Corporate Governance Analysis and Social Networks: A Case Study in Greek Firms

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Abstract
In this paper, we use a set of publicly available date regarding Greek Firms in order to investigate probable connections between the structure of their Boards of Directors and its possible linkage to the creation of the recent financial crisis in Greece or possible corruption existence. This study is developed in two parts. In the first part we create and analyze two derived social networks, using well known and robust metrics from the theory of Social Network Analysis. In the second part we examine any existing relation between corporate ownership structure and the information content of announced earnings.The empirical results of this study are generally consistent with the above arguments.

Keywords: Social Network Analysis, Corporate Governance, Ownership Structure of Enterprises.

JEL Classification: Z13, G32

Introduction

During the last longing financial crisis in Greece, many reasons have been proposed, trying to explain the depth of this phenomenon. A widely accepted proposition wants the public sector to be largely responsible, together with the extremely high levels of national dept. However, little is said about the responsibilities of the private sector, especially for large companies and not Small and Medium Sized Enterprises. The Greek Stock Market (ASE) consists of a number of companies and their subsidiaries and affiliates. To what degree do these companies form a healthy, competitive and productive group? Can this private sector create a steady and strong influx of investment capital? In order to achieve a flow of investments, a significant volume of data and information (qualitative and quantitative) need to be available as open sources. The adoption of International Financial Reporting Standards plays a key role to the achievement of high levels of disclosure requirements. Therefore, the mobility and duality of members of boards of directors should be disclosed to any potential investor of the companies were listed in Athens Stock Exchange. Any lack of disclosure probably will be creating a considerable suspicion that the persons of the Board manipulate any relative data and information, leading to mislead the investing public.

Literature Review

Some definitions from social network analysis

Network theory or Social Network Analysis theory is a mature theory which can help exploring the nature of interconnected unities (Wasserman and Faust, 1994). This theory first emerged by Moreno (Scott, 2000) a field anthropologist, and then studied successively

within Graph Theory, a branch of pure mathematics started from Euler and playing a central role in Computer Science ever since Harary's modern introduction in 1969 (Harary, 1969). Social Network Analysis has been one of the fields with exploding research in the past twenty to thirty years, yielding extensive literature, both in textbooks and journals. Relevant ideas and results have been used in many applications and cases, ranging from structural anthropology to marketing and banking and from viral infection to sociology.

A graph G consists of the pair (V, A), where V = $\{v_1, v_2, \ldots, v_N\}$ is the finite set of vertices (or nodes, or actors) of cardinality |N| and A = $\{l_1, l_2, \ldots, l_L\}$ is the finite set of links (or edges) of cardinality |L|, where $l_k = (v_i, v_j)$, v_i, v_j from V and l_k from A. Links of the type (v_i, v_i), when allowed, are called loops. A path is a sequence of nodes, where each node is written only once and there exists a link connecting two subsequent nodes. The length of a path is the number of "hops" needed to complete the path. The shortest path, or geodesic between two nodes is minimal, regarding its length, among all paths connecting these two nodes.

Traditionally we investigate nodes in a network regarding their overall position, with respect to all other nodes. We thus try to find which (if any) nodes are more important than others. A common technique is to measure the centrality index of nodes and compare all nodes according to this index. We will use three different measurements of centrality, namely degree, closeness and betweenness centrality (Kydros et al., 2011).

- In *Degree* centrality we measure the degree of each node. It can be argued that if a node is involved in many interactions, then this is an important node, playing an important role. However, this type of centrality focuses on the local view of immediate neighbours and sometimes leads to misleading perceptions.
- The *Closeness* centrality of vertex *v* is a summary measure of the distances from *v* to all other vertices; the number of other vertices divided by the sum of all distances between v and all others. Intuitively, shorter distances to other vertices should be reflected in a vertex's larger closeness score. In this sense, one can think of closeness as reflecting compactness. For reasons of easy interpretation we inverse this score, so actors with a higher score are more important than others.
- The *Betweenness* centrality of a vertex v is the proportion of all geodesics between the pairs of vertices which include v. The more a vertex is needed for, say, passing of information between all the pairs, the higher is its score. In this sense, one can think of betweenness as reflecting facilitation of circulation. Nodes with high values regarding this measurement act as brokers in communication.

Furthermore we will deal with link density, degree, distance, diameter and eccentricity. Link Density, S, is the ratio of the actual number of links, L, divided by the maximum possible number of links that could exist in a network. Obviously, in a network with N nodes, the maximum possible number of links will be exactly

$$\frac{N(N-1)}{2}$$

which is the case of a complete graph where each node is connected to

all other N-1 nodes of the network. Thus, link density is calculated as:

$$S = \frac{2L}{N(N-1)}$$

and can take values in [0..1].

The Degree, d_i, of node v_i is the number of links emanating from v_i. Since every link contributes to two nodes, the average degree of the network can be easily calculated as:

$$E(d_i) = \frac{2L}{N}$$

The Distance between two nodes v_i and v_j is the length of the shortest path that connects v_i to v_j. The average distance of a network is the average of all distances in this network. The Diameter, D, of a network is the longest distance over all pairs of nodes. The Eccentricity of a node is the largest distance from this node to any other node in the network. All node eccentricities can be averaged yielding the average eccentricity of the network (Kydros, 2012).

In a bipartite (or two-mode) network all nodes fall into two different sets, S_1 (actors) and S_2 (clubs). All possible links connect nodes between S_1 and S_2 and there is no link connecting nodes within S_1 or S_2. A bipartite graph can be decomposed into two derived one-mode graphs, G_1 (with nodes from S_1) and G_2 (nodes from S_2). The idea is that we connect two actors when they join the same club.

Some concepts of Corporate Governance

Corporate governance (corporate governance) is the cornerstone for the organization of effective internal control systems in modern undertakings. The impact of the failure or success of the companies in economies that worked was particularly significant and negative and positive implications for those related directly or indirectly to these (stakeholders). Specifically, negatively affected mainly shareholders (shareholders), and the other having interests in these companies as suppliers, customers, creditors, employees and the governments of the countries operating the above mentioned companies (a common feature of the above legitimate interest in the orderly and efficient operation of these companies). The financial performance of the companies is mainly due on the adequacy of their members of Board of Directors and the lack of effectiveness of their organisational control mechanisms (failure of 'Corporate Governance Systems').

In this section we analyse the generally accepted definition of corporate governance system, with significant reference to the rights and obligations of shareholders and to the role that board of directors should play on stock markets in accordance with internationally accepted good practices of corporate governance.

Any references to boards of directors can mainly concern listed companies on the Stock Exchange, but the adoption of good operating practices of the BoD should be an objective also of non-listed companies on the Stock Exchange in order to enhance the control environment. According to this, executive and non-executive members of the Board and the role that they can play in the effective implementation of legislation (where applicable) and good corporate

governance practices are distinguished. On these frames will also examine the role of audit committees as an empowering tool of BoD and as an effective instrument of the financial activities of the company, its risk management procedures and internal control system, as well as the activities of internal and external auditors.

Data Collection and Processing

The sample was constituted by 64 listed companies in the Athens Stock Exchange. The selection of companies was based on the composition of the General Index of ASE. More specifically, 64 are parent companies during the examination period. Those companies are the biggest in ASE in terms of capitalization. However, the total sample includes 64 parent companies and their subsidiaries and affiliates counts totally 400 companies. The majority of the selected companies classified to the following industries: banking, Construction, Financial, Healthcare industry, trade, services, food and Drink. Continuing the formation of sample, the persons that constitute the respective BoD's are also selected. The above data were extracted from the Athens Stock Exchange publicly available data and the companies' annual reports. The data frequency span from 2009 to 2012.

We formed a bipartite graph of companies (Figure 1) and their respective BoD's and afterwards extracted two one-mode networks, namely the BoD's network and the companies' network. As a relationship between persons we define the joint service in more than one company at the same time during the examined period (2009-2010).We used Pajek (2007), to form these networks and Pajek and NetworkX to calculate our metrics.

All following Figures were produced by Pajek. This software provides special visualization algorithmic techniques that can be used to separate components and "keep together" close nodes. Figure 1 shows the initial bipartite graph, Figure 2 links persons serving in the same board and Figure 3 links companies sharing the same person in their Board.

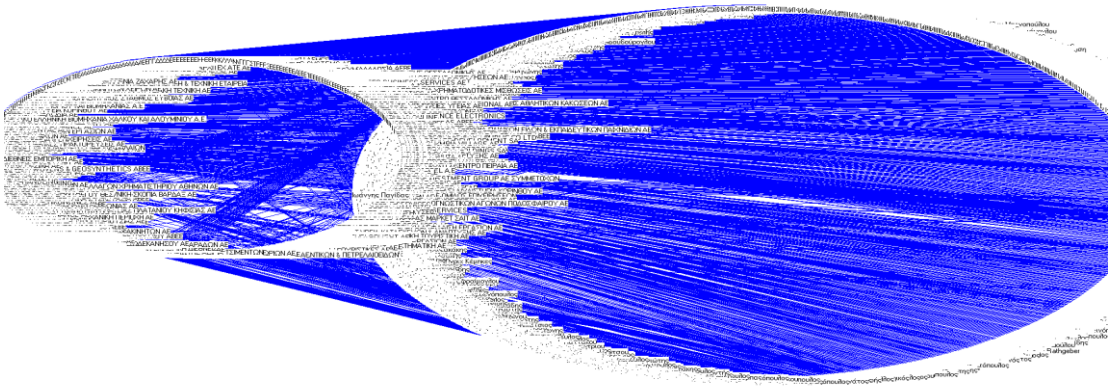

Figure 1: The initial bipartite graph

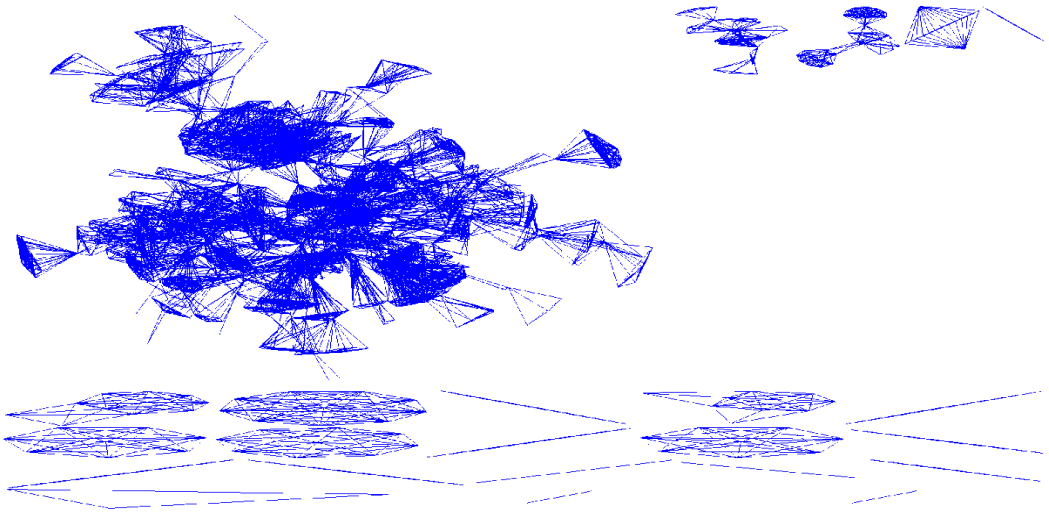

Figure 2: Persons in the same Board

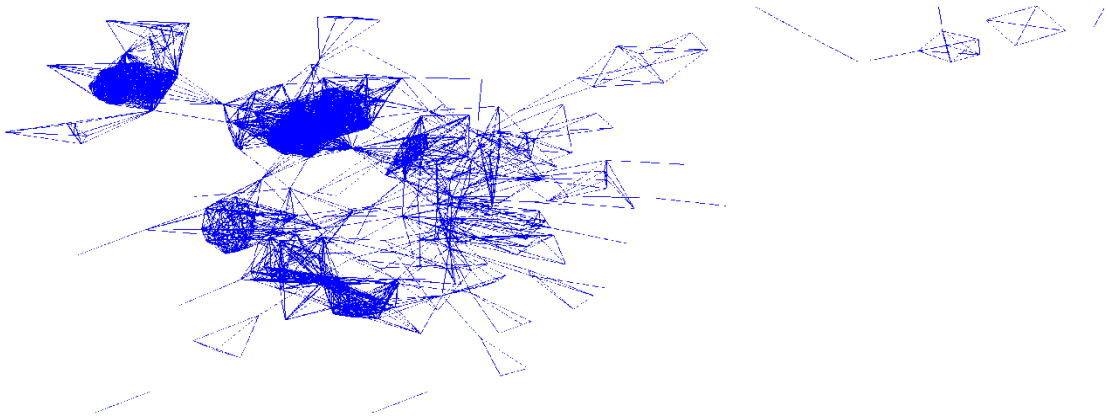

Figure 3: Companies' Relationships

Numerical and Statistical Analysis of Networks

Going to the network-oriented numerical and statistical analysis of the results, we will describe some tables and present the most essential elements. The sample, as already mentioned, the separated in'' People'' and '' Companies'', and their main results are shown in the table below.

Table 1: Numerical Results and Statistical Analysis of Networks

PEOPLE	**COMPANIES**
Size N = 1354	Size N = 374
Size L = 9142	Size L = 3070
Loops = 978	Loops = 308
Density: 0.009	Density: 0,041
Average Degree: 13.5	Average Degree:16,4

Distribution of Distances	**Distribution of Distances**
Number of unreachable pairs: 530058 Average distance among reachable pairs: 4.88509 The most distant vertices: Constantine Haitoglou (202) and Jean-Louis Tourne (979). Distance is 12. **Weak Components** Number of components: 23 Size of largest component: 1140 vertices (84.195%).	Number of unreachable pairs: 29480 Average distance among reachable pairs: 4.30694 The most distant vertices Management VIPATHE SA (50) and PIRAEUS WEALTH MANAGEMENT AE (254). Distance is 11. **Weak Components** Number of components: 23 Size of largest component: 332 vertices (88.770%).

Reasonably, the number of edges in the network of people is much greater due to the existence of many more nodes in the people's network. Regarding the number of loops for the first network it is Loops = 978 while for the second Loops = 308. This means that we have identified 978 cases of persons present in more than one company and those companies in which the above persons serve simultaneously are 308. The density of the people's network is 0.009, while the company's network is slightly larger 0,041. The average degree for the network of people is 13.5 and that means that each node interacts with 13.5 others. The minimum value of the degree is 1 and the maximum 76. For the network of companies, the average degree is 16.4 while the minimum and maximum values are 0 and 63 respectively.

An interesting result is the average distance. The values of 4.88 and 4.30 respectively for the two networks fulfill the famous six-degree separation principle in real-life networks (Watts and Strogatz, 1998). The diameters of the networks are 12 for the network of people and 11 for the network of companies. The longest geodesic path (the longest shortest path) is quite large for networks of these cardinalities. The paths that achieve the highest values emerge from *Constantine Haitoglou* and ends at *Jean-Luis-Tourne* (regarding the peoples network) and for the respective companies it starts from *Management VIPATHE* SA and ends at *BANK WEALTH MANAGEMENT*. The most important statistic is the one that determines the overall association of operators of networks, i.e. the total connectivity of these networks. Our results show that the 84.19% of people are connected in one large component (1140 out of a total of 1354 nodes. For the companies network companies this value is almost at the same level, 88,77% (i.e. 332 nodes of a total of 374). With these values we can say that the overall connectivity of the network is extremely high, and definitely higher a random network.

Then we move to the analysis of individual networks of persons and companies (Tables 2 and 3). We will focus on the first ten nodes of the networks and the value we get for the three measures of centrality, as mentioned above. The most important node is *Basil Fourlis*, who appears first in all three measurements. Although the companies he is involved, are not highly ranked on the list of the network of companies, his high scores emanate for the fact that he is a member of the Board of Piraeus Bank (probably the largest Bank in Greece. His position yields the greatest degree of proximities, has significant control flow information and is the most central point of the network to monitor the bulk information.

Table 2: Centrality Results of the Network of People

A/A	NODE	DEGREE	NODE	CLOSENESS	NODE	BETWENNESS
1	Basil Fourlis	76	Basil Fourlis	0,2545	Basil Fourlis	0,1148
2	Leonidas Bompolas	70	James Georganas	0,2525	James Georganas	0,0903
3	Demetrius Koutras	68	Demetrius Papalexopoulos	0,2522	Odysseus Athanasiou	0,0896
4	Anastasios Kalintsantsis	62	Nicholaos Karamouzis	0,2514	Anastasios Kalintsantsis	0,0795
5	Odysseus Athanasiou	59	Odysseus Kyriakopoulos	0,2505	Demetrius Hadzigrigoriadis	0,0696
6	James Georganas	58	Odysseus Athanasiou	0,2490	Demetrius Klonis	0,0600
7	Nicholaos Karamouzis	58	Spiridon Theodoropoulos	0,2450	Nicholaos Karamouzis	0,0569
8	Andreas Vgenopoulos	58	Spiridon Pantelias	0,2450	Theodore Pantalakis	0,0520
9	Demetrius Klonis	55	Eftixios Vassilakis	0,2431	Spiridon Theodoropoulos	0,0503
10	Spiridon Pantelias	53	Artemis Theodoridis	0,2413	Spiridon Pantelias	0,0490

The *Bobolas*, *Koutras*, *Kallitsantsis* nodes exhibit a very important set of interactions since they participate in the Boards of several companies which are in the top ten of the respective network, but the importance of these nodes is limited as they have no presence in the final table, beyond that of Kallitsantsis, who is in the fourth (4th) position regarding betweenness. *Odysseus Athanasiou, James Georganas, Nicholaos Karamouzis* and *Spiridon Pantelias* are considerably interesting in relation to the results, as they are shown in the top ten in three measures of centrality. Their degrees of closeness are close together, and the values of closeness are almost equal. In measuring betweenness, the *Georganas* and *Athanasiou* are in higher positions, almost double those of *Karamouzis* and *Pantelias*. These nodes have partnerships with the top two companies in the respective list of betweenness and four in the whole list. *Andreas Vgenopoulos* appears in the top ten of measuring degree and this is due to his presence in the Board of many companies from different sectors. We also point out nodes *Demetrius Papalexopoulos*, *Odysseus Kyriakopoulos*, *Eftixios Vassilakis* and *Artemis Theodoridis*, as they relate to a large number of companies. Finally, *Demetrius Hadzigrigoriadis* and *Theodore Pantalakis* are present in the betweenness list but are not present in the other two ranking. Their joint presence in a large number of different Boards, gives them their important role in the network of people, and therefore the increasing possibilities for them to come into contact with a wide range of information and simultaneously contribute to the promotion of their companies.

Turning then to the analysis of the network of companies (Table 3), we provide the list of the top ten companies that emerged from our data processing. We note that node *ELLAKTOR SA* seems to be the most important, as shown in the three measurements of centrality. The values for degree and closeness are maximum, 63 and 0.2901 respectively, which gives the largest number of neighbouring nodes and greater flow control. Regarding betweenness it has the last but one position in the list, the ninth, with a value 0.0738, a result that can be explained from the fact that this company belongs to the Constructions' Sector and therefore cannot be "in the middle" of many interactions as, for example, a Banking organization. Particularly noteworthy in this table is that the measurements of centrality in the degree and closeness, nodes occupying 85% (17 of 20) belong to

ELLAKTOR SA and its subsidiaries, which significantly affects the independence of the network. The lists are supplemented by two other companies also in the construction industry, *METROPOLITAN CENTER OF PIRAEUS SA* and *LAMDA DEVELOPMENT SA*, and one financial, *GREEK EXCHANGES SA*. This result can be explained by the fact that during our time-window, this Sector was at its peaks in the overall Greek Economic environment.

Table 3: Centrality results of the Network of Companies

A/A	NODE	DEGREE	NODE	CLOSENESS	NODE	BETWEENNESS
1	ELLAKTOR SA	63	ELLAKTOR SA	0,2901	PIRAEUS BANK SA	0,1307
2	AKTOR TC SA	59	METROPOLITAN CENTER OF PIRAEUS SA	0,2842	METROPOLITAN CENTER OF PIRAEUS SA	0,1142
3	ILEKTOR SA	58	LAMDA DEVELOPMENT SA	0,2833	ALPHA LEASING SA	0,1126
4	GREEK ENERGY & DEVELOPMENT SA	57	KANTZA TRADING SA	0,2764	KEKROPS SA	0,1012
5	ELTECH WIND SA	56	KANTZA SA	0,2764	GREEK PETROLEUM SA	0,0918
6	BIOSAR ENERGY SA	55	INTERNATIONAL ALKI SA	0,2764	GREEK EXCHANGES SA	0,0844
7	AKTOR CONCESSIONS SA	55	GREEK ENERGY & DEVELOPMENT SA	0,2756	PPCR – TERNA ENERGY SA	0,0813
8	AKTOR FM SA	54	GREEK EXCHANGES SA	0,2746	PPCR GREEK TECHNODOMIKI TC SA	0,0802
9	REDS SA	53	ILEKTOR SA	0,2731	ELLAKTOR SA	0,0738
10	GREEK ENERGY & DEVELOPMENT-RENEWABLE	51	ELTECH WIND SA	0,2726	LAMDA DEVELOPMENT SA	0,0711

We will close with a discussion of the results of centrality in relation to betweenness for the network of companies. These measurements give us very important and special insights. There is a considerable difference regarding the other two measurements, regarding a 'heterogeneity' on the industry to which these companies belong. More specifically, two companies of the banking sector are highly ranked on this list, *PIRAEUS BANK SA* (1st) and *ALPHA LEASING SA* (3h), with values 0.1307 and 0.1126 respectively. We also see an oil company, *GREEK PETROLEUM SA* (5th) with a value of 0.0918, a financial company *GREEK EXCHANGES SA* (6th), 0.0844 and to a greater extent the presence of companies in the construction industry, *METROPOLITAN CENTER of PIRAEUS SA* (2nd), 0.1142, *KEKROPS SA* (4th), 0,1012, *PPCR – Terna Energy SA* (7th), 0.0813, *PPCR GREEK TECHNODOMIKI TEB SA* (8th) with value 0.0802, *ELLAKTOR SA* (9th) and value 0.0738 and finally *LAMDA DEVELOPMENT SA* (10th) with value 0.0711. Obviously, betweenness centrality yields more important results in terms of explaining the importance of different sectors in the Greek Environment.

Corporate Governance Analysis. Data and Methodology

Data Selection

This section describes the sample, data sources, and the ownership structures of companies in the sample. Then, we examine the hypothesis developed in the previous section by analyzing the relationship between corporate ownership structure and the information content of earnings. For this section of analysis, data were obtained from the Athens Stock Exchange (ASE). From our sample we exclude companies' with negative book value.

Most previous studies on ownership structures focus on direct property - ordinary shares are owned directly by individuals or organizations. Direct property is not sufficient to characterize the structure of ownership and control of Greek companies, since these companies generally associated with complex indirect ownership. For the data selection, Claessens, Djankov, and Lang (2000), methodology were employed, identifying major shareholders of listed companies in the Greek market, with their shares, cash flow and voting rights. Moreover, the process of determining the major shareholders is quite similar to that used by La Porta, Lopez-De-Silanes, and Shleifer (2000).

As a major shareholder, defined one who has the largest percentage of the total of the voting rights of the company and who is not controlled by anyone else. If a company has not a major shareholder, is classified as broad ownership. For the purposes of research, the level of the major shareholder voting power is set to 50% and will not be considered when the level exceeds 50%.

In case of a company have more than one major shareholder; we will focus on the largest. That was based to our assumption that ownership is based on control of both cash flow and voting rights. Moreover, specific corporate information on pyramid structures and cross placements used to make the distinction between cash flow and voting rights. To facilitate the measurement of the separation of cash flow and voting rights, the maximum privilege level cash flows associated with any major shareholder is also set to 50%. However, there is no minimum cut-off level for the rights of the cash flows.

Our sample, for this section of analysis, consisted for 254 firms. Firms, whose largest absolute owners have less than 20% of the voting rights, were excluded. This restriction allows us to focus on companies controlled by shareholders and is expected to increase the strength of our control, since the entrenchment and arguments of information is more applicable to large shareholders, who have already secured effective control. La Porta, Lopez-De-Silanes and Shleifer (2000), also using the 20% cut-off level to define the controlling interest. The Bradley and Kim (1985) found interesting offers (for acquisition of the company) rarely occur in companies with controlling the level of 20%. The above data were obtained from HELLASTAT database. Data frequency span from 2009 to 2012. Moreover, we assume that the structures of ownership and control of companies have not changed substantially during this period. This is a reasonable assumption, since the economic and political conditions were unstable for companies to move to change the composition of their capital during the year due to the economic crisis.

Methodology - Regression Analysis

The methodology of least squares applied in order o determines the key relationships between stock returns and profits on Greek listed companies:

$$CAR_{it} = a0 + a1NI_{it} + (Fixed\_effects) + u_{it}$$

Where:
CARit = the cumulative net-of-market twelve-month stock returns at year *t*;
NIit = the net earnings at year *t* divided by the market value of equity at the beginning of year *t*;

Fixed effects = dummy variables controlling for fixed effects of calendar years and/or economies;
uit = error term at year *t*.

The above model is estimated from year to year, as well as collectively. Furthermore, to avoid econometric problems such as heteroscedasticity, we applied the control of white - adjusted t-statistics, for all the coefficients of determination of the model. Also, the fixed effects of calendar years and / or economies, where appropriate, are included as dummy intercepts in regressions. For simplicity, these are not listed in the table. The estimated coefficient of earnings (NI) is positive and statistically significant in all these years and economies, suggesting that earnings have an information role in Greece. According to the above we test the information content of reported earnings, on the ownership structure, using the following regression model:

$$CAR_{it} = a0 + a1NI_{it} + a2NI_{it}SIZE_{it} + a3NI_{it}Q_{it} + a4NI_{it}LEV_{it} + a5NI_{it}SEG_{i} + a6NI_{it}V_{i} + a7NI_{it}CV_{i} + (Fixed\ \_effects) + u_{it}$$

where,
CARit = the cumulative net-of-market twelve-month stock returns at year *t*;
NIit = the net earnings at year *t* divided by the market value of equity at the beginning of year *t*;
SIZEit = the natural logarithm of the market value of equity in millions of € at the beginning of year *t*;
Qit = the market value of equity divided by the book value of total assets at the beginning of year *t*;
LEVit = the total liability divided by total assets at the beginning of year *t*;
SEGi = the number of industry segment(s) in which the firm operates;
Vi = the voting rights level of the largest ultimate owner;
CVi = the ratio of cash flow rights over voting rights of the largest ultimate owner;
Fixed effects = dummy variables controlling for fixed effects of calendar years and
economies;
uit = error term at year *t*.

In the above analysis we include the ratio of market value of equity to the book value of total assets, to control for the effects of growth on the relationship between profits and shareholder return. Opportunities for growth are likely to be positively correlated with future levels of earnings and / or the continuation of earnings (Collins and Kothari, 1989, Vazakides A and Athianos S, 2010). The higher the market-to-book assets, the greater the expected increase in profit and / or continuation of gains, the stronger the relationship between profit and stock returns.

On the other hand, the market to book ratio can also be affected by corporate risk. High-growth companies may be riskier, which weakens the relationship between profit and stock returns. Also, fast- growing companies are likely to be new enterprises with lower level of information content in earnings announcements. Given these countervailing effects, the net effect of the increase in relative earnings and shareholder return, we think that therefore constitute an empirical question. Also within our model we incorporate leverage funds. Leverage could be an indication of risk of debt or bankruptcy

(Dhaliwal, Lee and Fargher, 1991). The high-level operations associated with high risk and therefore the relationship between profit - efficiency is reduced. On the other hand, Smith and Watts (1992) show that leverage can lead a company to an investment opportunity. Established companies with low growth potential generally have high leverage and are likely to press their profits to contain high- grade information. Therefore, companies with high leverage may have higher sensitivity profits and stock returns for companies with low leverage. While taking into account the risk and impact of the development, the net effect of leverage on the relationship between profit and stock returns should be determined by the model. Moreover, as another control, we include the number of sectors in which each sample company operates. Conglomerate companies because of the relatively complicated process profit-production, may have weaker relationships earnings and stock returns relative to companies operating in a single industry.

Finally, we include company size, based on market capitalization as a control for other factors that are missing and which affect the relationship between profit and shareholder return. For example, the previous literature on the U.S. case (Atiase, 1985) has documented that disclosure and the private development of information not related to the announced increase profit functions associated with the size of companies. Therefore, we will use the method of least squares, posing as the dependent variable the cumulative abnormal returns (Cumulative Abnormal Returns-CAR) with the level of voting rights (V), the degree of separation between cash flow and voting rights (CV), and the aforementioned variables identification and control.

Results

Table 4 lists the results of descriptive statistics of the variables determining the model. From these results we conclude that the set of model variables, dependent and independent, have good statistical distribution (normality).

Table 4: Descriptive statistics

Variables	Mean	Median	Min	Max	Std. Error
CAR (%)	-1.12	-6.96	-62.53	147.49	33.46
NI (%)	7.27	6.31	45.20	461.7	8.32
SIZE	12.03	11.99	7.13	17.05	1.37
Q	1.09	0.83	0.02	7.98	0.95
LEV (%)	46.83	44.16	0.08	259.95	23.57
SEG	2.55	2.00	1.00	9.00	1.16
V (%)	29.93	30.00	20.00	50.00	10.37
CV	0.85	1.00	0.13	1.00	0.22

Table 5 presents the results of the regression model. This model was evaluated in two sets of regressions. In the first equation we used all the observations of the sample, excluding the observations of variable determining V (the major shareholder voting rights) of <20%. In the second equation we used all the observations of the sample, excluding the observations of variable determining V (the major shareholder voting rights) to > 50%. First equation is numbered as (1) and second (2).

Table 5: Time series analysis of the ownership structure of firms

Fixing Model: $CAR_{it} = a0 + a1NI_{it} + a2NI_{it}*SIZE_{it} + a3NI_{it}*Q_{it} + a4NI_{it}*LEV_{it} + a5NI_{it}*SEG_i + a6NI_{it}*V_i + a7NI_{it}*CV_i$ + (Fixed effects) + u_{it}

	Equation (1)	Equation (2)
Intercept	-0.18***	-0.17***
	(-10.39)	(-9.09)
NI	-0.59	-0.99
	(-1.17)	(-1.79)
NI*SIZE	0.10***	0.12***
	(2.67)	(2.89)
NI*Q	-0.00	-0.03
	(-0.05)	(-0.34)
NI*LEV	1.03***	0.99***
	(4.09)	(3.71)
NI*SEG	-0.09***	-0.11***
	(-2.71)	(-2.83)
NI*V	-1.20**	-0.21
	(2.47)	(-0.29)
NI*CV	0.69***	0.74***
	(3.49)	(3.44)
Adj-R^2	0.27	0.26

****** Significance level of 1% (2-tailed).***
***** Significance level of 5% (2-tailed).***
**** Significance level of 10% (2-tailed).***

Regarding the test pattern determining variables are: where CAR_{it} net accumulated equity returns of the firm i in year on year at the time t. The annual returns are based on a continuous monthly recapitalization, until the announcement at the annual outturn statement. NI_{it}, relates to net earnings in year t divided by the market value for year t for firm i. $SIZE_{it}$, is the natural logarithm of the market value of the firm at the beginning of year t for firm i. Where Q_{it} the market value of the company divided the book value of total assets at the beginning of year t for firm i. LEV_{it}, total liabilities divided by total assets at the beginning of year t for firm i. Where SEG_i, is the number of parts of the industry where the company develops i. V_i, terms of voting rights of major shareholders (shareholders with significant stakes) of company i. Finally, where CV_i, represents the ratio of voting rights to receive cash flows mainly shareholders i.

Specifically, we found that the reporting of profits by the big companies (large base of the cap) containing further information as determined by the statistically significant and positive coefficient of NI * SIZE, with a degree of significance for p <1%. Instead, the rate NI * Q have a non- statistically significant suggesting that the risk and impact of development offset from one another. The estimated coefficient of NI*LEV is statistically significant at level p <1% and is consistent with the view that firms particularly high borrowing (Leveraged) tend to be mature businesses that provide a high degree of information through the reported profits. The coefficient of NI * SEG presented negatively also statistically significant for p <1%, suggesting that corporate groups conveying less information via their profits.

This gives us evidence that despite the adoption of the International Accounting Standards, members of the BoD's of the Greek listed companies in the stock market has not achieved full compliance with

the standards and disclosure requirements imposed, in respect of intra-corporate transactions. Instead, the NI rate is negative but statistically insignificant. This does not mean that profits do not provide information because the regressions indicate that stock returns are significantly related positively to profits. The relationship becomes insignificant in equation (1), because the inclusion of additional independent variables can be tested for the bulk of the change in NI, reducing the interpretive power. The intercept is also negative and statistically significant, which (the minus sign) that might be due to the omission of expected profits.

In particular, when included in a model with lagged earnings as expected earnings and replacing net income by the change in profits (earnings minus current year earnings lagged divided by the market value of the company hysteresis) in a regression model, the effect size of intercept reduced to more than half.

Certainly the focus of the analysis in Tables 4 and 5 is the role of the ownership structure of listed companies. The results of the model (1) show that the coefficient of determination NI * V is negative and statistically significant at the level of p <5%. This result is consistent with the effect of information that the concentration of units with large voting rights associated with privacy and low-level information content in earnings press releases. The result also shows that the impact of information, there is the incentive alignment, which provides that an additional concentration of ownership beyond the minimum level of effective control increases the information content of earnings.

To better understand the economic importance of the result, we tested the model of regression (1), using the average of all variables by calculating the change in the cumulative abnormal return (CAR) that will be caused by the effect of an increase in standard deviation units of variable voting rights (V). The results show that when the variable V increased from its mean, which is 30%, by one standard deviation at 40%, the level of cumulative yields abnormally (CAR) is reduced by 1%, which corresponds to a change equal 9% compared with the previous level.

Furthermore, we tested the effect level caused the transfer of information through profits from the separation of ownership share in the company cash flow and voting rights. The relationship of the index holdings in cash CV, by definition, is inversely proportional to the deviation of the voting rights based on equity. Therefore, to be consistent with the effect of vesting and / or the impact of information, there should be very positive statistically significant estimate of the coefficient CV. Consistent with our conjecture above , the coefficient of determination CV is positive and statistically significant at level p <1%. The above result expressed in terms of economic significance indicates that when all independent variables are measured based on their instruments; a reduced rate of CV from the medium (85%) by one standard deviation in 63% associated with 1% reduction in the level the cumulative abnormal returns (CAR), which represents a 11% decrease from the previous level.

In short, when the owners and major shareholders effectively control their business levels voting rights are negatively related to the information content of reported earnings. This suggests that the effect of information dominates over the incentive alignment of

ownership. We also found that, after reaching the level of control of voting rights, the voting rights arising from shares held in the capital, weaken significantly the information content of reported earnings. This result is consistent with the phenomenon of the effect of entrenchment of rights. Simultaneously, it is consistent and the phenomenon of channeling information, provided that the owners hold major shares control, tend to use multiple operators or pyramidal ownership structures for the protection of the information associated with other gainful activities. Their strategy was confirmed by the first level of analysis of this study, which concludes the existence of the same persons in positions other board business, either as a parent-subsidiary (group of companies) or as independents.

Respectively the results are listed in Table 6. Specifically, we observe that the variables NI * SIZE, NI * Q, NI * LEV and NI * SEG, show variations in terms of their statistical significance per year, which characterizes the high level of volatility in the economic environment of our country.

Table 6: Regressions results in interaction with the ownership structure

Model specification: $CAR_{it} = a0 + a1NI_{it} + a2NI_{it}*SIZE_{it} + a3NI_{it}*Q_{it} + a4NI_{it}*LEV_{it}\ a5NI_{it}*SEG_{i} + a6NI_{it}*V_{i} + a7NI_{it}*CV_{i} + (Fixed\ effects) + u_{it}$

	2009	2010	2011	2012
Intercept	-0.26***	-0.01	-0.27***	-0.25***
	(-7.51)	(-0.28)	(-8.35)	(-10.97)
NI	-1.28	1.25	-2.61**	0.24
	(-1.03)	(1.05)	(-2.08)	(0.23)
NI*SIZE	0.29***	-0.18*	0.33***	-0.01
	(3.39)	(-1.94)	(3.61)	(-0.12)
NI*Q	-0.32	-0.13	-0.22	0.26*
	(-1.43)	(-0.61)	(-1.22)	(1.79)
NI*LEV	0.44	1.46**	-0.10	1.54***
	(1.09)	(2.13)	(-0.19)	(3.42)
NI*SEG	-0.14*	-0.06	-0.12*	0.04
	(-1.87)	(-0.67)	(-1.77)	(0.55)
NI*V	-3.14***	-0.07	-0.85	-2.30**
	(-3.26)	-(0.06)	(-0.76)	(-2.42)
NI*CV	0.99**	1.13**	0.88*	0.77*
	(2.17)	(2.19)	(1.89)	(1.72)
Adj-R^2	0.21	0.16	0.19	0.20

****** Significance level of 1% (2-tailed).***
***** Significance level of 5% (2-tailed).***
**** Significance level of 10% (2-tailed).***

Also, as already mentioned above, in the determination of the variables under consideration, or are divided by market value, which varies strongly due to the economic crisis, either by total assets, which also varies considerably.

Regarding the variables determining the ownership structure of firms, we observe that although NI * V is negative and statistically significant only in the years 2009 and 2012 for p <1% and p <5%, but this does not negate the negative impact as to the percentage of accumulated abnormal returns (CAR%). Also the coefficient of determination NI * CV remains positive and statistically significant for the whole period under consideration (2009-2012) and at levels p <5% and p <10% for the 2009-2010 and 2011-2012 respectively.

As observed in both cases the results are consistent with the literature, making clear that while there is a high concentration of voting rights via shares, so weakened the informational role of reported earnings.

Conclusions

From the above discussion and results, it is obvious that both networks investigated show a large degree of cohesion. Interactions are also quite easy, since the diameters are small and average shortest paths also low. Large components also show that both networks are highly interconnected. In this key role played by the simultaneous presence of persons who make up their Boards of Directors, i.e. may support with certainty that there is a significant degree of interdependence and interaction in the overall network effect.

We also expected that the joint service of persons in more than one company will give us important data. This hypothesis was confirmed by the analysis of the network of people, as we realized that this is a network with a high degree of concentration, with a significant number of persons linked together, to interact, to be recipients of large amounts of information and play a very important role in manipulating and disseminating them. There is a significant concentration of information and interaction effect covering our initial goals. One of the main objectives of the study was confirmed as the final form of the network of companies, appears to interact heavily with the majority of the number of selected companies in the sample, correlate and creates a common information network (Quan-Haase, A., Wellman, B., 2006).

The economic crisis in the Greek economy since 2008, led us to investigate whether the level of publication of financial data of listed companies in the Greek stock market is sufficient. Although this problem should have been solved in 2005 by the mandatory adoption of International Financial Reporting Standards, the results show that the Greek supervisory authorities and the Greek companies have "eased" significantly observance of the necessary disclosures as provided by the standards (Athianos, S *et. al,* 2005).

In our research we hypothesized that high level of ownership concentration, while the high degree of separation of ownership and control, which is common for the Greek market, weakens the information content of reported earnings to investors. Two explanations are provided. The first explanation is based on the control rights of the owners. The reliability of earnings weakened because the minority expects the ownership structure gives major shareholders the ability to control both the ability and the incentive to manipulate earnings either to their final elimination or reference publications that do not involve information on earnings, aiming to avoid detection of activities erase profits. The second explanation relates to proprietary information. As speculative activities are widespread and highly profitable in this field, it is in the interests of speculators, who seek the high concentration of ownership of firms by making rights, so that their activity may not be obvious to potential competitors and the investing public. The argument concerning the effect of information provides that the high concentration of ownership associated with low levels of information on the announced earnings.

The empirical results of this study are generally consistent with the above arguments.

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