutional framework, the infrastructures and human capital as motives for the attraction of foreign capital.

Psycharis and Kokkinou (2004, pp. 283-316) examining the regional incentives and the regional attractiveness in Greece have shown that an increase of regional GDP is accompanied by an increase of the FDI inflows to that region. Their findings are supported by those of Leitao (2010, pp. 17-26). Following that, Bitzenis et al (2007, pp. 11-42), investigating why multinational choose to invest in Greece, identify the market size as well as the pursue of efficiency and resource exploitation as their main motives. Finally Pantelidis and Nikolopoulos (2008, pp. 90-100), investigating the FDI flows to Greece for the period 1976-2004, concluded that the main motives for foreign investors where the market size, the technological capacity, the human capital and the labor cost. On the other hand the main disincentives where insufficient infrastructure, taxation and macroeconomic instability.

5.2. Spain

Regarding the econometric investigations Bajo (1991, pp. 73-94), Bajo and Sosvilla (1994, pp. 104-20) and Bajo and Torres (1992, pp. 232-61), end up with the same, more or less, conclusions. The basic determinants of FDI in Spain have been the market size (real or per capita GDP), inflation (as an indication of economic stability) and finally the so called "Integration Effect" referring to the accession of the country to the E.C. Furthermore Diaz de Sarralde and Martinez (1996, pp. 19-31) conclude that the market size (real GDP), the Integration Effect and the relative exchange rate have determined FDI to Spain. One should note that none of the aforementioned investigations identifies the labor cost as a significant determining factor. The only exception is the study by Bajo and Sosvilla (1994, pp. 104-20). where the cost of labor is a significant determining factor for FDI in the non-manufacturing sectors of the economy.

There are also two studies focusing on the manufacturing sector in Spain and the FDIs this sector has attracted. Egea and Lopez (1991, pp. 105-18), investigating the distribution of FDI to the various manufacturing sectors, conclude that the role and the dynamism of each sector determine the FDI flows they attract. Campa and Guillen (1996, pp. 207-39) concluded that the per

capita GDP of the investing country and the intensity of trade between the two countries involved determine the size of FDI flows. Finally Molero (1995), investigating investments from German and Dutch investors concluded that the Germans were attracted by the size of the Spanish market whereas the Dutch were attracted by the low cost of the factors of production, the fiscal incentives and the legislative framework.

5.3. Portugal

There are many studies on the factors that have determined the inflow of FDI to Portugal. A variety of determinants has been tested including the political and economic stability of the country, the labor cost, the intensity of competition, the size and the rate of growth of the domestic market, the access to the E.C. market, the geographical distance, the differentiation of the market, the cultural similarities and many others (Buckley and Castro, 2001, pp. 1-15). The significance of each one of these variables in the determination of FDI varies from project to project.

Most of the research papers however see Matos, 1973. Saraiva, 1993 pp. 103-24, Simões, 1985, pp. 5-15 and Faustino H. and N. Leitao, 2010, pp 434-61) converge to the conclusion that the size and the growth of the domestic market played a decisive role in the attraction of FDI to Portugal. Also the low labor cost (relatively to other European countries) and the accessibility to the European markets because of the geographic proximity of Portugal to these markets, especially after the accession of Portugal to the E.C. have played an important role to this end.

Portugal therefore seems to combine an abundant and cheap labor force and a promising and expanding domestic market. The combination of these two advantages has probably facilitated the large inflows of foreign capital to Portugal in the postwar period.

6. Empirical analysis and findings

FDI flows have attracted a lot of attention from the point of economic research in recent years. Their trends and patterns as well as their implications for the countries involved have been extensively analyzed both at a theoretical and an empirical level. The use of real data as well as complicated mathematic stochastic models has facilitated the testing of the theoretical hypotheses and the building of the theoretical framework. The factors determining FDI has probably been the most interesting research area on this subject. The main

reason is that determining the decisive factors of a particular FDI flow is the first and crucial step towards designing and implementing a policy aiming at influencing their size and patterns from the receiving country's point of view. The empirical findings seem to converge in general on a group of determining factors including the size of the domestic market (of the receiving country), the cost of the factors of production (especially labor), the exchange rates, the presence and the intensity of tariff as well as non-tariff barriers on trade, social stability political risk etc.

In the present study the econometric – empirical investigation refers to the factors that have determined FDI flows in Greece, Spain and Portugal in a period of 30 years covering the twenty years before and the five years after their E.C. accession (when the transition periods expire). The core of the investigation refers to the testing of the “Market Size Hypothesis” that is the significance of the domestic market size as an explanatory variable for FDI attraction.

6.1. Research methodology

The testing of the applicability of the “Market Size Hypothesis” and the other determining factors of FDI to Greece, Spain and Portugal was carried out for each country individually. In the case of Greece the use of the Ordinary Least Squares-OLS method provided the best results whereas in the case of Spain and Portugal the Cointegration method proved to be the best choice. The use of Cointegration is justified on the basis that this methodology determines the long-run causality relationship between non-stationary time series-variables.

6.2. The data

The empirical investigation was based on time series, annual data. The period of investigation refers to the years after the completion of the reconstruction of these economies (following a war for Spain and Greece) and until the completion (end of the transition period) of the process of accession to the E.C. Because Greece joined the E.C. five years earlier than the two Iberian countries, the sample periods and models are as follows:

- Greece. Sample period 1953-85. Variables tested as explanatory ones for the inflows of FDI in that period: Private domestic consumption expenditure, long-term interest rate, a proxy of the tariff protection of the Greek economy.

- Spain. Sample period 1960-90: Variables tested as explanatory ones for the inflows of FDI in that period: Real GDP and real per unit labor cost.
- Portugal. Sample period 1960-90: Variables tested as explanatory ones for the inflows of FDI in that period: GDP and the labor cost.

6.3. The findings

The findings of the econometric investigation are summarized in table 4.

Table 4: The findings of the econometric investigation

Greece (1954-85)	Econometric Model - Cointegration Analysis - ARDL		
	I.Private Consumption Expenditure	.34,732E-2 (4.637)	R ² = 0.866 F(3,28) = 60.2457
	II. Tariff Protection	.134.9E+10 (6.322)	
	III. Interest Rate	.18080E+8 (-5.296)	
Spain (1960-90)	Econometric Model - Cointegration Analysis - ARDL		
	I. Real G.D.P.	1.5085 (4.2068)	R ² = 0.974 F(4,29)= 281.1878
	II. Real Unit Labor Cost	-7.1330 (-2.2006)	
Portugal (1960-95)	Econometric Model - Cointegration Analysis - ARDL		
	I. G.D.P.	4.5889 (3,1607)	R ² = 0.914 F(4,23)= 61.8040
	II Employee. Compensation	-3.4886 (-2.2440)	

7. An interpretation of the findings and final conclusions

The findings of the econometric investigation confirm the applicability of the “Market Size Hypothesis” as far as the attraction of FDI in the three countries we have examined is concerned. In other words, the continuous and rapid expansion of the domestic markets of the three Mediterranean economies in the period examined, operated as a first class motive for the attraction of FDI.

For Greece in particular, the econometric investigation revealed that the main determining factor for FDI was the expansion domestic market (manifested by the growing consumption expenditure). Another important determining factor was trade protection until the accession to the E.C. This high

protectionism prevented the capturing of the Greek market by means of exports and left FDI as the only alternative strategy. The cost of money, represented by the long-term interest rates in Greece was found to be significant as a determining factor for FDI. Finally it is worth noting that although the labor cost in Greece in the period examined was quite low by W. European standards, it was not found to be a significant determining factor for FDI (contrary to the cases of Spain and Portugal).

Regarding Spain, the domestic market size combined with the dynamism of the Spanish economy during the period 1960-90, proved to be a decisive motive for foreign investors. On the other hand the econometric investigation revealed a long-term causal relationship between the labor cost and the FDI inflows. For most of the 1960-90 period, the labor cost in Spain was relatively low by W. European standards. In fact, until 1975, wages were kept low. Between 1975 and the early 1980s real wages did increase. The attempts to maintain low wages during the 1980s eventually paid off and the explosion in FDI flows after 1986 is, to a very large extent, attributed to that. We should also keep in mind that most of the FDI projects referred to manufacturing where the labor cost was substantially lower compared to the other E.C. countries. Regarding the short-run effects on FDI flows, GDP was found to determine them significantly and positively.

Finally, in the case of Portugal, it appears that the foreign investors in the postwar period were motivated both by the size of the domestic market (market-seeking) as well as the relatively low labor cost (efficiency-seeking).

The econometric investigation revealed that the domestic market factor is more important than the labor cost one. By the late 1980s Portugal was among the main FDI recipients and the fastest growing E.C. member-state. The Portuguese success in attracting FDI was greatly facilitated by the increasingly flexible regulatory framework the enhancement of competition and the implementation of privatization.

Prior to their accession to the E.C., the three Mediterranean countries were representing promising and expanding markets, which were quite protected and therefore not accessible by means of exports. Market seeking FDI was a way to "jump over" their tariff and non-tariff walls. However, efficiency seeking consideration also applied for Spain and Portugal. This can help us explain why FDI in Greece eventually fainted out, while in the case of the two Iberian countries it continued in spite of trade liberalization.

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A SIMULATION MODEL OF ECONOMIC GROWTH AN EMPIRICAL ANALYSIS FOR USA

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Abstract

This study investigates a simulation model of economic growth for United States of America for the period 1970-2012. The purpose of this study is to examine the main determinants of economic growth examining a structural system equation model. Two stage least squares method is used in order to examine the direct and indirect relationships between the dependent variables of the model. Finally, a Monte Carlo simulation method is applied in order to define the sensitivity analysis and predictive ability of the estimated system equation model.

JEL Classification: O11, C22

Keywords: economic growth, system equation model, Monte Carlo simulation

1. Introduction

The recent revival of interest in the relationship between financial development and economic growth examines the insights and techniques of endogenous growth models. Pagano (1993) suggests that financial development affects economic growth in three ways. First, financial development increases the productivity of investments. Second, financial development reduces transaction costs and thus increases the share of savings improving the liquidity of investments. Third, financial development promotes or declines savings.

Many models emphasize that well-functioning financial intermediaries and markets promote economic growth through technological progress and innovation, so increase the demand of financial services and therefore foster efficient resources allocation by facilitating information and transactions costs (Greenwood and Jovanovic, 1990; Bencivenga, Smith, and Starr, 1996). Levine (1997) suggested that financial development leads to economic growth through the two 'channels' of capital accumulation and technological innovation, while King and Levine (1993) regarded innovation as the basic transmission channel.

Endogenous growth theory also predicts that trade liberalization promotes

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economic growth facilitating the transactions of goods and services, the efficiency of investments and causing positive externalities for firms (Rivera-Batiz and Romer, 1991).

It is well known that well functioning stock markets facilitate investments and exports growth taking into account low inflation rates and a healthy banking system. The volatility of general stock market index defines the level of economic growth, the degree of trade openness and the financial depth in a developed country such as USA

The main issue is not only concentrated on analysing some theoretical determinants of economic growth, but also is referred to the statistical analysis of a system equation model based on basic econometric methodology. Surely, this paper examines a very powerful economy which is characterized by higher rates of economic growth facilitating the investment and exports growth. USA's economy is regarded as one of the most rich and widely developed countries worldly. The model hypothesis predicts that stock market development, trade of openness and general government expenditures promote economic growth taking into account the negative effect of inflation rate.

This empirical study has the following objectives:

- To examine the interrelation among economic growth, trade of openness, inflation rate and stock market development.
- To make simulations by estimating a system equation model with Monte Carlo simulations method.
- To examine the predictive ability of the model by calculating the inequalities ratios indices of Theil.

The remainder of the paper proceeds as follows: Section 2 describes the methodology of empirical study, while section 3 analyses the empirical results. Finally, section 4 provides the conclusions of this paper.

2. Data and Methodology

2.1. Data analysis

In this study the method of ordinary least squared method is adopted to estimate the effect of stock market development, general government expenditures and trade of openness on economic growth. Initially, ordinary least squares method is applied in order to find out the interrelation between the examined variables based on economic theory. For this reason basic diagnostic econometric tests are examined for their reliability and validity such

as autocorrelation and specification tests for each equation relatively. Then a system equation model is estimated by using the two-stage least squares method and a Monte Carlo simulation model is applied for sensitivity analysis.

Suppose that each equation can be estimated separately with ordinary least squares method and then a structural system equation model is estimated by using the two-stage least squares method. All variables are transformed to their logarithmic form in order to obtain better statistical estimations

$$\text{LGDP}_t = c_1 + c_2 \text{LSM}_{t-1} + c_3 \text{LG}_{t-1} + c_4 \text{LOP}_{t-1} + u_{1t} \quad (1)$$

$$\text{LSM}_t = c_5 + c_6 \text{LGDP}_{t-2} + c_7 \text{LSM}_{t-1} + u_{2t} \quad (2)$$

$$\text{LG}_t = c_8 + c_9 \text{LGDP}_{t-1} + c_{10} \text{LG}_{t-1} + [\text{ar}(1)=c(11)] + u_{3t} \quad (3)$$

$$\text{LOP}_t = c_{12} + c_{13} \text{LCPI}_{t-1} + c_{14} \text{LGDP}_t + c_{15} \text{LOP}_{t-1} + u_{4t} \quad (4)$$

regarding each variable as a dependent one with other independent variables respectively

where:

GDP = gross domestic product

SM = stock market index

OP = trade of openness

G = general government expenditures

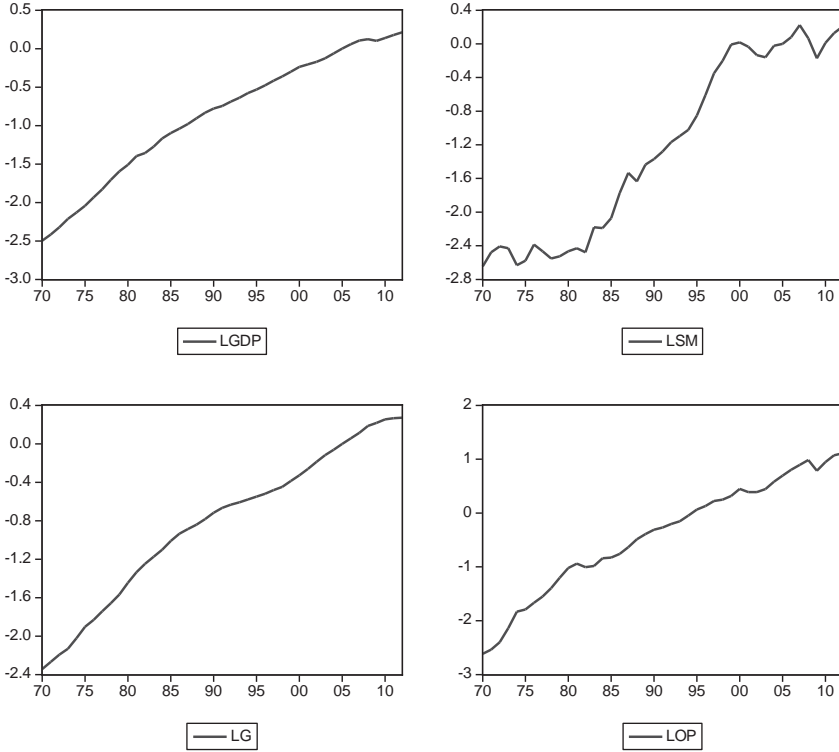
CPI = inflation rate

L = logarithmic symbol

t = time trend

Following the empirical studies of Adamopoulos (2010a), Adamopoulos (2010b), Vazakidis and Adamopoulos (2011a), the variable of economic growth (GDP) is measured by the rate of change of real GDP, the stock market development is expressed by the stock market index, inflation rate is expressed by consumer price index, while trade openness denotes the sum of imports and exports to gross domestic product.

In this empirical study annual data are used for USA and the time period ranges from 1970 to 2012, regarding 2000 as a base year. The statistical data are transformed in logarithmic valued and are obtained from statistical database of International Monetary Fund. (IMF, 2012), The graphs of examined variables are presented as follows (Figure 1).

Figure 1. Graphs of dependent variables

2.2. Methodology

The structural system equation model is consisted by four logarithmic equations. The dependent variables are $(LGDP_t, LSM_t, LG_t, LOP_t)$ and the independent variables are $(LGDP_{t-1}, (LGDP_{t-2}, LOP_{t-1}, LSM_{t-1}, LG_{t-1}, LCPI_{t-1})$. Each equation is examined for statistical significance based on the statistical diagnostic tests such as possible existence of autocorrelation problem, heteroskedasticity test, normality test and specification test. The Eviews 7.1 (2009) software package is used to conduct these tests.

2.2.1. Ordinary least squares method

Initially, ordinary least squares method is applied to estimate a linear regression model. for statistical significance. This method defines that the regression line is fitted to the estimated values by minimizing the sum of squared residuals which indicates the sum of the vertical distances among each point and the relative point on the regression line. The smallest distances the better regression line is fitted. A regression model has a general form as follows:

$$Y_t = a + bX_t$$

Estimating a regression model with ordinary least squares method, mainly we have to find the estimations of constant term (\hat{a}) and the slope of equation model (\hat{b}), namely to solve the following patterns (Katos, 2004)

$$\hat{b} = \frac{n \sum X_t Y_t - \sum X_t \sum Y_t}{n \sum X_t^2 - (\sum X_t)^2} \text{ and } \hat{a} = \bar{Y}_t - \hat{b} \bar{X}_t,$$

where \bar{Y} is average of values of Y (dependent variable) and \bar{X} average of values of X (independent variable).

The final estimated model has the general form as follows (Katos, 2004)

$$\hat{Y}_t = \hat{a} + \hat{b}X_t$$

2.2.2. Diagnostic tests

The estimation of a regression model is mainly based on some basic specification tests (Vazakidis, 2006). If the assumptions of these specification tests are violated then there are problems of statistical significance. In order to examine whether these diagnostics tests are violated we use some statistical tests as Durbin Watson test statistic for autocorrelation, White test statistic for heteroskedasticity, Ramsey Reset test statistic for functional form, Jarque-Bera test statistic for normality test, Engle test statistic for ARCH effect.

Autocorrelation test refers to the way of residuals are distributed randomly and correlated. Autocorrelation test is violated when the residuals are not distributed correctly around the regression line and are not correlated In order to test autocorrelation we use Breusch-Godfrey test which is regarded more reliable than Durbin Watson test statistic.

The null hypothesis defines that there is no autocorrelation in residuals, while the alternative defines that there is autocorrelation in residuals. We reject

null hypothesis when the value of Breusch-Godfrey (BG) test statistic is larger than the value of chi-squared distribution $\chi^2(2)$ (Seddighi et al 2000,)

In order to correct the existence of autocorrelation problem, we can use the first order autoregression model. which has the general form. The autoregressive coefficient defines that each disturbance equals to a portion of a preceding disturbance plus a random effect expressed by v_t namely

$$u_t = \rho u_{t-1} + v_t \quad |\rho| < 1 \text{ where } \rho = \text{autoregressive coefficient}$$

Ramsey reset test statistic is used for specification test of equation model. The null hypothesis defines that there is correct specification in the equation model, while the alternative defines that there is misspecification. We reject null hypothesis when the value of Ramsey Reset test is larger than the value of chi-squared distribution $\chi^2(2)$.

White test statistic is used for heteroskedasticity test. Under heteroskedasticity, the residuals of the estimated model don't have constant variance. The null hypothesis defines that there is homoskedasticity in estimated residuals, while the alternative defines that there is heteroskedasticity. We reject null hypothesis when the value of Ramsey Reset test is larger than the value of chi-squared distribution $\chi^2(2)$ (Katos, 2004)

$$WH = n \cdot R^2 = n \cdot \frac{\sum (\hat{Y}_t - \bar{Y}_t)^2}{\sum (Y_t - \bar{Y}_t)^2}$$

Normality test for residuals is examined by Jarque-Bera test statistic. The null hypothesis defines that the residuals are normally distributed in the equation model, while the alternative defines that the residuals are not normally distributed. We reject null hypothesis when the value of Jarque-Bera test statistic is larger than the value of chi-squared distribution $\chi^2(2)$. Jarque-Bera test statistic examines whether the coefficients for skewness and kurtosis are jointly zero (Seddighi et al 2000, Katos, 2004)

$$JB = n \left[\frac{m_3^2}{6} + \frac{(m_4 - 3)^2}{24} \right] \text{ where } m_3 = \frac{Eu^3}{s^3} \text{ and } m_4 = \frac{Eu^4}{s^4}$$

Finally, the existence of ARCH effect is examined by Engle test statistic. The null hypothesis defines that there is no ARCH effect in the equation model, while the alternative defines that there is ARCH effect. We reject null hypothesis when the value of Engle test statistic is larger than the value of chi-squared distribution $\chi^2(2)$

$$EN = (n-p) * R^2$$

where n is a sample size, p expresses the degrees of freedom and R² is the coefficient of determination (Seddighi et al 2000, Katos, 2004).

2.2.3. Two stage least squares method

Two stage least squares method is used for estimation of structural system equation model. Simulation defines the simultaneous solution of the system equations model., while a Monte Carlo simulation method is used for making predictions in the estimations of system equation model (Katsouli 2003, Katos et al 2004).

2.2.4.1 Sensitivity analysis

Simulation policies are useful to test for *predictive ability* of the estimated model. The main goal of simulation method is to examine whether a possible exogenous shock in one independent variable effects on the other dependent variables. In order to *make simulation policies* we have to estimate the dynamic multipliers of dependent variables of the system equation model. For this reason we estimate the percentage change of experimental values of dependent variables to simulated values as follows:

$$mpl = \frac{x_t^{exp} - x_t^{sim}}{x_t^{sim}} * 100 \text{ or } mpl = \frac{x_t^{exp}}{x_t^{sim}} \text{ (Katos, 2004).}$$

where x^{exp}=experimental values of x and x^{sim}=simulated values of x

Furthermore, the best predictive ability of the system equation model is achieved by estimating the inequalities ratios indices of Theil, specifically bias ratio, variance ratio and covariance ratio as follows:

$$U = \frac{\sqrt{\frac{1}{T} \sum (x_t^{sim} - x_t)^2}}{\sqrt{\frac{1}{T} \sum (x_t^{sim})^2} + \sqrt{\frac{1}{T} \sum (x_t)^2}} \text{ Theil index} \tag{1}$$

$$U^M = \frac{(\bar{x}^{sim} - \bar{x})}{\frac{1}{T} \sum (x_t^{sim} - x_t)^2} \text{ bias ratio} \tag{2}$$

$$U^S = \frac{(S_{x^{sim}} - S_x)^2}{\frac{1}{T} \sum (x_t^{sim} - x_t)^2} \text{ variance ratio} \quad (3)$$

$$U^C = I - (U^M + U^S) \text{ covariance ratio} \quad (4)$$

The smaller dynamic multipliers and inequalities ratios indices the better predictive ability of the system equation model. Bias ratio (U^M) measures the distance between the average of simulated values of time series and the average of actual values of time series. Variance ratio (U^S) measures the distance between the variance of simulated values of time series and the variance of actual values of time series. Covariance ratio (U^C) is a non-systematic prediction failure. The smaller values of inequalities ratios indices the better fitting of simulated values of time series to actual values of time series. Perfect adjustment exists when Theil index equals to zero (Katos, 2004).

3. Empirical Results

The significance of the empirical results is dependent on the variables under estimation. The number of fitted time lags and the usage of first order autoregressive term was selected for the best estimations results and for existence of statistical significance in each equation model. Based on Levine and Zervos (1998) and Shan (2005) studies the model of economic growth is mainly characterized by the direct effect of trade of openness, stock market development and general government expenditures, while there is an indirect effect of inflation rate.

Estimating each equation with ordinary least squares method we can infer that there is statistical significance in coefficients of independent variables based on probabilities and t-student distribution test statistics. Their estimated values have the expected statistical sign based on economic theory. The coefficient of determination in each equation is very high (0,99) and is close to unity, so the model is very well adjusted (Table 1).

The same conclusion is easily confirmed by studying probabilities and F-distribution test statistics. All probabilities values are lower than 5% and t-student and F-student test statistics are greater than critical values obtained by statistical tables of t-student and F-distributions for 5% level of significance. Durbin Watson test statistic indicates that there is a possible problem of autocorrelation, while there is a possible existence of multicollinearity problem due to the highest values of coefficients of determination (Table 1).

Examining the economic interrelation between dependent and independent variables we can infer that stock market development, trade of openness and general government expenditures have a positive effect on economic growth (equation 1), economic growth has a positive effect on stock market development (equation 2), on general government expenditures (equation 3), and on trade of openness (equation 4), while inflation rate has a negative effect on trade of openness (equation 4). The results of ordinary least squared method estimations appear in Table 1.

Table 1: Method: Ordinary Least Squares

Equation 1: Dependent Variable: LGDP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.1059	0.0395	-2.6803	0.0110
LSM(-1)	0.0780	0.0194	4.0023	0.0003
LG(-1)	0.5540	0.0903	6.1345	0.0000
LOP(-3)	0.2470	0.0645	3.8242	0.0005
R-squared	0.9966	Akaike info criterion		-3.3404
Adjusted R-squared	0.9963	Schwarz criterion		-3.1715
F-statistic	3593.0	Durbin-Watson stat		0.6183
Prob(F-statistic)	0.0000			
Equation 2: Dependent Variable: LSM				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.0686	0.0299	2.2903	0.0276
LGDP(-2)	0.1891	0.0744	2.5404	0.0153
LSM(-1)	0.8604	0.0566	15.1966	0.0000
R-squared	0.9871	Akaike info criterion		-1.2814
Adjusted R-squared	0.9864	Schwarz criterion		-1.1561
F-statistic	1455.9	Durbin-Watson stat		1.6642
Prob(F-statistic)	0.0000			

Equation 3: Dependent Variable: LG				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.0421	0.0128	3.2901	0.0022
LGDP(-1)	0.2839	0.1242	2.2855	0.0281
LG(-1)	0.6744	0.1301	5.1823	0.0000
AR(1)	0.7540	0.1618	4.6575	0.0000
R-squared	0.9996	Akaïke info criterion		-5.5308
Adjusted R-squared	0.9995	Schwarz criterion		-5.3637
F-statistic	33119.5	Durbin-Watson stat		2.0958
Prob(F-statistic)	0.0000			
Equation 4: Dependent Variable: LOP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.3152	0.070272	4.486473	0.0001
LCPI(-1)	-0.6273	0.175639	-3.571631	0.0010
LGDP	0.8601	0.178855	4.809157	0.0000
LOP(-1)	0.6357	0.104432	6.087529	0.0000
R-squared	0.996456	Akaïke info criterion		-2.623920
Adjusted R-squared	0.996176	Schwarz criterion		-2.458427
F-statistic	3561.661	Durbin-Watson stat		1.640941
Prob(F-statistic)	0.000000			

The empirical results of ordinary least squared method (based on Table 1) are summarized as follows:

$$LGDP_t = -0.1059 + 0.0780 LSM_{t-1} + 0.5540 LG_{t-1} + 0.2470 LOP_{t-1} + u_{1t} \quad (1)$$

$$LSM_t = 0.0686 + 0.1891 LGDP_{t-2} + 0.8604 LSM_{t-1} + u_{2t} \quad (2)$$

$$LG_t = 0.0421 + 0.2839 LGDP_{t-1} + 0.6744 LG_{t-1} + [ar(1)=0.7540] + u_{3t} \quad (3)$$

$$LOP_t = 0.3152 - 0.6273 LCPI_{t-1} + 0.8601 LGDP_t + 0.6357 LOP_{t-1} + u_{4t} \quad (4)$$

As we can see from the above results an increase of stock market index per

1% causes a relative increase of gross domestic product per 0.07, an increase of general government expenditures per 1% causes a relative increase of gross domestic product per 0.55, an increase of trade of openness per 1% causes a relative increase of domestic product per 0.24 (Equation 1). Also, an increase of gross domestic product per 1% causes a relative increase of stock market index per 0.18 (Equation 2).

Furthermore, an increase of gross domestic product per 1% causes a relative increase of general government expenditures per 0.28 (Equation 3). Finally, an increase of gross domestic product per 1% causes a relative increase of trade of openness per 0.86, while an increase of inflation rate per 1% causes a relative decrease of trade of openness per 0.62 (Equation 4).

Examining each equation for statistical significance based on the statistical diagnostic tests we can conclude that there are statistical problems in auto-correlation, heteroskedasticity and specification tests in first equation model, while there are statistical problems in heteroskedasticity, normality and specification tests in fourth equation model, due to lower probabilities of 5% level of significance. In second and third equations there is statistical significance in all diagnostics tests. Also there is no Arch effect only in first equation model. The results related to diagnostic tests appear in Table 2.

Table 2: Diagnostics tests

Breusch-Godfrey Serial Correlation LM Test:

Equation 1			
F-statistic	18.7935	Prob. F(2,34)	0.0000
Obs*R-squared	21.0021	Prob. Chi-Square(2)	0.0000
Equation 2			
F-statistic	1.0103	Prob. F(2,36)	0.3742
Obs*R-squared	2.1791	Prob. Chi-Square(2)	0.3364
Equation 3			
F-statistic	0.2678	Prob. F(2,35)	0.7666
Obs*R-squared	0.6180	Prob. Chi-Square(2)	0.7341
Equation 4			
F-statistic	0.6087	Prob. F(2,36)	0.5495
Obs*R-squared	1.3739	Prob. Chi-Square(2)	0.5031

Ramsey RESET Test:

Equation 1			
F-statistic	33.54678	Prob. F(1,35)	0.0000
Log likelihood ratio	26.88673	Prob. Chi-Square(1)	0.0000
Equation 2			
F-statistic	2.8685	Prob. F(1,37)	0.0987
Log likelihood ratio	3.0614	Prob. Chi-Square(1)	0.0802
Equation 3			
F-statistic	0.8151	Prob. F(1,36)	0.3726
Log likelihood ratio	0.9180	Prob. Chi-Square(1)	0.3380
Equation 4			
F-statistic	8.3557	Prob. F(1,37)	0.0064
Log likelihood ratio	8.5520	Prob. Chi-Square(1)	0.0035

Heteroskedasticity Test: White

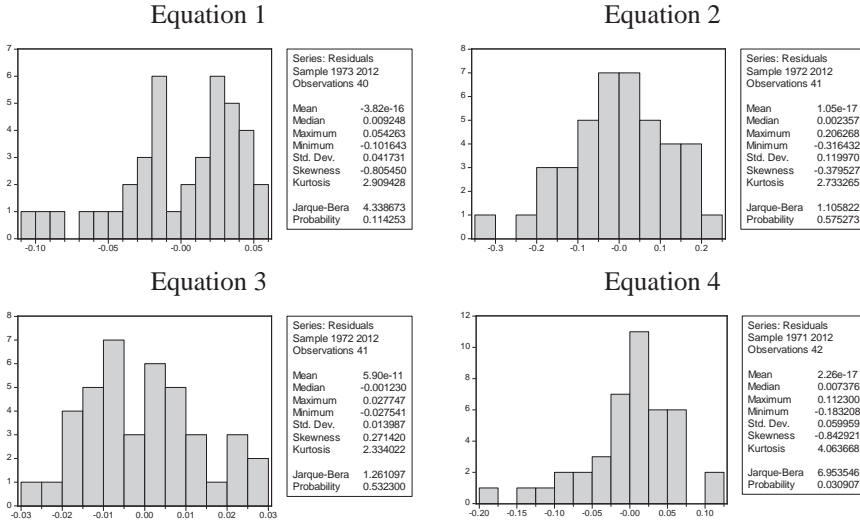
Equation 1			
F-statistic	5.2877	Prob. F(9,30)	0.0002
Obs*R-squared	24.5340	Prob. Chi-Square(9)	0.0035
Equation 2			
F-statistic	0.1793	Prob. F(5,35)	0.9686
Obs*R-squared	1.0242	Prob. Chi-Square(5)	0.9606
Equation 3			
F-statistic	1.5794	Prob. F(9,31)	0.1651
Obs*R-squared	12.8898	Prob. Chi-Square(9)	0.1677
Equation 4			
F-statistic	2.617883	Prob. F(9,32)	0.0216
Obs*R-squared	17.81035	Prob. Chi-Square(9)	0.0374

ARCH Test:

Equation 1			
F-statistic	7.3962	Prob. F(1,37)	0.0099
Obs*R-squared	6.4972	Prob. Chi-Square(1)	0.0108
Equation 2			
F-statistic	1.4140	Prob. F(1,38)	0.2418
Obs*R-squared	1.4350	Prob. Chi-Square(1)	0.2309
Equation 3			
F-statistic	0.7858	Prob. F(1,39)	0.3808
Obs*R-squared	0.8097	Prob. Chi-Square(1)	0.3682
Equation 4			
F-statistic	0.5087	Prob. F(1,39)	0.4799
Obs*R-squared	0.5279	Prob. Chi-Square(1)	0.4675

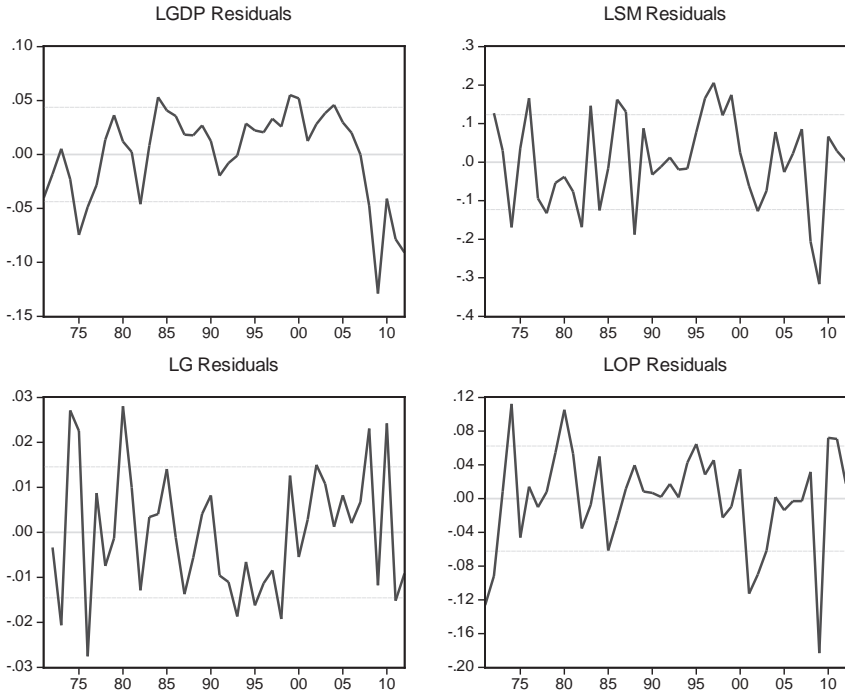
The results related to normality test of residuals by estimating Jarque-Bera statistic test appear in Table 2.

Normality test



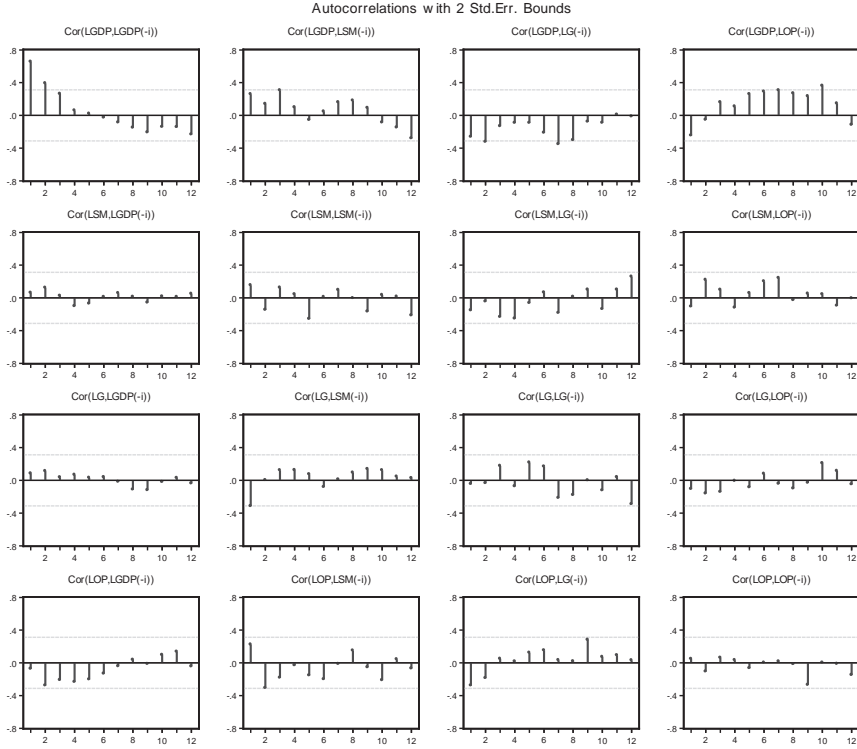
The graph of estimated residuals shows that there are normally distributed estimated residuals (Figure 2).

Figure 2: Graph of estimated residuals



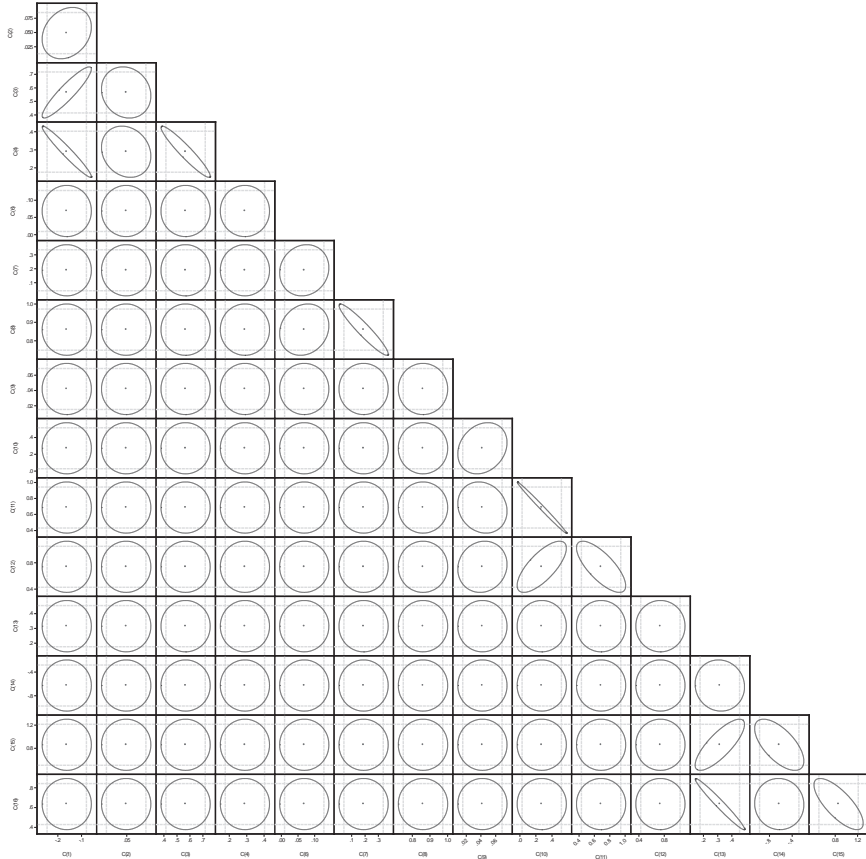
Also the correlogram of residuals indicates that there is a problem in auto-correlation test (Figure 3).

Figure 3: Correlogram of residuals



Finally, the graph of confidence ellipse of coefficients of estimated equations model indicates the existence of statistical significance (Figure 4).

Figure 4: Graph of confidence ellipse of coefficients



Estimating the system equation model with two stage least squared method we can see that there is statistical significance in coefficients of independent variables based on probabilities and t-student distribution test statistics. Their estimated values have the expected statistical sign based on economic theory. All probabilities values are lower than 5% level of significance. Durbin Watson test statistics indicates that there is a possible problem of autocorrelation (Table 3). Table 3 presents the results from two stage least squared method.

Table 3: Estimation Method: Iterative Two-Stage Least Squares

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.1500	0.0436	-3.4382	0.0008
C(2)	0.0547	0.0189	2.8896	0.0044
C(3)	0.5808	0.0777	7.4669	0.0000
C(4)	0.2706	0.0599	4.5185	0.0000
C(5)	0.0686	0.0299	2.2903	0.0234
C(6)	0.1891	0.0744	2.5404	0.0121
C(7)	0.8604	0.0566	15.196	0.0000
C(8)	0.0419	0.0135	3.0923	0.0024
C(9)	0.2724	0.1237	2.2013	0.0293
C(10)	0.6867	0.1295	5.3007	0.0000
C(11)	0.7394	0.1577	4.6886	0.0000
C(12)	0.2874	0.0705	4.0758	0.0001
C(13)	-0.5574	0.1727	-3.2273	0.0015
C(14)	0.7619	0.1834	4.1544	0.0001
C(15)	0.6675	0.1048	6.3688	0.0000
Determinant residual covariance		1.12E-11		

Equation: $LGDP = C(1) + C(2)*LSM(-1) + C(3)*LG(-1) + C(4)*LOP(-1)$			
Instruments: LOP(-1) LGDP(-1) LG(-1) LSM(-1) LCPI(-1) LGDP(-2) C			
Observations: 41			
R-squared	0.9968	Mean dependent var	-0.7980
Adjusted R-squared	0.9966	S.D. dependent var	0.7547
S.E. of regression	0.0437	Sum squared resid	0.0707
Durbin-Watson stat	0.5377		

Equation: $LSM = C(5) + C(6)*LGDP(-2) + C(7)*LSM(-1)$			
Instruments: LOP(-1) LGDP(-1) LG(-1) LSM(-1) LCPI(-1) LGDP(-2) C			
Observations: 41			
R-squared	0.9871	Mean dependent var	-1.1686
Adjusted R-squared	0.9864	S.D. dependent var	1.0570
S.E. of regression	0.1230	Sum squared resid	0.5757
Durbin-Watson stat	1.6642		

Equation: $LG = C(8) + C(9)*LGDP(-1) + C(10)*LG(-1) + [AR(1)=C(11)]$			
Instruments: LOP(-1) LGDP(-1) LG(-1) LSM(-1) LCPI(-1) LGDP(-2) C LG(-2)			
Observations: 41			
R-squared	0.9996	Mean dependent var	-0.7558
Adjusted R-squared	0.9995	S.D. dependent var	0.7249
S.E. of regression	0.0145	Sum squared resid	0.0078
Durbin-Watson stat	2.0793		

Equation: $LOP = C(12) + C(13)*LCPI(-1) + C(14)*LGDP + C(15)*LOP(-1)$			
Instruments: LOP(-1) LGDP(-1) LG(-1) LSM(-1) LCPI(-1) LGDP(-2) C			
Observations: 41			
R-squared	0.9964	Mean dependent var	-0.3005
Adjusted R-squared	0.9961	S.D. dependent var	0.9579
S.E. of regression	0.0596	Sum squared resid	0.1316
Durbin-Watson stat	1.9570		

The empirical results of two-stage least squared method (based on Table 3) are summarized as follows:

$$LGDP_t = -0.1396 + 0.0580 LSM_{t-1} + 0.6644 LG_{t-1} + 0.2169 LOP_{t-1} + u_{1t} \quad (1)$$

$$LSM_t = 0.0686 + 0.1891 LGDP_{t-2} + 0.8604 LSM_{t-1} + u_{2t} \quad (2)$$

$$LG_t = 0.0419 + 0.2724 LGDP_{t-1} + 0.6867 LG_{t-1} + [ar(1)=0.7394] + u_{3t} \quad (3)$$

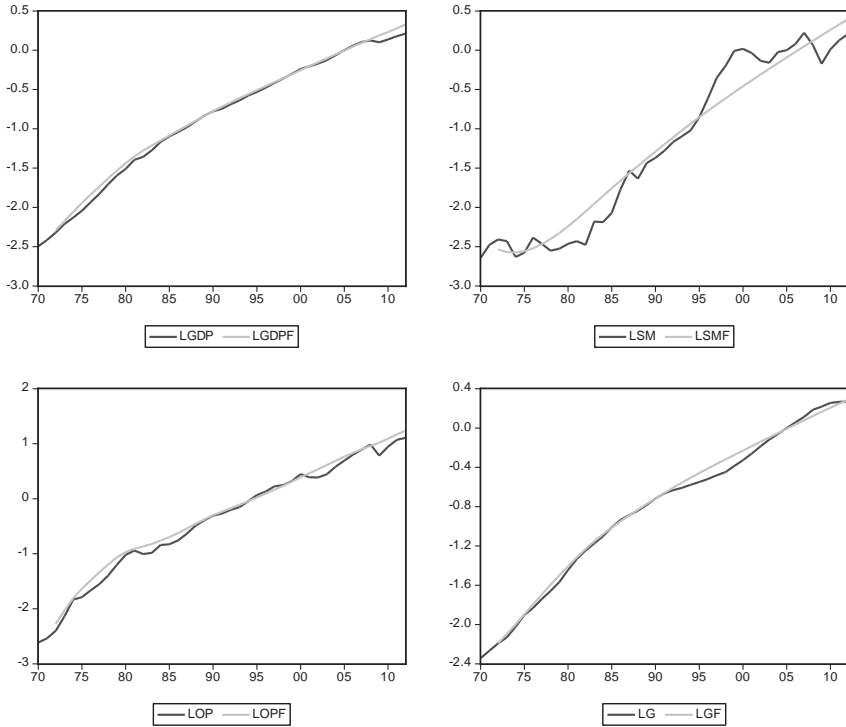
$$LOP_t = 0.2874 - 0.5574 LCPI_{t-1} + 0.7619 LGDP_t + 0.6675 LOP_{t-1} + u_{4t} \quad (4)$$

As we can see from the above results an increase of stock market index per 1% causes a relative increase of gross domestic product per 0.05, an increase of general government expenditures per 1% causes a relative increase of gross domestic product per 0.66, an increase of trade of openness per 1% causes a relative increase of domestic product per 0.21 (Equation 1). Also an increase of gross domestic product per 1% causes a relative increase of stock market index per 0.18 (Equation 2).

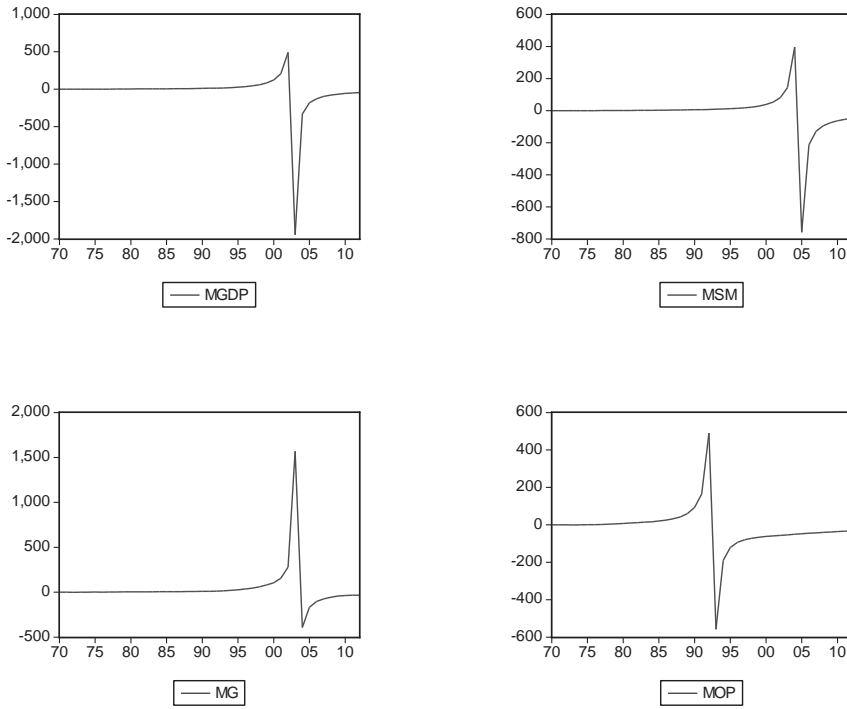
Furthermore, an increase of gross domestic product per 1% causes a relative increase of general government expenditures per 0.27 (Equation 3). Finally, an increase of gross domestic product per 1% causes a relative increase of trade of openness per 0.76, while an increase of inflation rate per 1% causes a relative decrease of trade of openness per 0.55 (Equation 4).

Therefore, estimating the system equation model with Monte Carlo simulation method we can infer that the estimated simulated values are very close to actual one, so the model is very well simulated (Figure 5).

Figure 5: Graph of Monte Carlo simulation model



Examining the changes of a possible increase of inflation rate of 10% in 1971 in estimations of the simulation model, we can infer that there is a rapid increase of dynamic multipliers of economic growth, stock market development and general government expenditures in 2003, but a rapid decrease in 2004, while there is a rapid increase of dynamic multipliers of trade of openness in 1993, but a rapid decrease in 1994 (Figure 6).

Figure 6: Graphs of dynamic multipliers of estimated simulated model

The results of estimated inequalities ratios indices of Theil, suggested that there is a good predictive ability of simulated system equation model (Table 4).

Table 4: Estimations of inequalities ratios indices

	U	U^M	U^S	U^C
$LGDP_t$	0.0528	0.7369	0.1038	0.1592
LSM_t	0.0725	0.1055	0.0099	0.8844
LG_t	0.0443	0.6660	0.1013	0.2325
LOP_t	0.1128	0.7378	0.1224	0.1397

4. Conclusions

This study examines a simulation model of economic growth for United States of America for the period 1970-2012. The purpose of this study is to estimate a simulation model of economic growth examining a structural system equation model. Initially, the results of two-stage least squares method suggested that economic growth is mainly characterized by the direct effect of trade of openness, stock market development and general government expenditures and by indirect effect of inflation rate.

Furthermore, the empirical results of Monte Carlo simulation method indicated that the system equation model is very well simulated, since the simulated values are close to actual values of examined variables. A possible change in general government expenditures in 1971 causes a rapid increase of dynamic multipliers of economic growth, trade of openness and stock market development in 2003 but a rapid decrease in 2004. Finally, the results of estimated inequalities ratios indices of Theil suggested that there is a good predictive ability of simulated system equation model.

Many empirical studies examining the main determinants of economic growth differ relatively to the sample period, the examined countries and the estimation methodology. The empirical results of this paper are agreed with the studies of Vazakidis (2006), Vazakidis and Adamopoulos (2011a). However, more interest should be focused on the comparative analysis of empirical results for many other countries in future research.

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EXPLORING ACCOUNTANTS' PERCEPTIONS ABOUT THE IMPACT OF ERP INFORMATION SYSTEMS ON MANAGEMENT ACCOUNTING AND PRODUCT COSTING PROCESSES

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Abstract

This study aims to explore accountants' perceptions about the impact of ERP Information Systems on management accounting and, more specifically, on product costing processes, in very small and small companies¹. A convenience sample of 32 very small and small Greek companies participated in the questionnaire survey. Most of the companies implement ERP, especially, for product costing only during the last 5 or less years, thus, the experience on ERP use for product costing and its potential benefits can be regarded as relatively limited. Costing is one of the main operations that ERP is used, while Stock – Purchases and Payroll operations are the most important. The most significant benefits from ERP usage are the reduction of the time spent on accounting reports, the faster communication with other company departments and the reduction of the time spent on data analysis. The accounting methods and practices for which ERP was almost a lot important were, inter alia, Cost per production order, Multiple costing scenarios and what-if scenarios, Overheads allocation to responsibility centers.

JEL Classification: M15, M41

Keywords: Enterprise information system, Product costing, Small and very small companies

1. Introduction

Enterprise Resource Planning (ERP) systems seem to have become essential for companies in their effort to integrate the processes of their various business units and of different business departments such as finance, production, sales, human resources, marketing. In fact, the ERP systems have resulted to radical changes to the way businesses operate, as they enable to collect, store, process and disseminate data throughout the business departments and units,

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as well as from and to their supply chain partners (Sánchez-Rodríguez and Spraakman, 2012; Daoud and Triki, 2013; Kanellou and Spathis, 2013; Galani et al 2010). Moreover, recent technological changes have impacted on the relatively wide adoption and implementation of ERP systems from medium sized and even smaller companies. Thus, not surprisingly a significant proportion of small and medium-sized firms benefits from ERP systems in management accounting processes and practices (Sánchez-Rodríguez and Spraakman, 2012; Mantakas and Doukas 2011a; 2011b; 2012; 2013a; 2013b; 2013c; Doukas and Mantakas, 2007).

Although there are several studies regarding the interaction between the ERP systems and accounting processes (Bae and Ashcroft, 2004; Daoud and Triki, 2013; Kanellou and Spathis, 2013; Teittinen et al, 2013), none of them has focused on the product costing methods and practices, except than the study of Mantakas and Doukas (2012). Moreover, most of the studies focused on large or medium sized companies, where the ERP effective implementation is crucial for their survival, while very small and small companies have attracted little attention.

This study aims to fill this gap by exploring accountants' perceptions about the impact of ERP Information Systems on management accounting and, more specifically, on product costing processes, in very small and small companies. In order to approach this issue in a systematic and integrated manner, the Research Questions (RQ) are the following:

- RQ1. How important accountants consider that ERP system is for the various business operations?
- RQ2. What is the impact (benefits) of ERP software on accountant's work?
- RQ3. What is the importance of ERP software for accounting methods and practices, and especially of those of product costing?
- RQ4. Which are the causes that impede the use of ERP software for accounting management?
- RQ5. Which are the ERP software implementation success factors for accounting management?
- RQ6. What is the level of satisfaction with the ERP software implemented in the company in general and, in particular, for product costing processes?

The remainder of this paper is organized as follows. The next section presents a review of previous research in the field, followed by the description of the methodology employed for this study. Next, the study results are reported. Finally, the paper concludes with a discussion of the research findings, some practical implications, the limitations of the particular research and some suggestions for future research.

2. Literature review

During the last decade the number of Greek companies adopting and implementing ERP systems has increased significantly (Galani et al, 2010; Kanellou and Spathis 2013). ERP systems have evolved over the time and they integrate all the functional areas within an organization. Thus, ERP systems have enabled companies to integrate business processes, share data across departments and produce and access information in real-time environment, resulting to considerably improved business performance both in terms of effectiveness and efficiency (Spathis and Constantinides, 2004). Hence, ERP systems are indispensable for all business operations and processes for any company aiming to obtain and retain a competitive advantage. Spathis and Constantinides (2004) found that financial and management accounting modules were used by all the 26 companies included in their sample, while fixed asset registry and costing by 92 and 89%, respectively. Thus, companies' main motive to adopt ERP systems was to integrate their accounting processes.

Several studies have explored the impact, often in terms of benefits, of ERP software on accountant's work (Booth et al, 2000; Sangster et al, 2009; Chen et al, 2012; Hyvönen 2003; Kanellou and Spathis, 2013; Olhager and Selldin 2003; Spathis and Constantinides, 2004; Spathis and Ananiadis, 2005; Spathis, 2006; Rom and Rohde 2006; 2007). Kanellou and Spathis (2013) identified five dimensions of accounting benefits, specifically: IT accounting benefits, operational accounting benefits (time), organizational accounting benefits, managerial accounting benefits and operational accounting benefits (cost). Chen et al (2012) concluded that ERP successful implementation results, among others, to enhancement of data quality, improvement of decision making, and increase of the percentage of reports automatically generated. Moreover, after ERP implementation, the focus of internal control has shifted from accounting operation to the whole business operations.

Mantakas and Doukas (2012) studied the costing models and processes used by small and medium-sized enterprises (SMEs) in enterprise information system (ES) implementations. They found that all (15) companies involved in their survey used the ERP software for Hierarchical cost center modeling, Activity Based Costing, Dynamic activity-to-activity and activity-to-product cost allocation, Moving average, Cost per item, Cost per production order, Dynamical costing period definition, Overhead calculation, WIP calculation, WIP calculation, Automatic inventory valuation update and reporting. However, several or most of the companies did not use preliminary costing and the prerequisite standard costing, fixed/variable cost analysis, net profit

calculation, multiple costing scenarios and related what-if analyses, and production variance calculation which could support cost reduction tactical decisions.

Mantakas and Doukas (2013b) have created a comprehensive list of potential causes that impede the use of ERP software for business operations and processes. The same authors in 2012 concluded that the main deficiencies of SMEs companies implementing ERP software for costing models and processes are primarily the lack of maturity of the companies, particularly the lack of knowledge, in some cases the lack of manpower and the systematic manufacturing data collection, as well as particular business culture of underestimating the potential value of best practices.

Tadinen (2005) investigated the factors that contribute to the successful implementation of ERP software by large- and medium-sized Finnish organizations. It was found that factors such as top management support, effective project management, user involvement, interdepartmental cooperation, project team competence, user training and education, and interdepartmental communication received high and extremely high importance.

3. Methodology

3.1. Method– Questionnaire survey

A questionnaire survey approach was adopted in order to fulfil the aim and objectives of this research. All questions included were close-ended using, where appropriate, a Likert 5 to 7 –scale. The first research question dealt with the importance of the ERP system for the various business operations. Thus, the first question in the questionnaire stated “Please state with X the level you think that the ERP software is necessary for the following business operations in your company” and respondents were asked to select among the 5 alternative answers (1= Not at all, 2=Little, 3=Fairly, 4= A lot, 5=Extremely) (5-scale Likert). The business operations selected derived from the discussions with two accountants, who served as business informers, and the literature review (Spathis and Constantinides, 2004).

The second research question investigated the impact of ERP software on accountant’s work and the relevant question in the questionnaire was “Please state with X the level you agree or disagree regarding the impact of the ERP software on accountant’s work comparing with the traditional way”. This was also a Likert 5-scale close-ended question and the alternative answers included

1= Totally disagree, 2=Rather disagree, 3=Neither disagree nor agree, 4= Rather agree, 5=Totally agree. The various forms of the relevant impact proposed to the respondents came from the discussions with the same two accountants, who served as business informers, and the literature review (Booth et al, 2000; Sangster et al, 2009; Chen et al, 2012; Hyvönen 2003; Kanellou and Spathis, 2013; Olhager and Selldin 2003; Spathis and Constantinides, 2004; Spathis and Ananiadis, 2005; Spathis, 2006; Rom and Rohde 2006; 2007).

The third research question explored the importance of ERP software for accounting methods and practices, and especially of those of product costing. The relevant question was "Please state with X the level you think that the ERP software is necessary for the following accounting methods and practices in your company" and the alternative answers were 0= This accounting method or practice is not used, 1= Not at all, 2=Little, 3=Fairly, 4= A lot, 5=Extremely (6-scale Likert). The accounting methods and practices were concluded by the discussions with the two accountants, who served as business informers, and the literature review (Mantakas and Doukas, 2012; Kallunki et al 2011; Spathis, 2004).

The fourth research question inquired into the causes that impede the use of ERP software for accounting management and the question posed to the participants in the survey was "Please state with X the level you think that following factors impede the use of the ERP software for product costing processes in your company". The available answers consisted of 1= Not at all, 2=Low degree, 3=Moderate degree, 4= High degree, 5=Very High degree. The causes that hindered the ERP software use for product costing were chosen after the discussions with the two accountants, who served as business informers, and the literature review (Mantakas and Doukas, 2013b).

The fifth research question investigated the factors that contribute to the successful implementation of ERP software and the relevant question was "Please state with X the level you think that following factors are important for the successful implementation of the ERP software for product costing processes in your company". The available answers consisted of 1= Not at all, 2=Little, 3=Fairly, 4= A lot, 5=Extremely. The proposed success factors derived from the discussions with the two accountants, who served as business informers, and the literature review (Tadinen, 2005).

For the sixth research question it was asked from the respondents to answer to two questions A) "How satisfied are you with the ERP software used by your company in general?" and B) "How satisfied are you with the ERP software used by your company for product costing?". The alternative answers

included 1= Not at all, 2= Very low degree, 3= Low degree, 4= Moderately, 5= High degree, 6= Very high degree, 7= Extremely.

3.2. Sample

The sample of the study was a convenience sample consisted of 32 very small and small companies and the main respondents' and companies' characteristics are presented in Table 1. The majority (2/3) of the sample consists of men which can be explained by the fact that most of the accountants are men. Almost half of the participants in the survey are between 35 and 44 years old and a ¼ of them 45-54 years old. The sample of the study consists of accountants that use ERP in the companies they work for, and thus it is more probable for the relatively young accountants to use ERP than older ones. Around 90% of the sample has a total working experience more than 5 years and 75% more than 10 years, hence the accountants included in the survey can be assumed to be quite experienced. However, it is noticeable that their experience on implementing ERP systems for Product Costing is considerably much less than their total working experience, as only 15% of them mention to use ERP for Product Costing for more than 10 years and 60% for less than 5 years (37,5% for 1-2 years and 22% for 3-5 years). All accountants of the sample have graduated from a College or University and yet 15% of them hold a MSc or PhD degree. It should be mentioned that in Greece it is still possible for somebody to become an accountant without a University or College degree, but with limited professional rights. As expected the convenience sample emanates mainly from the manufacture (almost half of it) and the commerce (around 30%) sectors, as these are the main sectors whose operations require a lot Information Systems' (IT) support.

Table 1: Sample of the study

Characteristic	Frequency	Percentage
Gender		
Male	21	65.63%
Female	11	34.38%
Age		
25-34	6	18.75%

Characteristic	Frequency	Percentage
35-44	15	46.88%
45-54	8	25.00%
55-64	3	9.38%
Total working experience		
0-4	3	9.38%
5-9	5	15.63%
10-14	12	37.50%
15-19	8	25.00%
>20	4	12.50%
Level of Education		
MSc/PhD	5	15.63%
College/University	27	84.38%
Other (less than College)	0	
Company size		
Very small	22	68.75%
Small	10	31.25%
Type of industry		
Primary production	3	9.38%
Manufacture	15	46.88%
Commerce	10	31.25%
Services	4	12.50%
Years of ERP use for product costing		
1-2	12	37.50%
3-5	7	21.88%
6-10	8	25.00%
>10	5	15.63%

4. Results

According to Table 2 ERP systems are considered to very important for Stock – Purchases and Payroll, as more than 70% and 55% of the respondents, respectively, consider them extremely important for these business operations, while only 6% stated that they are of little importance. Costing and Logistics follow in terms of importance, with an average 3.78 for both, as 65-70% of the respondents mentioned that ERP systems are a lot and extremely important for these business operations. For operations such as Financial accounting, Fixed asset register, Sales, Production and E-commerce, ERP was found to be fairly to a lot important, as more than 40% of respondents reported that it is a lot and extremely important. Finally, Management accounting, Quality management and Marketing are thought to be the processes that ERP's contribution is fair to little.

Not surprisingly Stock – Purchases and Payroll, followed by Costing and Logistics are considered to have been very significantly benefited by the ERP systems implementation. This is because irrespective of business characteristics, such as size (in terms of annual turnover and employees), legal type, sector involved, etc, the above mentioned operations seem to be rather important for all business and the accountants rely heavily on ERP systems in order to perform them efficiently and effectively. Thus, accountants think that ERP systems' contribution for Costing (in general) operation is notable. The low "scores" for operations such as Management accounting, Quality management and Marketing may be explained by the fact that the study sample consists of very small or small companies. Thus, it is quite probable that for medium sized and large firms ERP systems to be much more important for these operations than for very small or small companies.

Table 2: Importance of Enterprise (Information) System(s) (ES) for business operations management (% on valid answers, N=32)

	1	2	3	4	5	Mean	St.Dev.
Financial accounting	0.00	3.13	53.13	37.50	6.25	3.47	0.66
Fixed asset register	9.38	21.88	9.38	37.50	21.88	3.41	1.30
Management accounting	6.25	21.88	50.00	9.38	12.50	3.00	1.03
Costing	3.13	9.38	15.63	50.00	21.88	3.78	0.99

	1	2	3	4	5	Mean	St.Dev.
Production	9.38	15.63	31.25	25.00	18.75	3.28	1.21
Logistics	0.00	6.25	28.13	46.88	18.75	3.78	0.82
E-commerce	12.50	18.75	21.88	31.25	15.63	3.19	1.26
Stock –Purchases	0.00	6.25	3.13	18.75	71.88	4.56	0.83
Payroll	0.00	6.25	15.63	21.88	56.25	4.28	0.94
Quality management	3.13	28.13	56.25	12.50	0.00	2.78	0.70
Sales	0.00	18.75	40.63	28.13	12.50	3.34	0.92
Marketing	28.13	21.88	18.75	21.88	9.38	2.63	1.34

(1= Not at all, 2=Little, 3=Fairly, 4= A lot, 5=Extremely)

The most significant benefits for accountants from ERP usage in their work include Reduction of the time spent on accounting reports, Faster communication with other company departments and Reduction of the time spent on data analysis, as around 80% of the respondents rather and totally agree, and the mean value ranges from 4.19 to 4.25. Reduction of the time spent on data selection, Collecting more detailed data and Reduction of time for issuing invoices follow in terms of the ERP contribution on accountants' work. Mean value for these impacts is around 3.85 and the respondents who rather and totally agree are around 65%. Accounts seem to fairly agree about the impact on ERP on the Reduction of time for issuing payroll and the More reliable data transfer from the other company departments, with a mean value of 3.65. Despite the considerable positive impacts of ERP, the accountants mentioned that the benefits on the Increase of the quality of statement analysis and management, the Improvement of work performance, Improving the provision of tax consulting and the Improved decisions due to more accurate and reliable information, are limited. This finding may be attributed to sample selection of very small or small companies, and thus, because of the small scale of business operations it is not feasible to fully exploit the benefits accruing from ERP implementation. Indeed, accountants perceived that ERP usage had almost no impact at all on their status.

**Table 3: Impact of ERP Software on accountant's work
(% on valid answers, N=32)**

	1	2	3	4	5	Mean	St.Dev.
Reduction of regular workload	6.25	21.88	15.63	31.25	25.00	3.47	1.25
Improvement of work performance	9.38	18.75	34.38	15.63	21.88	3.22	1.24
Increase of the quality of statement analysis and management	3.13	18.75	31.25	34.38	12.50	3.34	1.02
Reduction of the time spent on data selection	6.25	9.38	15.63	31.25	37.50	3.84	1.20
Reduction of the time spent on data analysis	0.00	6.25	15.63	31.25	46.88	4.19	0.92
Reduction of the time spent on accounting reports	0.00	0.00	15.63	43.75	40.63	4.25	0.71
Collecting more detailed data	0.00	9.38	28.13	34.38	28.13	3.81	0.95
Reduction of time for issuing payroll	6.25	3.13	40.63	18.75	31.25	3.66	1.13
Reduction of time for issuing invoices	9.38	6.25	15.63	21.88	46.88	3.91	1.31
Improved decisions due to more accurate and reliable information	12.50	21.88	28.13	21.88	15.63	3.06	1.25
Faster communication with other company departments	0.00	6.25	15.63	28.13	50.00	4.22	0.93
More reliable data transfer from the other company departments	6.25	6.25	34.38	31.25	28.13	3.65	1.14
Improvement of the status of the accountant	21.88	15.63	28.13	18.75	15.63	2.91	1.35
Improving the provision of tax consulting	12.50	21.88	15.63	43.75	6.25	3.09	1.18

1= Totally disagree, 2=Rather disagree, 3=Neither disagree nor agree, 4= Rather agree, 5=Totally agree

The accountants revealed that from the list of 45 accounting methods and practices under consideration, only Standard cost, Standard cost based on sales plan and Standard cost based on historical cost were not used by less than 10% of the respondents, while all the methods and practices were used by all respondents. For the following methods and practices accountants considered ERP almost a lot important (mean value from 3.72 to 3.84): Cost per production order, Multiple costing scenarios and what-if scenarios, Overheads allocation to responsibility centers, Total production cost (including administration, sales, marketing, and financing overheads), and net value calculation, Indirect cost analysis, Cost per unit (final products), Objectives based costing.

ERP's importance for accounting methods and practices such as Activity Based Costing, Cost Centers, Sales and Marketing overheads allocation to products/services, Fixed cost analysis, Cost designing, What-if costing scenarios, Production overheads allocation to products/services, Direct cost analysis, Cost per unit (semi-finished products), Profit centers, Standard cost, Life Cycle Costing, Creating a Capital Expenditure Budget, Full Costing, Preliminary costing, Profitability analysis by customer, Labour cost and Management overheads allocation to products/services, was considered to be relatively moderate to great (mean value between 3.34 to 3.69).

For the rest of the accounting methods and practices the ERP's importance is deemed to be relatively fair to little, indicating that these are not quite important for their companies or that the necessary data are not collected or that it is rather difficult to make the relevant calculations (cost allocation, etc.).

**Table 4: Importance of ERP for accounting methods and practices
(% on valid answers, N=32)**

	0	1	2	3	4	5	Mean	St.Dev.
Fixed cost analysis	0.00	3.13	15.63	65.63	9.38	6.25	3.63	1.01
Variable cost analysis	0.00	6.25	12.50	53.13	12.50	15.63	3.25	1.05
Cost per unit (final products)	0.00	3.13	12.50	46.88	28.13	9.38	3.72	1.01
Cost per unit (semi-finished products)	0.00	9.38	6.25	50.00	21.88	12.50	3.47	1.08
Activity Based Costing	0.00	6.25	21.88	37.50	28.13	6.25	3.69	1.18
Cost per production order	0.00	6.25	15.63	18.75	50.00	9.38	3.84	1.14
Cost designing	0.00	3.13	15.63	53.13	18.75	9.38	3.59	1.01

	0	1	2	3	4	5	Mean	St.Dev.
Objectives based costing	0.00	0.00	6.25	37.50	40.63	15.63	3.72	0.82
Standard cost	9.38	9.38	15.63	18.75	40.63	6.25	3.44	1.09
Standard cost based on sales plan	6.25	9.38	21.88	12.50	31.25	18.75	2.91	1.31
Standard cost based on historical cost	9.38	18.75	9.38	21.88	25.00	15.63	2.78	1.34
Preliminary costing	0.00	18.75	9.38	25.00	34.38	12.50	3.38	1.32
Period-end costing	0.00	9.38	31.25	28.13	21.88	12.50	3.24	1.22
Life Cycle Costing	0.00	6.25	28.13	37.50	18.75	9.38	3.41	1.13
Total production cost (including administration, sales, marketing, and financing overheads), and net value calculation	0.00	3.13	18.75	28.13	40.63	9.38	3.78	1.08
Direct cost analysis	0.00	3.13	12.50	53.13	18.75	12.50	3.50	0.97
Indirect cost analysis	0.00	6.25	9.38	25.00	46.88	12.50	3.75	1.06
Multiple costing scenarios and what-if scenarios	0.00	3.13	12.50	34.38	40.63	9.38	3.84	1.03
What-if costing scenarios	0.00	6.25	18.75	21.88	40.63	12.50	3.59	1.13
Simultaneous costing	0.00	3.13	15.63	21.88	25.00	34.38	2.66	1.59
Labour cost	0.00	6.25	3.13	31.25	37.50	21.88	3.34	1.09
Overheads calculation	0.00	3.13	12.50	18.75	40.63	25.00	3.22	1.18
Overheads allocation to responsibility centers	0.00	3.13	15.63	31.25	40.63	9.38	3.81	1.06
Production overheads allocation to products/services	0.00	12.50	15.63	28.13	34.38	9.38	3.56	1.25
Management overheads allocation to products/services	0.00	9.38	25.00	25.00	28.13	12.50	3.34	1.21
Sales and Marketing overheads allocation to products/services	0.00	6.25	21.88	37.50	28.13	6.25	3.69	1.18
Full Costing	0.00	15.63	21.88	25.00	28.13	9.38	3.38	1.30
Marginal Costing	0.00	12.50	25.00	21.88	28.13	12.50	3.28	1.26
Cost Centers	0.00	6.25	15.63	18.75	46.88	12.50	3.69	1.12
Profit centers	0.00	15.63	25.00	28.13	25.00	6.25	3.44	1.32

	0	1	2	3	4	5	Mean	St.Dev.
Profitability analysis by product	0.00	31.25	12.50	18.75	21.88	15.63	2.84	1.47
Profitability analysis by activity / sector	0.00	37.50	9.38	15.63	18.75	18.75	2.59	1.57
Profitability analysis by customer	0.00	12.50	15.63	31.25	28.13	12.50	3.38	1.22
Creating Master Budget	0.00	15.63	21.88	12.50	31.25	18.75	3.03	1.38
Creating a Cash Flow Budget	0.00	21.88	15.63	21.88	28.13	12.50	3.19	1.37
Creating a Capital Expenditure Budget	0.00	18.75	25.00	18.75	34.38	9.38	3.38	1.39
Analysis of Financial Indicators	0.00	15.63	21.88	34.38	12.50	15.63	2.97	1.26
Analysis of non-Financial Indicators	0.00	15.63	34.38	25.00	15.63	9.38	3.13	1.26
Internal Audit	0.00	6.25	28.13	34.38	12.50	18.75	2.97	1.19
Comparative Evaluation	0.00	18.75	9.38	28.13	28.13	15.63	3.19	1.32
Valuation methods	0.00	9.38	15.63	31.25	28.13	15.63	3.31	1.17
Variance calculation	0.00	18.75	21.88	28.13	18.75	12.50	3.09	1.30
Automatic accounting records update	0.00	6.25	15.63	34.38	15.63	28.13	2.75	1.40
Automatic inventory valuation update	0.00	3.13	12.50	28.13	18.75	37.50	2.50	1.71
Automatic depreciation valuation update	0.00	6.25	15.63	28.13	18.75	31.25	2.66	1.53

0= This accounting method or practice is not used, 1= Not at all, 2=Little, 3=Fairly, 4= A lot, 5=Extremely

The Inadequate end user ES training and the Inadequate experience (mean value 4 to 4.16) on ES are considered by the accountants, as the most important causes that hinder the effective implementation of ERP systems in businesses, followed by Shortage of personnel - ES users and Inadequate hardware (mean values around 3.75).

Next causes in terms of the degree that impede ERP implementation are the Lack of personnel's basic computer skills, the Inadequate experience in ES-supported process use and/or ES potential in general, and the Inadequate historical data in ES database (mean values from 3.34 to 3.47).

Negative attitude of personnel regarding ES use, Lack of prerequisite

processes and data, End users consider that the process ES implementation is not user friendly, The company is still not interested for the process of ES implementation and The company considers that the process ES implementation is not worthwhile are thought to be moderate barriers to ERP implementation.

Consequently, it is the human - personnel related factors that mostly impede companies from fully exploiting ERP benefits. Inadequate hardware is also a considerable obstacle, probably because the sample consists mainly of very small companies. Moreover, factors such as Lack of prerequisite processes and data, and Inadequate historical data in ES database are not deemed to significantly impede the ERP usage. Finally, the last barriers to ERP implementation are The company is still not interested for the process of ES implementation and The company considers that the process ES implementation is not worthwhile, probably because even very small companies have realized that it is compulsory to use an ERP system for accomplishing their operations.

**Table 5: Causes that impede the use of ES (ERP)
(% on valid answers, N=32)**

	1	2	3	4	5	Mean	St.Dev.
Inadequate experience on ES.	6.25	12.50	9.38	18.75	53.13	4.00	1.30
Inadequate end user ES training	0.00	6.25	15.63	34.38	43.75	4.16	0.91
Lack of personnel's basic computer skills	9.38	15.63	18.75	37.50	18.75	3.41	1.22
Shortage of personnel - ES users	6.25	15.63	18.75	15.63	43.75	3.75	1.32
Negative attitude of personnel regarding ES use	9.38	18.75	34.38	15.63	21.88	3.22	1.24
End users consider that the process ES implementation is not user friendly	6.25	15.63	43.75	25.00	9.38	3.16	1.00
Lack of prerequisite processes and data	3.13	12.50	53.13	25.00	6.25	3.19	0.85
Inadequate hardware	6.25	12.50	18.75	21.88	40.63	3.78	1.27
The company considers that the process ES implementation is not worthwhile.	9.38	25.00	31.25	18.75	15.63	3.06	1.20
The company is still not interested for the process of ES implementation	15.63	28.13	12.50	18.75	25.00	3.09	1.44
Inadequate experience in ES-supported process use and/or ES potential in general	9.38	12.50	21.88	34.38	21.88	3.47	1.22

	1	2	3	4	5	Mean	St.Dev.
Inadequate historical data in ES database	3.13	15.63	37.50	31.25	12.50	3.34	0.99

1= Not at all, 2=Low degree, 3=Moderate degree, 4= High degree, 5=Very High degree

User training and education was found to be the most important factor that contributes to the successful implementation of ERP system, as two thirds of the respondents considered that it is extremely important and only 6% little (mean value 4.41). Not surprisingly, Interdepartmental cooperation, Interdepartmental communication, and User involvement were found to closely follow in terms of importance (mean from 4.06 to 4.22). Other factors that play a considerable important role on ERP implementation include The Education on new business processes, the Fit between ES software and hardware, the Effective project management, the Project team competence, and the Change management, as mean values range from 3.53 to 3.81. The factors that were stated to be the least (fairly) important for the successful implementation of ERP system are the Top management support, Management of expectations and Business Process Reengineering.

Consequently, consistent with their perceptions about the causes that impede ERP successful implementation, the participants in the survey think that personnel related factors are the most important for the effective use of ERP. Given the fierce competition among companies, profit margins have been drastically decreased, and, as such, interdepartmental cooperation and communication are compulsory for business survival and consequently they are also critical factors for the ERP successful implementation. The fact that Top management support, Management of expectations and Business Process Reengineering are considered as fairly important success factors may be attributed to the sample characteristics, since very small companies tend to follow less formal processes, and the great majority of decision making is based on intuitive rather than formal scientific manner.

**Table 6: ERP software implementation success factors
(% on valid answers, N=32)**

	1	2	3	4	5	Mean	St.Dev.
Top management support	9.38	28.13	21.88	12.50	28.13	3.22	1.36
The effective project management	3.13	0.00	43.75	34.38	18.75	3.66	0.89

	1	2	3	4	5	Mean	St.Dev.
Business Process Reengineering	6.25	28.13	37.50	12.50	15.63	3.03	1.13
Fit between ES software and hardware	6.25	0.00	37.50	21.88	34.38	3.78	1.11
User involvement	3.13	12.50	12.50	18.75	53.13	4.06	1.20
Project team competence	6.25	18.75	18.75	21.88	34.38	3.59	1.30
User training and education	0.00	6.25	12.50	15.63	65.63	4.41	0.93
Education on new business processes	3.13	15.63	21.88	15.63	43.75	3.81	1.24
Change management	0.00	6.25	50.00	28.13	15.63	3.53	0.83
Interdepartmental communication	0.00	0.00	12.50	59.38	28.13	4.16	0.62
Interdepartmental cooperation	0.00	0.00	9.38	59.38	31.25	4.22	0.60
Management of expectations	6.25	21.88	31.25	31.25	9.38	3.16	1.06

1= Not at all, 2=Little, 3=Fairly, 4= A lot, 5=Extremely

The participants in the survey stated that they are moderately to high degree satisfied with the ERP implemented in their company both in general and for Product Costing, in particular, as mean values are 4.66 and 4.34, respectively. In fact, a very small proportion of the respondents stated to be either not at all (and at very low degree) or extremely satisfied. Once more, this moderate to high degree satisfaction can be explained by the very small business size, since it does not permit companies to fully exploit ERP benefits. ERP systems are indispensable for medium and large sized companies with highly complex and scaled processes.

Table 7: Satisfaction with the ERP software implemented in the company (% on valid answers, N=32)

	1	2	3	4	5	6	7	Mean	St.Dev.
In general	0.00	6.25	15.63	18.75	31.25	21.88	6.25	4.66	1.31
For Product Costing processes	3.13	6.25	18.75	18.75	34.38	15.63	3.13	4.34	1.36

1= Not at all, 2= Very low degree, 3= Low degree, 4= Moderately, 5= High degree, 6= Very high degree, 7= Extremely

5. Conclusions

This research aimed to investigate the impact of ERP systems on management accounting and product costing processes². It was found that the great majority of the small and very small companies included in the sample implement ERP, especially, for product costing only during the last 5 or less years. Thus, the experience on ERP use for product costing and its potential benefits can be regarded as relatively limited.

Costing and Logistics follow, in terms of importance of ERP use, the Stock – Purchases and Payroll operations. Specifically, 65-70% of the respondents mentioned that ERP systems are a lot and extremely important for these business operations. However, the importance of ERP systems for Financial accounting, Fixed asset register and Management accounting was considered to be lower (fair to a lot for the first two and fair for the latter). Thus, (product) costing is regarded as one of the operations that rely, to great extend, on the effective implementation of ERP systems.

The accountants that participated in the survey regarded that the most significant benefits from ERP usage in their work are the reduction of the time spent on accounting reports, the faster communication with other company departments and the reduction of the time spent on data analysis, as around 80% of the respondents rather and totally agree. The next most important benefits include the reduction of the time spent on data selection, the collection of more detailed data and the reduction of time for issuing invoices. However, ERP's contribution to increasing the quality of statement analysis and management, the improvement of work performance, improving the provision of tax consulting and the improved decisions due to more accurate and reliable information, was considered to be limited, probably because of the small size of the companies included in the sample, which does not allow to fully exploit the benefits accruing from ERP implementation.

Consistent with their perceptions about the relative importance of ERP usage for Costing, Financial Accounting, Fixed asset register and Management accounting operations, the accountants mentioned that the accounting methods and practices for which ERP was almost a lot important were Cost per production order, Multiple costing scenarios and what-if scenarios, Overheads allocation to responsibility centers, Total production cost (including administration,

2 This research is implemented through the Operational Program "Education and Lifelong Learning" and is co-financed by the European Union (European Social Fund) and Greek national funds.

sales, marketing, and financing overheads), and net value calculation, Indirect cost analysis, Cost per unit (final products), and Objectives based costing. For a great number of the proposed accounting methods and practices ERP's contribution was found to be rather limited, which may be due to the relatively low importance of these accounting methods and practices for their companies, or to difficulties on collecting the relevant data.

The analysis revealed that it is mainly the human - personnel related factors (Inadequate end user ES training, Inadequate experience, Shortage of personnel - ES users) that mostly impede companies from fully exploiting ERP benefits. Inadequate hardware is also a considerable obstacle, probably because the sample consists of very small companies. It is worth mentioning that factors such as a) the company is still not interested for the process of ES implementation and b) the company considers that the process ES implementation is not worthwhile, are not considered to hinder the ERP implementation, indicating that even very small companies have realized that it is compulsory to use an ERP system for accomplishing their operations.

Consistent with their perceptions about the causes that impede ERP successful implementation, the participants in the survey think that personnel related factors (user training, user involvement, education on new business processes) are the most important for the effective use of ERP. Given the fierce competition among companies, profit margins have been drastically decreased, and, thus, interdepartmental cooperation and communication are compulsory for business survival and consequently they are also critical factors for the ERP successful implementation. Factors such as the top management support, the management of expectations and the Business Process Reengineering were found not to be important for the ERP successful implementation, probably because very small companies tend to follow less formal processes, and the great majority of decision making is based on intuitive rather than formal scientific manner.

The accountants of the small and very small companies that participated in the survey stated to be moderately to relatively high degree satisfied with the ERP implemented in their company both in general and for Product Costing. This is probably due to the small company size that does not allow them to fully exploit ERP benefits, as the ERP systems are indispensable for medium and large sized companies with highly complex and scaled processes.

There are some practical implications that could be derived from this study. Small and very small companies still seem to follow less formal processes, and the great majority of decision making is based on intuitive rather than formal scientific manner. Hence, it is not surprising that such companies have started

to implement ERP systems mainly during the last five years and that they have not fully exploited ERP benefits. Thus, it is strongly recommended that decision making should be based more on formal processes than on managers' intuition, because in this way it is expected that companies would obtain and retain a competitive advantage, realizing the great contribution of IT (ERP) systems on conducting business operations, product costing included. Moreover, the research results could be very useful for ERP developers, identifying, for example, the operations that accountants still do not exploit ERP benefits, the ERP benefits not considered yet to be important, the most important barriers and success factors to ERP implementation, as well as the accounting methods and practices considered to benefit most from ERP implementation. Such information could be valuable to better customize ERP software for small and very small businesses, as well as to improve their communication techniques when addressing the accountants' hesitations and reservations about the effective ERP implementation.

Some limitations must be considered when drawing conclusions on the findings of this study. First, it was not possible to include all possible accounting benefits, barriers and success factors to ERP implementation, because it would increase a lot the questionnaire length. However, some important information may have been lost because of the particular selection of benefits, barriers and success factors to ERP implementation. Moreover, the survey was based on a convenience sample of 32 small and very small companies. Thus generalization of the role of ERP systems cannot be made without considerable caution. Increasing the sample size, and including medium and large companies would allow several comparisons to be made, such as, in terms of the company size, location (urban and rural areas), sector involved, years of ERP implementation or even the characteristics of the ERP software used.

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TESTING THE TRADE OFF AND PECKING ORDER MODELS OF CAPITAL STRUCTURE

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Abstract

The current research work attempts to review the capital structure literature based mostly on the two prominent theories, the trade-off and pecking order, and attempts to test which of these two theories better explain the issuance of debt. Moreover, the current paper focuses on how the Trade-off, Pecking Order and Market Timing theories can explain the unsolved capital structure puzzle. Following, is a deliberation about which listed factors can most influence the degree of leverage according to empirical evidences. Next, an empirical analysis takes place based on Shyam-Sunder and Myers's (1999) models in order to identify which of Trade-Off and Pecking Order models can better explain debt issuance decisions. A balanced data panel has been created, including all the variables that both models need, in order to run an OLS regression. The data used in this empirical analysis contain a sample of 45 companies traded on the London Stock Exchange. The period covered runs from 1995 to 2012; different approaches have been conducted based on these two models and the results are that the null hypothesis for both models has been rejected. The results show that, following the pecking order theory, the deficit fund does not have the explanatory power neither for the debt issue, nor the target level of debt. On the other hand, the target-adjustment model seems to better explain the results according to R^2 .

JEL Classification: G32

Keywords: Capital Structure theories

1. Introduction & Literature Review of Capital Structure

Under the Modigliani and Miller (1958) Propositions 1 & 2 and based on perfect capital markets, the market value of a company is irrelevant to the proportion of its debt and equity. Consequently the cost of capital is constant and there is no benefit altering debt to equity ratio.

In the real world we do not have perfect capital markets; factors such as

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taxes, transaction costs, bankruptcy costs, asymmetric information, adverse selection and many other factors bias the irrelevancy theory of Modigliani and Miller (1958). Despite that, their theory is used as a benchmark for corporate finance, and many researchers and practitioners have been trying until now to find which of the above factors, or any other factor, weight more heavily on the theory's bias. Many different theories have been proposed to describe the financing decisions of firms. The most prominent theories of capital structure are the Trade-off, Pecking Order and Market Timing theories.

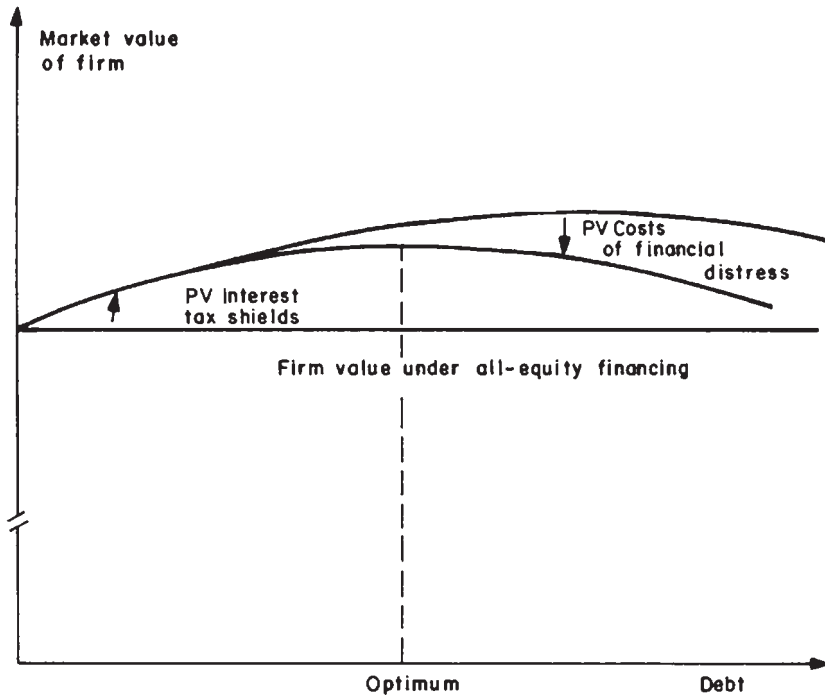
Modigliani and Miller (1963) adjusted their analysis to incorporate the tax benefits of leverage. These tax benefits arise because the interest expenses are tax-deductible and as a result the total amount of income to investors is higher. Common sense implies that as there is gain from leverage then all companies should have 100% debt financing. Due to frictions such as taxes, financial distress and agency costs in the capital markets this is not possible.

Consequently there is a trade-off between the tax advantages of borrowing and the costs of financial distress. As result, there is an optimal solution for mutual neutralization. Financial distress costs are referred according to Myers (1984) as the legal and administration costs of bankruptcy, agency costs and moral hazard as well as monitoring and contracting costs. Figure 1 explains the whole concept of the static trade-off theory; for a firm to maximize its market value, it should naively take advantage of the interest tax shields, but due to the financial distress costs the actual optimum point will be at the top of the middle curve.

The next prominent theory is the *pecking order theory* which Myers (1984) interpreted as another explanation of the capital structure. Under this theory, the adverse selection problem appears with declining intensity in equity, debt and retained earnings, with the last having no problem at all. As a result financing preferences follow the reverse ordering, so as to minimize the adverse selection problem. Moreover, the theory assumes perfect financial markets except knowledge of the rational investors of the real value of the company or its investment opportunities. As a result they do not know if a company is overvalued or undervalued.

According to Myers and Majluf (1984), managers who are making the company's financing decisions in favor of existing shareholders, are not reluctant to issue new shares unless these shares are overvalued. Given the asymmetry of information between the rational investors and managers, the former will revalue the company and its share price will fall. Myers (2001) mentions an average fall of about 3% pre-issue market capitalization of the firm. In contrast, the debt issue has much smaller impact on stock price as investors assumed

Figure 1: Optimal Capital Structure

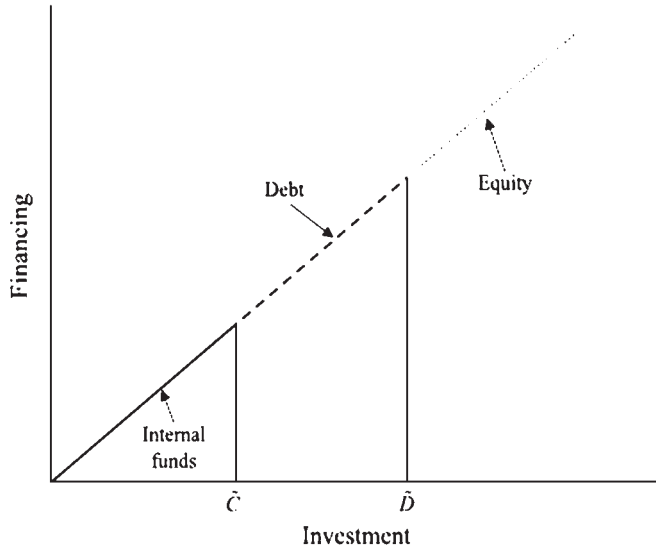


Source: Myers (1984) p.577

that they are not exposed in errors of the firm's valuation as with equity issue. From the prospective of shareholders, using internal financing is preferable to using external financing.

Figure 2 presented by Leary M. et al. (2010), illustrates the hierarchy pecking order. A firm will finance investment with internal funds, such as retained earnings, up to the point C which represents the company's maximum available internal funds. After point C, the firm will finance its needs with external funds until point D. This point is the higher level where the debt is less costly than to issue equity, which is the last option.

According to Baker et al. (2002) there are four different types of studies which provide evidence for the market timing theory. Firstly, evidence showing tendency of firms to issue equity instead of debt when at high market value, and repurchase when at low. Secondly, firms issue equity when its cost was lower than the cost of financing through debt, and repurchase equity when its

Figure 2: Financing hierarchy of the pecking order

Source: Leary M. and Roberts M.R (2010) p.334

cost was higher. This is consistent with Huang et al. (2009) who found that firms cover their deficit with debt when the market equity risk premium is high, and issue external equity when this cost is relatively low. Next, firms issue equity when investors were overoptimistic about the performance of the company. Last and most cogent, also according to Baker et al. (2002) and based on the survey of Graham et al. (2001), is that managers are looking at the current conditions of the markets and act favorably to the interest of their shareholders. The evidence support this interpretation, as they show that firms with low debt-to-equity ratio and high market value are inclined to raise funds, and the same occurs with firms having reversed characteristics.

Market timing theory has nothing to do with factors influencing traditional capital structure theories such as taxes, financial distress costs or investments opportunities. It has to do with stock performance and debt market status and according to Baker et al. (2002) and Frank et al. (2009) these factors will play a significant role in the puzzle of the capital structure explanation.

2. Factors that influence the capital structure decisions

1. Leverage and Profitability

Profitable firms have more incentives to issue more debt as they gain the benefit of interest tax shield and the cost of the financial distress becomes less. Moreover, profitable firms with excess cash flows are pushed by their shareholders to issue more debt as they believe that with this way they can lower the conflicts between manager and their interests (Jensen, 1986). Profitability factor is consistent with the pecking order theory, as more profitable firms prefer to use less external financing, as they can use their internal funds. In contrast, Strebulaev (2007) found that the dynamic trade-off model has a negative relationship with profitability and according to Kayhan et al. (2007) this happens due to firms passively accumulating profits. In addition, this negative relationship can be explained neither by the transaction costs nor by the taxes (Chen et al., 2005).

2. Leverage and Growth

Frank and Goyal (2009) mention that growth is negatively related to the trade-off theory and positively related to the pecking order theory. Regarding the first theory, the reason is that the factor growth increases the financial distress cost, which is a variable of the trade-off theory, and as the financial distress cost increases the leverage should be reduced. On the contrary, the pecking order theory dictates that the higher a firm's growth, the more investments opportunities it will have resulting to the increase of its leverage. There are different proxies for growth; one is the capital expenditure which is used in the pecking order model of Shyam-Sunder and Myers (1999) and predicts that as the financial deficit increases the leverage will be increased also.

3. Leverage and Industry Sector

Managers often use the median industry debt ratio as a proxy for their company. To justify this, one needs only notice firms in the same industry meet approximately the same financial risk, they have the same technology, probably have the same type of assets or the same regulations. Hovakimian et al. (2001) found that firms adjust their target debt ratio towards the industry's average debt ratio. Frank and Goyal (2009) found that under the pecking order

theory, industry factors are taken into consideration only if it is used as a proxy for the firm's financing debt.

4. Leverage and Type of Assets

Different types of assets have different expected financing distress costs. Tangible assets give the opportunity to outside investors to value the company more precisely and as a result the agency cost between them and managers declines. The outcome of this is that these firms are capable of issuing more debt following the trade-off theory; tangibility allows higher leverage. In contrast, pecking order theory dictates that as the asymmetric inflow of information of managers and investors decline, the issuance of equity will be less costly, and that has as a consequence the contrary effect of tangibility on leverage. If the adverse selection has to do with the assets in place, then as the tangible assets increase the adverse selection will increase also, so the firms will increase their debt as the issuance of equity will be more costly.

5. Leverage and Taxes

There is a positive relation between leverage and taxes, as the higher tax rates give incentives to firms to benefit from the higher interest tax shields under the trade-off theory. In addition, DeAngelo and Masulis (1980) found that there is a negative relationship between the nondebt tax shields and leverage, as these are substitute of the debt financing, like the depreciation expenses or the net operating loss carryforwards.

6. Leverage and Volatility on Cash flows

According to Frank and Goyal (2009) volatility on cash flows drive the financial distress cost to increase, as a result the firms should employ less debt under the trade-off theory. This volatility on cash flows and on stock performance also leads to an increase of the adverse selection problem. Under the pecking order theory, this increase requires the firm to also increase the debt ratio.

7. Leverage and Access to Debt Markets

A firm having restricted access to debt markets has negative impact on its ability to issue debt, and thus negative impact on leverage according to

Faulkender and Petersen (2006). As a result the firm will have to issue equity instead, to cover its deficit. Firms with investment rating acceptable by market standards have no restrictions on debt markets; consequently they can issue more debt.

8. Leverage and Inflation

The inflation variable is positively related with the interest rates. As a result when the inflation rate is going up, the interest rates of debts will go up also. Under the trade-off theory and according to Taggart (1985) firms issue more debt when the inflation rate is high as they can benefit more through the interest tax shields mechanics. In contrast, Barry et al. (2008) observed the same reaction but to lower –than their historical average– interest rates.

Finally, according to Frank and Goyal (2009) the following factors influence mostly the market leverage of a company. These are:

1. Industrial median leverage
2. Tangibility
3. Profitability
4. Size of the firm
5. Market-to-book assets ratio
6. Inflation

They found that these factors explain over 27% of the fluctuation in leverage, while adding any other factor can add only another 2% on the explanation.

3. Testing the Pecking Order Theory against the Trade-off Theory

A lot of researches and tests have been conducted about which of these two theories better explain the capital structure of firms. Shyam-Sunder and Myers (1999) were first to test the pecking order theory against the static trade-off theory. Their results included that their pecking order model was more suitable for financing decisions in comparison to the target adjustment model, which was based on the trade-off theory. This means when the investments were greater than the earnings the companies issue debt, otherwise their debt falls. Moreover, they showed that the pecking order hypothesis can be rejected in favor of the target-adjustment model if the company follows the latter financing behavior. In addition, they found that the target-adjusted model performed considerably well but not as well as the pecking order model. Chirinko and Singha (2000) made a critical observation about the pecking order model. It was the inability of the model to detect situations where the financing hierarchy

does not follow the pecking order theory. Moreover, when the debt and equity are issued always in fixed proportions the model fails to interpret the pecking order theory. Huang et al. (2009) found that the pecking order theory is not a trustworthy estimator and cannot explain the firm's financing decisions in periods where equity's cost is lower than debt's and as a result the firm has preference of equity issue instead of debt.

Frank and Goyal (2003) found the opposite results from Shyam-Sunder and Myers (1999). They found that external financing needs cover mostly from equity issues rather than debt issues; such a result is against the pecking order theory. They noticed that as the pecking order theory is based on adverse selection problem they were expected to find that small growing firms should follow the pecking order as the adverse selection problem on these companies should be greater. In contrast, they found that small firms did not act according to pecking order theory and only large firms follow it; implying firm size plays a significant role.

In addition, Lemmon and Zender (2010) found the same results with Frank and Goyal (2003) regarding young high-growing firms. But their results were not driven by the adverse selection problem, but by the debt capacity factor. They separated the firms into two categories; those with debt rating which are unconstrained by debt capacity and those without debt rating which are constrained by debt capacity. For the former category, when firms need external financing they issue debt, while for the latter category they issue equity. Their evidence shows that young high-growing firms are those that have debt capacity constraints and as a result they issue equity more frequently. That is not necessary against the pecking order theory, as they do not have the same access to the debt market as large companies with unconstrained debt capacity.

Jong et al. (2011) made a framework in which the pecking order and trade-off theories are inconsistent with each other when it comes to issuing and repurchasing debt decisions. Specifically about issuing debt, they conflict when the firm's target ratio and debt capacity serve as lower and upper bounds for the debt ratio, respectively. The trade-off model supports that the firm should decrease the debt level in contrast to the pecking order theory. Regarding the repurchase of debt, the confliction occurs when the current debt ratio is below the target. The trade-off theory says that the current ratio of the company should move towards the target ratio, while the pecking order theory suggests the reduction of the company's leverage. They tried to identify which of these two models provide the most accurate results. For the issuing decisions they found that most of the firms in their sample still increase their leverage beyond their initial estimation of an optimum target. This evidence is in conflict with

the static trade-off theory. In contrast, they found that the static trade-off theory better explains repurchase debt decisions.

A different approach about the explanation of the financing decisions of firms by Hackbarth (2008) connects the managerial traits and the capital structure decisions under cross-sectional differences in firm's capital structure. He diversified managerial traits into two categories, those who overestimate the growth rate of their company's earnings and those that underestimate the riskiness of earnings. He found that for the former category of managers, believe that the external financing is overwhelmingly costly and they judge that the market undervalued their risky securities. As a result they will not issue equity and they will follow the pecking order theory as they believe that issuing equity will be more costly. On the other hand, the latter category of managers, believe that the market undervalued the debt financing of their firm and their firm's equity is overvalued. As a result they will benefit mostly by issuing equity by following a reverse pecking order. They found also that the low biased manager's capital structure decisions are more in favor of the interest of the shareholders, while extreme biased managers are harmful for the firm.

4. Pecking Order and Trade-off Models

Pecking Order Model

The most prominent model to test the pecking order theory is by Shyam-Sunder and Myers (1999) who had the idea to test if this theory explains the financing decisions of firms better than the trade-off theory. Consequently they made a model based on their strict assumption that firm's debt can be explained only by the deficit on funds.

The model of the pecking order theory is

$$\Delta D_{it} = \alpha + b_{PO} DEF_{it} + e_{it} \quad (1)$$

Where i determines the company, e is the error term of the regression, α is the constant term and b_{PO} is the coefficient of the deficit on funds term. The dependent variable can be determined either as net debt or gross debt.

DEF is determined as

$$DEF_t = Div_t + Cap.Exp_t + \Delta N.Wor.Cap_t + C.LTD_t - OP.NCF_t \quad (2)$$

- Div_t is the dividend payment at time t
- $Cap.Exp_t$ is the capital expenditure at time t
- $\Delta N.Wor.Cap._t$ is the change in net working capital at time t
- $C.LTD_t$ is the current long term debt at the beginning of the financial year at time t
- $OPNCF_t$ is the operating net cash flow after interest and taxes at time t

By regressing equation (1) tells us that when a firm needs to finance an investment but its internal funds are insufficient, then it needs to issue debt. In particular, the variation of the debt variable (ΔD) can be explained only from one variable, the deficit in funds (DEF). As a result we expect the b_{PO} to be equal to one and the α_{PO} to be equal to zero, to put it differently it can be explained that every pound that missing from the company will be replaced by the debt issued. So the time-series null hypothesis is that $b_{PO} = 1$ and $\alpha_{PO} = 0$.

Also, Shyam-Sunder and Myers (1999) mention that the sign of the DEF does not matter, as they mentioned that both less optimistic and more optimistic managers will end up using the surplus as ($DEF_t < 0$), to pay back debt rather than using it to repurchase shares or pay back dividends. In addition, on equation (2) there is no variable representing equity, as it is assumed that the company will issue equity only as a last option. Also, on equation (1) there is no variable that explains the debt ratio of the firms. The reason, according to Shyam-Sunder and Myers (1999), is that the model assumes that firms do not have extreme debt ratios; in case their debt ratio is extremely low they will probably issue debt, otherwise they issue equity. As a result the model assumed that companies have a reasonable range of debt ratios.

Moreover, it is assumed that all the variables of the DEF are exogenous and according to Frank and Goyal (2003) this may be problematic as it is difficult to verify if it is indeed so. In case these variables are endogenous the model is incorrectly specified and any minor adjustments to the terms will result in major changes on betas. In addition, they criticize the model as they mention that it is not stable during different time periods and application of the model is not accurate across different samples.

Target adjustment model

The target adjustment model is based on the trade-off theory where managers are willing to find the optimal capital structure for their firms. Due to different random events just as costs and lags, managers need to adjust their debt level to reach the target level.

Shyam-Sunder and Myers (1999) present a simple target adjustment model. The dependent variable is the net debt level, and the independent variable is the difference between the target adjustment debt level of the firm at a specific time, minus the current debt. It is necessary to assess whether or not the change in the level of debt can be explained by the variation between the current level of debt and the target level.

The model is

$$\Delta D_{it} = \alpha_{TA} + b_{TA}(D_{it}^* - D_{it-1}) + e_{it} \quad (3)$$

Where i determines the company, e is the error term of the regression, α is the constant term and b_{TA} is the coefficient of the target-adjustment term. The null hypothesis of this model is that by having $b_{TA} > 0$ shows that the model is adjusted towards the target level, and $b_{TA} < 1$ implies that there are some random events which do not allow the current debt level to be equal to the target.

The target level of debt is difficult to observe for outsiders. Shyam-Sunder and Myers (1999) mention two ways which can be used to approximately find the target level. The first way is by using the average historical debt ratio for each firm, and then adjusting it by multiplying this figure with the total capital. The second way is by using again the average historical debt ratio but adjusting it with lags more than one year.

5. Empirical analysis

In this section we will discuss the data, methodology and the empirical analysis's results regarding the tests of the trade-off theory and pecking order theory based on the previous models.

Data

The data used in this empirical analysis contain a sample of 100 companies traded on the London Stock Exchange. The period covered runs from 1992 to

2012. To apply the above models, we need to have continuous data; to meet this requirement the first three years had to be deleted otherwise the sample would only include 5 companies. The result from this adjustment is to end up with 45 companies. The companies are:

Table 1

EUROMONEY INSTL INV	NORTHGATE PLC	LOW & BONAR PLC	WHITBREAD PLC
FENNER PLC	LADBROKES PLC	RENOLD PLC	ANTOFAGASTA PLC
ELECTROCOMPONENTS	RPS GROUP PLC	RICARDO PLC	TAYLOR WIMPEY PLC
MORGAN ADVANCED	CABLE & WIRELESS	INTERSERVE PLC	PENNON GROUP PLC
MITIE GROUP PLC	MORGAN SINDALL	SERCO GROUP PLC	MARKS & SPENCER
PHOTO-ME INT'L PLC	VP PLC	BERKELEY GROUP	KINGFISHER PLC
GALLIFORD TRY PLC	UNITED DRUG PLC	SMITHS INDUSTRIES	SPECTRIS PLC
TT ELECTRONICS PLC	SIG PLC	SEVERN TRENT PLC	DS SMITH PLC
ANITE PLC	DOMINO PRINTING	SPIRAX-SARCO ENGIN.	JOHNSON MATTHEY PLC
VOLEX PLC	SYNTHOMER PLC	BABCOCK INT'L GROUP	PERSIMMON PLC
WPP PLC	BAE SYSTEMS	INVENSYS PLC	RIO TINTO PLC
GREENE KING PLC			

Methodology

In order to test the pecking order and target adjusted theories the models are based on those Shyam-Sunder and Myers (1999) used. The variable of the current long term debt at the beginning of the financial year for the pecking order model was not taken into consideration, as according to Frank and Goyal (2003) this variable does not influence the DEF. The next step is the creation of a balanced data panel including all the variables that both models need in order to run an OLS regression. In order to create a consistent estimator for the beta of the models, we need to assume that the unobserved effect α_i is uncorrelated with the independent variable. Also in order to satisfy the key assumptions of the OLS regression and to solve this problem, the first-differenced equation used for the pecking order and target adjustment models. Therefore the new equations are

Pecking Order Model: $\Delta D_{it} = a + b_{PO}\Delta DEF_{it} + \Delta e_{it}$ for $t=2, \dots, T$ and $i=1 \dots N$ (4)

Target Adjusted Model: $\Delta D_{it} = a_{TA} + b_{TA}\Delta(D_{it}^* - D_{it-1}) + \Delta e_{it}$ for $t=2, \dots, T$ and $i=1 \dots N$ (5)

It has to be mentioned here that for the pecking order model, the dependent and independent variables are scaled by the Total Book Assets variable in order to eliminate firm size.

Following, is a multi-regression analysis for the pecking order theory by using equation (1) and applying the first difference approach, but now the variable DEF is broken down by its variables in order to test if $b_{Div} = b_{Cap.Exp.} = b_{\Delta N.Work.Cap} = b_{OP.NCF} = 1$. If the previous hypothesis is correct, then the equation (4) is also reliable,

$$\Delta D_{it} = a + b_{Div}\Delta Div_t + b_{Cap.Exp.}\Delta Cap.Exp_t + b_{\Delta N.Work.Cap}\Delta N.Work.Cap_t - b_{OP.NCF}\Delta OP.NCF_t + \Delta e_{it}$$

for $t=2, \dots, T$ and $i=1 \dots N$

Moreover, the dependent variables for both models have been determined as the Long-Term Debt (LTD hereafter) scaled by the Total Assets (TA hereafter) but also we determined them as Total Debt (TD hereafter) scaled by Total Assets in order to identify if the gross debt or net debt plays any significant role in the models. Last but not least, a differentiation by large, mid and small market capitalization of firms made so as to identify if this classification better explains the debt issue. The classification for the firm's market capitalization made under the below criterion

Large Cap: greater than £10 billion (4 companies)

Mid Cap: from £2 billion to £10 billion (17 companies)

Large Cap: Less than £2 billion (24 companies)

Following the interpretation of the procedure for the target adjustment model, a debt ratio needs to be calculated. Two different formulas were used for debt ratio.

The first is $Debt\ Ratio_1 = \frac{Long\ Term\ Debt}{Total\ Equity}$ and the second is

$$Debt\ Ratio_2 = \frac{Long\ Term\ Debt}{Total\ Assets}$$

Also, on both ratios the TD variable is used in the numerator to identify if the results give any different explanation. The target level of debt D_{it}^* is clarified as the average historical performance of the debt ratio for each company.

Results

The results from both models are not statistically significant as in every regression the null hypothesis is rejected with 5% significance value. In particular, from table 2 the pecking order coefficient for both levels of debt rejects the $H_0: b_{PO} = 1$ as a result of the t-test $= \frac{\hat{b}-1}{SE(\hat{b})}$, whose value is much greater than the critical value. Next, R^2 is not significantly high which means that there are other elements which influence the debt level of the firm and cannot be explained from the pecking order model. The results are in contrast with those of Shyam-Sunder and Myers (1999) as they show a significantly high R^2 and a beta near one.

Table 2

Pecking Order Model	LDT / TA	TD / TA
Constant a	0.0030 (0.0035)	0.0013 (0.0032)
Pecking order coefficient, b_{PO}	0.1068 (0.0129)	0.0606 (0.0121)
R^2	0.0861	0.0338
t-test	-68.76	-77.57

Similar results were found for the target adjustment model as the null hypothesis $b_{TA} > 0$ is rejected also. The table 3 shows that in contrast with the pecking order results, R^2 is much higher for both debt level categories. The target adjustments coefficients are greater than zero but their t-test does not allow them to be statistically significant. Next, considering table 3 again, it is observed that second debt ratio's formula is giving a much lower result and specifically R^2 had a dramatic decline, but as both results are not statistical significant it is not possible to identify the reasons why that happen.

Table 3

Target Adjustment Model	Debt Ratio ₁ with LTD	Debt Ratio ₁ with TD
Constant a	-0.0278 (0.076)	-0.065 (0.095)
Target adjustment coefficient, b_{TA}	0.552 (0.026)	0.546 (0.025)
R^2	0.3700	0.3914
t-test	20.53	21.49

	Debt Ratio ₂ with LTD	Debt Ratio ₂ with TD
Constant a	0.013 (0.003)	0.010 (0.003)
Target adjustment coefficient, b_{TA}	0.176 (0.021)	0.130 (0.018)
R^2	0.084	0.060
t-test	8.38	7.00

As can be seen from the multi-regression analysis, null hypothesis $b_{Div} = b_{Cap.Exp.} = b_{\Delta N.Work.Cap} = b_{OP.NCF} = 1$ is again rejected as F-test's figure is much greater than the critical value. Moreover, to test if there is any heteroscedasticity phenomenon in the model, the Lagrange Multiplier (LM) test was applied. The outcome of this test is that it is not possible to reject the null hypothesis for heteroscedasticity and as a result the model suffers from this phenomenon implying that it is not feasible to use it in order to examine the pecking order theory.

Table 4

Pecking Order Model	LDT / TA	TD / TA
Constant a	0.030 (0.003)	0.001 (0.003)
ΔDiv_t coefficient, b_{Div}	0.177 (0.013)	0.123 (0.013)
ΔCap_t coefficient, $b_{\Delta N.Work.Cap}$	0.065 (0.112)	0.032 (0.105)
$\Delta \Delta N.Work.Cap_t$ coefficient, $b_{\Delta N.Work.Cap}$	0.270 (0.030)	0.016 (0.031)
ΔOP_t coefficient, $b_{OP.NCF}$	0.127 (0.063)	0.244 (0.050)
R^2	0.1983	0.1402
LM-test	1.1967	0.902
F-test	44.21	29.16

Next is a classification, based on the market capitalization of the companies. The pecking order model's results show that the null hypothesis is again rejected. It has to be noted that the large cap category has only six companies and as this sample is very small it is difficult to get any significant results, even though they might be rejected.

Table 5

Pecking Order Model	LDT / TA			TD / TA		
	Small Cap	Mid Cap	Large Cap	Small Cap	Mid Cap	Large Cap
Constant a	0.0036 (0.005)	0.0032 (0.004)	0.0004 (0.0089)	0.001 (0.005)	0.001 (0.004)	-0.0027 (0.0101)

Pecking order coefficient, b_{PO}	0.098	0.187	0.2972	0.057	0.983	0.0979
	(0.0157)	(0.039)	(0.090)	(0.014)	(0.037)	(0.1032)
R^2	0.093	0.078	0.1503	0.040	0.025	0.0145
t-test	-57.14	-20.822	-7.767	-65.45	-24.14	-8.73

On the other hand, the target-adjustment model had a much better R^2 regarding the classification based on the market capitalization, but again the null hypothesis is rejected as can be seen from table 6. Once more, the determination of the debt ratio has a significant impact here, as the debt ratio based on equity gives a much higher R^2 for small and mid cap categories. This is consistent with R^2 of table 3.

To sum up the results, it is not possible to identify which model is better, but it is possible to say that the trade-off model better explains our results based on R^2 . Due to the rejection of the null hypothesis the outcome is that the external financing is not dictated by debt. Moreover, the differentiation between long-term debt and total debt does not seem to influence the results.

Table 6

Target Adjustment Model	<i>Debt Ratio₁ with LTD</i>			<i>Debt Ratio₁ with TD</i>		
	Small Cap	Mid Cap	Large Cap	Small Cap	Mid Cap	Large Cap
Constant a	-0.030	0.056	-0.494	-0.054	0.008	-0.765
	(0.075)	(0.107)	(0.611)	(0.093)	(0.004)	(0.828)
Target Adjustment Coefficient, b_{TA}	0.826	0.757	0.579	0.895	0.054	0.568
	(0.035)	(0.036)	(0.074)	(0.031)	(0.117)	(0.071)
R^2	0.5918	0.614	0.4916	0.6805	0.743	0.502
t-test	23.56	20.77	7.74	28.56	28.04	7.91

	<i>Debt Ratio₂ with LTD</i>			<i>Debt Ratio₂ with TD</i>		
Constant a	0.0197	0.0093	-0.012	0.016	0.008	-0.015
	(0.006)	(0.004)	(0.009)	(0.005)	(0.004)	(0.009)

Target Adjustment Coefficient, b_{TA}	0.198	0.009	0.477	0.141	0.119	0.445
	(0.030)	(0.004)	(0.108)	(0.026)	(0.030)	(0.103)
R^2	0.098	0.071	0.236	0.068	0.052	0.240
t-test	6.44	4.56	4.38	5.29	3.87	4.43

6. Conclusion

The current project attempts to analyze the capital structure literature review based mostly on the two prominent theories, the trade-off and pecking order, and it was attempted to test which of these two theories better explain the issuance of debt. Elements such as tangibility or the size of the firm need be taken into consideration, under the pecking order theory, as they seem to affect debt financing issuance. The negative relationship between leverage and profitability which the trade-off theory highlights, needs to be taken into consideration, as it is possible for the firm to increase the level of its retained earnings in order to increase its debt capacity, resulting in an increase of leverage.

Based on a sample of 45 companies for the period 1995 to 2012, we found that both models have rejected the null hypothesis. As a result it was not possible to identify which model was the better predictor for debt issuance. The outcome was that the target adjusted model better explains the results than the pecking order model as R^2 was much higher. Neither the differentiation between long-term debt and total debt does seem to influence the results, nor does the market capitalization. Moreover, the results from the multi-regression analysis show that the null hypothesis is also rejected, which means that the coefficient of each variable cannot be simultaneously equal to zero. This indicates that the multivariate regression is consistent with the results from the bivariate analysis, as in both cases the H_0 is rejected. In our opinion, other than the econometric difficulties met due to the small sample, factors such as the regulations, by which according to Basel II, banks are forced to scrutinize the firms before issuing loans. This reduces the probability of it, and this in turn may contribute to the cost of debt being more expensive than issuing equity. Another factor influencing companies conducting business internationally may be global economic crises such as the Asian economic crisis in 2000 or the financial crisis of 2007-2008, or the one now present in most countries of Europe, and thus the capital structure puzzle becomes even harder to solve.

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PRIVATE OR PUBLIC SECTOR? AN INVESTIGATION OF EMPLOYER PREFERENCES OF UNIVERSITY STUDENTS USING HERZBERG'S TWO FACTOR THEORY OF MOTIVATION

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Abstract

This paper examines the differences between public and private sector organization attractiveness to students facing career decisions in their immediate future. Extrinsic and intrinsic motivators are being used to assess their role in the organization type choice. The research questions addressed here are the following: Do extrinsic and intrinsic motivators relate to employer choice of graduating students and in what way? A Quantitative study was used in a sample of 324 students of a large urban university from three different faculties, Management, Health Services Professionals and Engineering. Regression analysis was used to help understand the relationship between each individual motivator and hygiene factor with the public sector choice first and the private sector subsequently. The results of the study are expected to contribute to a better understanding of the process of career choices students make, within the confines of the sample used.

JEL Classification: M10, M12, M50

Keywords: employer preferences, extrinsic motivation, intrinsic motivation, student career choices

1. Introduction and Literature Review

Early research has considered Public Service Motivation (PSM) as a type of intrinsic motivation, a force within the individual that is unrelated to the context of the task or the job, that influences people to seek employment in the public sector (Houston, 2000; Crewson, 1997). Prior to the PSM studies several researchers' effort has focused on the distinction between intrinsic and extrinsic motivation and the implications of each of these types on employee

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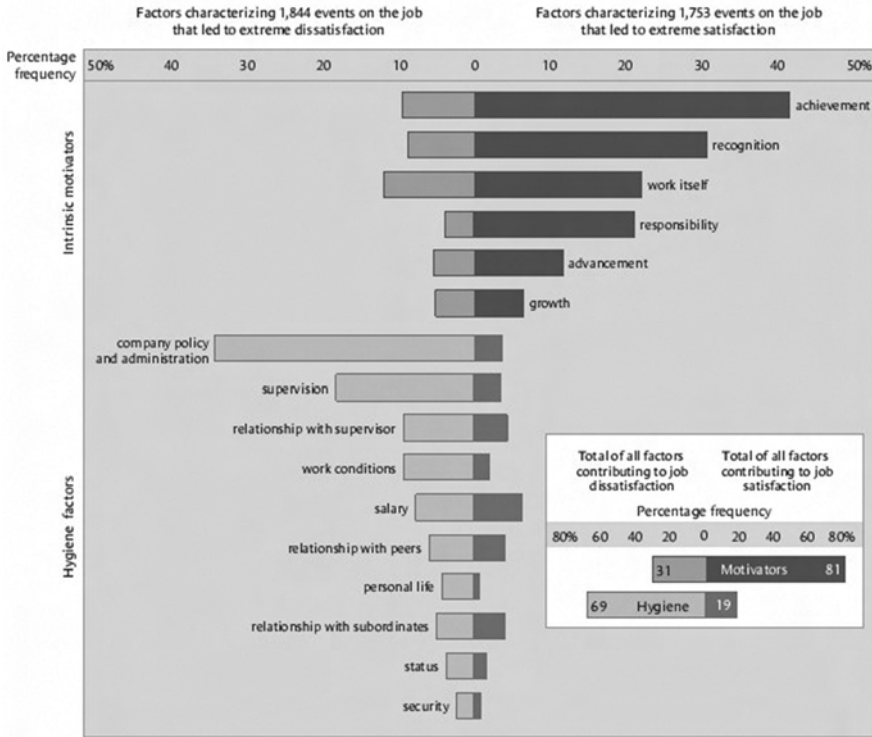
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performance. The seminal study by Herzberg and his associates and the ones that followed, demonstrated the differences between motivators (intrinsic factors) and hygiene factors (extrinsic ones), in how they impact performance (Herzberg, Mausner and Bloch-Snyderman, 1959; Herzberg, Mausner, Peterson, and Capwell, 1957). Motivators include elements characterizing the job such as achievement, recognition, the work itself, responsibility, advancement and growth. Hygiene factors, include, company policy, supervision, relationship with superiors and with colleagues, work conditions, salary, personal life, job security and status (Exhibit 1). Herzberg (2003, p. 88), backed by the findings of 12 studies claims that “it is only when one has a generator of one’s own that we can talk about motivation. One then needs no outside stimulation. One wants to do it.” He also claims that the traditionally believed to be effective motivation techniques are nothing but myths. He criticized the lack of effectiveness of reduced workweek, spiraling wages, expansive use of fringe benefits, Human relations training and sensitivity training, employee counseling and job participation. These according to Herzberg are Hygiene factors and can only reduce dissatisfaction. They are extrinsic factors which do not motivate and nor do they satisfy. Motivators, on the other hand, such as responsibility and personal achievement, recognition, growth, learning and advancement, the intrinsic factors, have proven to be effective in increasing job satisfaction and employee performance. Through job enrichment managers can infuse a job with motivators and make it more meaningful, interesting to the person and satisfying overall. Through vertical loading managers can achieve job enrichment using various techniques and succeed in motivating subordinates. Such techniques are:

1. Removing some controls while maintaining accountability
2. Increasing individual accountability
3. Giving employees complete natural units of work
4. Giving more job freedom and authority to employees
5. Making periodic reports available to employees themselves rather than their supervisors
6. Introducing more new and more difficult tasks
7. Helping individuals become experts (Herzberg, 2003)

Herzberg’s theory has been tested in other countries besides the USA and research yielded similar findings. As reported by Adler and Graham (1989), studies have shown that the motivators as well as the hygiene factors were associated in very similar ways with satisfying and dissatisfying events, in all five countries they examined, namely, the USA, Japan, Finland, Italy and Hungary. This provides legitimacy to the two factor theory internationally, in

Figure 1: Comparison of satisfiers and dissatisfiers



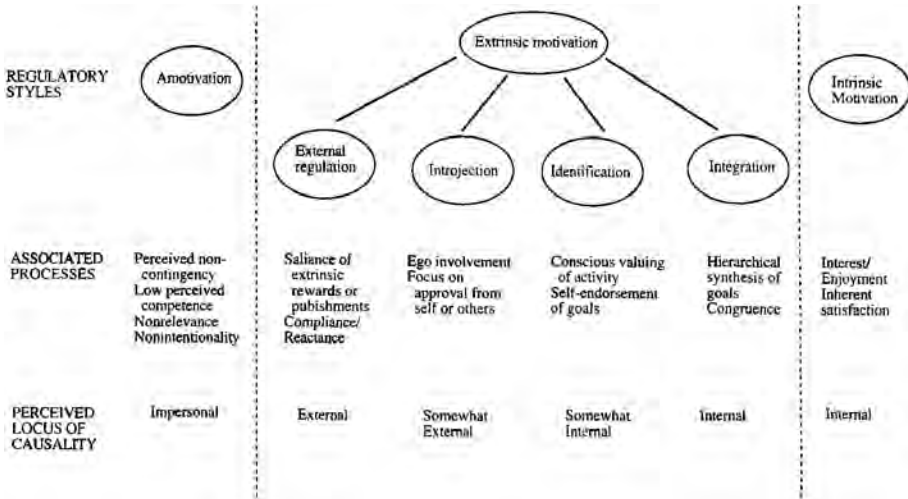
Source: Herzberg, F. (2003). ‘One more time: How do you motivate employees?’ Harvard Business Review January 2003, pp. 87-96

light of the criticism several US-originating motivation theories received, as being culturally biased.

Herzberg’s work has not been used in the context of studies addressing the issue of individual employer preferences and especially of sector choice of employment, with the notable exception of Vandenaabeele (2007) and his associates and Kim and colleagues (2013) in his ensuing work. This study aspires to explain the link between public and private sector employment preferences among young individuals, with the motivator and the hygiene factors of the Herzberg theory.

Extrinsic motivation according to Ryan and Deci (2000, p. 71) “...refers to the performance of an activity in order to obtain some separable outcome

Figure 2: The Self-Determination Continuum



Source: Ryan, R.M. and E.L. Deci. 2000. 'Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being', *American Psychologist*, 55, 1, 68–78

and thus contrasts with intrinsic motivation, which refers to doing an activity for the inherent satisfaction of the activity itself.” The two authors presented a model of motivation, the Self-Determination Continuum, along which they placed various parameters of their theory (Figure 2).

On the left side of the continuum are individuals without motivation, which is a result of lacking self-competence, not valuing any activity, or having no expectancy of any valuable outcome (Ryan and Deci, 2000). At the right side of Figure 2, there is intrinsic motivation, discussed in the previous paragraphs. There are four types of extrinsic motivation between amotivation and intrinsic motivation, which differ in terms of the degree of self-determination, or the autonomy of the individual. The externally regulated behaviors are the typical reinforcement theory types where there is a stimulus-response relationship, involving reward and punishment. Introjected regulation also involves extrinsic motivation but at a more subtle level, where the behavior aims at avoiding guilt, or to gain pride. A third type of extrinsic motivation is the regulation through identification. The person identifies with the externally imposed aim and strives for its accomplishment as if it were his/her own. The last type of

extrinsic motivation is the integrated regulation, which entails the full adoption of the values imposed externally, making the individual feel like it is he/she who wants to behave the way they do and not some external force. Due to the high degree of autonomy, integrated regulation is very close to intrinsic motivation and in several cases they are combined to form an autonomy index (Ryan and Deci, 2000).

From the above discussion of internal and external motivation and the corresponding factors, becomes clear that there are many tools that managers can use, in order to motivate their subordinates, some of which are more appropriate than others, depending on the individual's needs and on the discretion the manager can have, his/her position power, ability to allocate resources, to reward and to punish.

The two-factor theory, used in this study, emphasizes the motivators, proposing that it is those factors that will make the employees 'run the extra mile' (Herzberg, 2003, Herzberg et al., 1959). Ryan and Deci (2000) on the other hand, demonstrate that not all extrinsic motivators are the same and some can be more powerful than others in motivating employee behavior, hence managers could use both types of motivation to achieve their organizational goals.

Based on the discussion above one can expect the following:

H1a: There is a positive association between selecting public sector employment and intrinsic motives.

H1b: There is a negative association between selecting public sector employment and extrinsic motives

H2a: There is a positive association between selecting private sector employment and extrinsic motives.

H2b: There is a negative association between selecting private sector employment and intrinsic motives.

2. Methodology

A large urban university, located in the Athens Metropolitan area was selected to test the hypotheses above. The sample of 141 people was selected from graduating students, representing both sexes and roughly equally three different faculties, The Health Professional one, the Technology one and the Business Administration School. The students were requested to answer an online questionnaire of 24 Likert-type items. In measuring Extrinsic and Intrinsic motivation factors, the measure by Herzberg (2003) was used, slightly modified to adapt it to the specifics of the study. The reliability of the motivation instrument was also acceptable with the Chronbach $\alpha = .730$.

Using SPSS, version 17, first, Correlation analysis was utilized to check for the relationships of the extrinsic and intrinsic factors with each of employer choices. Then, I used regression analysis to test the hypotheses about the relationship of the motives with the employer choice.

3. Results

In testing the relationship between intrinsic and extrinsic motives with the employer type preference, first an attempt was made to separate the motives into the two factors, intrinsic and extrinsic motives. The results however did not allow for such factoring, since some of the intrinsic motives would form one factor with extrinsic ones. So, the decision was made to examine the relationship of each individual motive with each employer type. In the case the Central or Regional or Local Government organizations the motives with significant association were Personal Interest in the job, ($p = .05$, $\beta = -.157$), Involvement in politics and policy ($p = .003$, $\beta = .248$), Wage ($p = .004$, $\beta = -.355$) and Job Security ($p = .042$, $\beta = .190$) (Table 1.). The adjusted R Square = .277. The expectation expressed in hypothesis H4 was that all intrinsic motives will relate in a positive way with the Public organization employer choice. The results fail to support H1a since the only significant intrinsic motivator, in the results is Personal Interest in the job and its relationship with Public employment preference is negative. Hypothesis H1b, on the other hand, is supported in the case of the wage, an extrinsic variable, related in a negative manner with public employment choice. Two other extrinsic variables demonstrate a significant relationship with public employment choice, Involvement in Politics and Job Security, however, against the direction hypothesized, failing to support H1a and H1b.

Table 1: Dependent Variable: Central or Regional or Local Government organization

Coefficients ^a							
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	4,965	1,022		4,860	,000	

B1. Prestigious employer	-,145	,104	-,130	-1,391	,167	,591	1,692
B2. Social orientation of my job	,113	,090	,115	1,253	,213	,609	1,641
B3. Personal interest in my job	-,336	,172	-,157	-1,956	,050	,801	1,248
B4. Financial benefits (allowances, commissions, bonuses)	,265	,155	,208	1,709	,090	,349	2,868
B5. Non-financial benefits (health insurance, accommodation, car, GSM offered by employer)	,044	,108	,038	,408	,684	,591	1,692
B6. Lack of stress	,099	,090	,095	1,097	,275	,691	1,446
B7. Having a post of responsibility	-,244	,154	-,173	-1,582	,116	,433	2,308
B8. Involvement in politics and policies through my job	,245	,082	,248	3,005	,003	,759	1,317
B9. Good relation with superior	-,166	,115	-,117	-1,442	,152	,784	1,276
B10. Opportunities for fast promotion	,036	,135	,032	,269	,788	,374	2,671
B11. Wage	-,458	,158	-,355	-2,896	,004	,344	2,905
B12. Job security	,225	,109	,190	2,058	,042	,606	1,651
B13. Equal opportunities for men and women offered by my employer	-,012	,075	-,014	-,160	,873	,674	1,484
B14. Personal development/individual growth through my job	-,260	,168	-,158	-1,551	,124	,495	2,022
B15. Taking up challenges on my job	,190	,173	,135	1,098	,274	,342	2,927

Moving on, the hypotheses H2a and H2b are tested. Again, only three of the motives appear to significantly relate to the dependent variable, the large private company choice as a place of work, The Social Orientation of my Job (beta= -.249, p= .006), the Wage (beta= .343, p= .004) and the Personal Development and Growth (beta= .227, p= .023, Table 7.3) while the Adjusted R Square = .330 (Table 2). The H2a Hypothesis is supported in the case of

the wage, which shows a strong relationship to the private company choice. H2b is also supported in the case of social orientation of my job, which can be considered as intrinsic motive and as such it is expected to have a negative association with the private organization choice. Contrary to expectations, Personal Development and growth, an intrinsic motive has a significant positive relationship with the private company choice.

4. Discussion

The hypotheses tested, concerning the relationship between Employer choice and extrinsic/intrinsic motives, presented some interesting findings. Based on the literature, the public organization employment choice ought to be related to intrinsic motivators, other than PSM and should have a negative relationship with the extrinsic motives (Rainey and Steinbauer, 1999; Herzberg, 2003; Buelens and Broeck,

Table 2: Dependent Variable: Large Private Sector Organizations (Corporations)

Coefficients ^a								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1,407	,886		1,588	,115		
	B1. Prestigious employer	,103	,090	,102	1,139	,257	,591	1,692
	B2. Social orientation of my job	-,221	,078	-,249	-2,814	,006	,609	1,641
	B3. Personal interest in my job	-,156	,149	-,081	-1,045	,298	,801	1,248
	B4. Financial benefits (allowances, commissions, bonuses)	-,137	,135	-,119	-1,014	,313	,349	2,868
	B5. Non-financial benefits (health insurance, accommodation, car, GSM offered by employer)	,070	,094	,067	,742	,459	,591	1,692
	B6. Lack of stress	,061	,078	,065	,776	,439	,691	1,446

B7. Having a post of responsibility	-,004	,134	-,003	-,031	,975	,433	2,308
B8. Involvement in politics and policies through my job	-,077	,071	-,086	-1,082	,281	,759	1,317
B9. Good relation with superior	,189	,100	,148	1,888	,061	,784	1,276
B10. Opportunities for fast promotion	,067	,117	,064	,566	,572	,374	2,671
B11. Wage	,399	,137	,343	2,911	,004	,344	2,905
B12. Job security	-,077	,095	-,072	-,808	,421	,606	1,651
B13. Equal opportunities for men and women offered by my employer	-,110	,065	-,142	-1,689	,094	,674	1,484
B14. Personal development/individual growth through my job	,336	,145	,227	2,310	,023	,495	2,022
B15. Taking up challenges on my job	,081	,150	,064	,543	,588	,342	2,927

2007; Crewson, 1997; Houston, 2000). As mentioned earlier, extrinsic motivation according to Ryan and Deci (2000, p. 71) “, refers to the performance of an activity in order to obtain some separable outcome and thus contrasts with intrinsic motivation, which refers to doing an activity for the inherent satisfaction of the activity itself.” The Hypothesis H1a, was not supported. Four types of motives were significantly related to the public organization employment choice, three extrinsic motives, Job Security (positive relationship), Wage (negative), Involvement in politics and policy (positive) and one intrinsic, the Personal interest in the job, which had a negative relationship, contrary to expectations. Wage also had a negative relationship with public employment choice, supporting thus the Hypothesis H1b, since there are several studies reporting similar findings (Stazyk, 2013; Houston, 2000; Wright, 2003; Kavoura, A., Katsoni, V., Vassiliadis, C. A., & Vlachopoulou, M. 2013). This finding corroborates earlier findings calling for the attention of Human Resource Managers in public organizations, when they adopt market practices, such as pay for performance, frequently resulting to the “crowding out” of intrinsic motivation, essentially diminishing it (Stazyk, 2013; O’ Riordan, 2013; Stavroulakis, Mitoula, Kaldis, & Papagrigroriou, 2013).

The hypotheses relating Large private organizations with extrinsic/intrinsic

motives also present some interest, given that wage, an extrinsic motive, supports the hypothesis H2a, showing a positive significant relationship, Social Orientation of the job, shows a negative significant relationship supporting thus, H2b and Finally, Personal Development shows also a positive relationship with Private employer choice, although considered an intrinsic motive (Herzberg, 2003; Alexandrakis, Mantzaris, & Pazarskis, 2012, Kefis and Aspridis, 2014). The latter relationship may be related to the nature of the sample, being young and aspiring individuals with a relatively high education level (Nina-Pazarzi, 2014).

5. Implications of the Study

This study attempted to answer the question whether Employer sector choice relates to intrinsic and extrinsic motives and if this is the case to what extent. There was partial support of the hypotheses made and some of the conclusions drawn were that elements such as Wage, Job security, Personal growth, Social orientation of the job and Challenging tasks, appear to be related to the employer choice. The knowledge of the relationship between employment sector preference and extrinsic and intrinsic motives, can be of great help to public organizations' human resource managers according to many scholars (Clerkin and Cogburn, 2012; Paalberg et al., 2008). Provided the strong support found in research that intrinsic motives will lead to higher outcomes such as performance, job satisfaction, commitment, Organizational citizenship behavior and intention to stay, HR managers in public organizations have every reason to recruit and select intrinsically motivated individuals and even train existing employees accordingly (Naff and Crum, 1999; Kim 2005).

It is also important to design reward systems that place emphases on intrinsic rewards since PSM is reinforced by those, as opposed to the commonly used market practices in private organizations. Pay for performance schemes used in various public organizations led to lower overall performance (Moynihan, 2007).

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