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# Corporate performance, managerial ownership and endogeneity: A simultaneous equations analysis for the Athens stock exchange☆

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ABSTRACT

This paper investigates the relationship between managerial ownership and firm performance by considering the endogenous nature of the ownership variables. We conducted our analysis by applying a simultaneous equations framework. We empirically controlled the direction and significance of this relationship, using a panel comprised of 146 firms quoted on the Athens Stock Exchange between 2000 and 2004. The main findings of our analysis indicated that when managerial ownership is treated as endogenous, there is a positive impact on corporate value. Given the particularly high degree of managerial ownership that is observed in the firms listed in the Athens Stock Exchange, we argue that the estimated positive relationship can be mainly explained by the existing high levels of managerial ownership.

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## 1. Introduction

The relationship between ownership structure and corporate value remains a long-standing issue in corporate finance. Although voluminous literature has emerged over the last two decades there

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has been no agreement on its empirical verification. Earlier literature recognizes a conceptual interrelationship between economic and ownership variables referred to as the endogeneity problem. The motives/interests of the insiders and their effect on the value maximization process are currently investigated more with regard to the direction of the causality and rather less to its statistical significance.

Both theoretical and empirical arguments suggest that the problems linked to corporate control are due to the diffusion of ownership. To a certain degree, it is reasonable to consider that a conflict of interests between the managers, whose primary target is the maximization of their own utility function, and the owners who have traded their involvement in the decision making process in favor of higher profits, was generated by an allegedly more efficient management.

Based on this approach research undertaken until the mid-90s focused on the level of insider ownership whenever this managerial discretion was offset by shareholders' wealth (convergence of interests hypothesis).[1] Despite the fact that most of the empirical work has led to conflicting results, the main finding was that firm performance was not a determinant of ownership.

Recent corporate governance literature questioned two important assumptions made in the earlier empirical work. Demsetz and Lehn (1985) contradicted the persistence in a linear relationship between accounting measures and ownership variables and supported the notion that the coefficients of single equation models are biased. On the other hand, many researchers supported the view that ownership structure is endogenous and should be modeled as an endogenous variable in order to avoid biased regression estimates.

More specifically, Demsetz (1983) argued that firms undergo rapid and drastic changes in their ownership structure in response to their profitability. In this respect, firm performance could be a determinant of ownership structure for reasons related to insider information or to performance based compensation. Demsetz and Villalonga (2001) pointed out that ownership structure is chosen so as to maximize firm performance, while Himmelberg et al. (1999) supported the notion that ownership structure may be endogenously determined by the firm's contracting environment. In other words, when we account for the interrelationships under the framework of endogeneity (Loderer and Martin, 1997; Cho, 1998; Himmelberg et al., 1999; Demsetz and Villalonga, 2001), a common conclusion is that managerial ownership, does not predict performance.

The main objective of this paper is to investigate the direction, as well as the nature, of the systematic relationship between managerial ownership and firm performance, using a sample of firms quoted in the Athens Stock Exchange. Most of the empirical works have focused on examining the existence of this relationship for the US, the UK and other mature stock markets and limited attention has been given to the emerging capital markets (see, for example, Loderer and Martin, 1997; Cho, 1998; Himmelberg et al., 1999; Demsetz and Villalonga, 2001). Our analysis was carried out in a simultaneous equations framework in which firm performance and managerial ownership were treated as the endogenous variables. We estimated our system with the application of 2SLS and 3SLS econometric methodologies using panel data for 146 firms listed in the Athens Stock Exchange for the period 2000–2004. Moreover, we provided formal testing procedures to test for the quality of the instrumental variables used as additional explanatory variables as well as for the exogeneity of the managerial ownership and external blockholders variables.

There are a number of interesting findings that stem from our analysis. First, it is shown that the degree of ownership concentration is an important determinant to the relationship between ownership and a set of important economic variables. Second, our results strongly indicate that there is a statistically significant positive relationship between managerial ownership and firm performance.

The remainder of this paper is organized as follows. Section 2 provides a brief review of the literature on the relation between managerial ownership and firm performance. In Section 3 we discuss the data construction and the variable definition. Section 4 presents our model and discusses the choice of

[1] Morck et al. (1988) and McConnell and Servaes (1990) tried to define the percentage of managerial ownership in which managers change their attitude. According to Morck et al. (1988) a positive relation exists between insider ownership and firm performance between 0% and 5%, and also beyond 25%. On the other hand, they observed a negative relation between 5% and 25%. McConnell and Servaes (1990) supported the notion that a positive relation exists up to 50% between managerial ownership and firm performance, with the relation becoming negative from there on.

the instruments. Section 5 describes the results of the empirical analysis and Section 6 presents our summary and concluding remarks.

## 2. Literature review

The issue of whether ownership structure affects performance has been the subject of a large number of studies, for which a definite conclusion has not been reached. It is worth noting that during the last three decades research has mainly focused on the importance of managerial ownership and its potential impact on firm performance. Most of the literature has discussed the endogenous nature of the relationship between managerial ownership and firm performance, rather than investigating the potential impact the latter has on the former.

Loderer and Martin (1997) applied simultaneous equations estimation methodology by setting managerial ownership and firm performance, as endogenous variables in a two equation system. Using a large sample of 867 corporations, which participate in buy-outs, they concluded that managerial ownership does not affect the performance of the firm. However, they claimed that high performance leads to lower levels of managerial ownership. A possible explanation of this negative effect of corporate performance on managerial ownership is that Tobin's Q measures growth opportunities that were already capitalized in the stock price. Therefore, there is no reason for managers to hold stocks of firms with high corporate value.

Cho (1998) examined the relationship between ownership structure, investment, and the company's value with respect to the potential role of the ownership structure as a determining factor on investment. In a sample of 326 firms from Fortune 500, the author found different results depending on the econometric method employed. When the OLS method is applied, ownership structure seems to affect the value of the firm while the use of simultaneous equations shows that investments affect firm performance, which in turn affects ownership status, but not vice versa.

Himmelberg et al. (1999) argued that both managerial ownership and firm performance are endogenously determined by exogenous changes or other factors within the spectrum of the firm. Using an unbalanced (over time) 12-year sample, they extended the results of the cross-sectional analysis by Demsetz and Lehn (1985) and found that managerial ownership could be explained by a set of specific variables linked to the firm environment in a way that satisfies the predictions of the agency theory.[2] Using panel data and controlling for fixed firm effects, they found no statistically significant correlation between managerial ownership and corporate performance. In contrast, when instrumental variables are used along with examining for endogeneity of ownership, they found that a quadratic specification describes the effect of ownership on firm performance. Himmelberg et al. (1999) concluded that previous works were unable to examine the non-observable heterogeneity of the business (which affects both ownership status and performance), and hence any relationship detected might result from spurious correlations.

Demsetz and Villalonga (2001) examined the issue of ownership structure and corporate performance from a different perspective arguing that no previous study had treated ownership structure correctly. Ownership structure should not be considered as an endogenous variable but rather as a synthesis of many shareholders with different interests. They empirically investigated their assumptions, using both OLS and 2SLS methods, in a sample of 223 firms quoted in the Fortune 500 list, for the time-period 1976–1980, and concluded that ownership structure, whether defined as high concentration or wide diffusion, does not appear to have a significant impact on firm performance. However, their attempt to control for the inverse relationship appeared to yield a generalized conclusion that the market succeeds in creating efficient ownership structures for the firms they serve. These structures differ across firms due to differences in the business environment.

Davies et al. (2005) proposed an alternative structure to the managerial ownership–corporate value relationship. Their model captured nonlinearities in this relationship at high levels of managerial

[2] They distinguish the variables into qualitative and quantitative. In order to explain the effect of qualitative variables on the wider environment of a business, they gave the example of the high technology owners may use to control managers, the intangible assets of a business, etc. At the same time, they mentioned the size of a business, cash flows, Research and Development Expenses, Publicity expenses, etc., as variables of quantity.

holdings and had a quintic specification.[3] By using an extensive sample of 752 industrial companies listed on the London Stock Exchange for the year 1995, the authors concluded that even if one accounts for the endogenous relationship between managerial ownership and corporate value misspecification in the model, this still may lead to spurious conclusions concerning the direction of causality. They provided evidence that the managerial ownership–corporate value relationship is co-deterministic; suggesting that the correct form for the above relationship is a double humped curve.[4]

Cheung and Wei (2006) examined the relationship between insider ownership and corporate performance in the presence of adjustment costs. They suggested that the existing literature was unable to distinguish between optimal ownership and observed ownership. According to the authors, the possible difference between the optimal ownership structure which theoretical models attempt to explain, and the observed ownership, which empirical studies observe, is due to the presence of adjustment costs.[5] Cheung and Wei (2006) found that in a model specification without adjustment costs managerial ownership is positively associated with firm performance. But once allowance is made for adjustment costs, the above relationship no longer exists.

A different approach regarding the impact of large managerial ownership in firm performance is suggested by Gomes (2000) and Acharya and Bisin (2009), who argue that when managerial ownership is large it is possible that another hypothesis operates, suggesting a negative relationship even when managerial ownership is large. Therefore, Gomes (2000) and Acharya and Bisin (2009) provided evidence against the conventional hypothesis of the interest alignment and management entrenchment effect. More specifically, Gomes (2000) argued that opposite effects like the reputation effect are also in force when ownership is large, which is the case for Greece and other emerging markets with weak market regulation. Gomes (2000) further suggested that in firms with high managerial ownership, managers are interested in reputation in the long run. Therefore, managers with large shareholdings commit themselves to not expropriate from small shareholdings but rather to hold concentrated equity ownership. By so doing, managers provide a guarantee to investors who are willing to build a reputation for consuming low levels of private benefits. It may be possible that the reputation hypothesis could make the documented positive relationship weaker in the Greek capital market where there is a limited number of institutional investors who are not active enough. Acharya and Bisin (2009) also argued that managers are required to hold their firm shares in order to limit their incentive to seek private benefits when they choose projects with different expected cash flows. In addition, Acharya and Bisin (2009) examined the relationship between managerial ownership and the extent of aggregate risk in a firm's cash flows.[6]

Karathanassis and Drakos (2004) set out to examine how ownership structure affects firm performance in the Greek capital market. With the use of a sample of 59 firms quoted on the Athens Stock Exchange for the period 1996–1998 and with the employment of a combination of time series and cross section data (panel data analysis, checking both for fixed and random effects), they failed to find any relation between managerial ownership and firm performance. When testing for the impact of institutional shareholdings however, they found a positive relation with corporate value, interpreting their results as supporting the efficient monitoring hypothesis. Our considerations over their findings

[3] The model specification that Davies et al. utilised extends the cubic or quadratic specification assumed previously (Morck et al., 1988; Short and Keasey, 1999), to a 5th degree exponential equation as follows: $Q = a_0 + a_1\mathrm{MO} + a_2\mathrm{MO}^2 + a_3\mathrm{MO}^3 + a_4\mathrm{MO}^4 + a_5\mathrm{MO}^5 + \varepsilon$.

[4] Previous studies limited the turning points for the relationship of managerial ownership and corporate performance to two and by construction only one hump. For example, Morck et al. (1988) and Himmelberg et al. (1999) suggested almost identical turning points (5% and 25%, respectively). Davies et al. (2005) added another two turning points at much higher levels of managerial ownership and they observed therefore a double humped curve. Firm Performance increases in firms for managerial ownership levels up to 7%, then declines until 26%, increases again up to 51%, decreases until ownership levels reach 76% after which Tobin's Q increases.

[5] Cheung and Wei (2006) argue that insiders will change their ownership only occasionally because of the cost of ownership adjustment. Therefore observed ownership deviates from optimal ownership because impediments to quick adjustment exist. Examples of these are as follows: (1) Legal restrictions on insider trading, (2) Corporate restrictions on insider trading, (3) Short selling constraint, (4) Information asymmetry, (5) Number of insiders, (6) Insiders' market timing and (7) The amenity of a firm's outputs.

[6] We thank an anonymous referee for bringing into our attention these relevant papers to our attention.

are both on the methodology employed, since the ownership variables were treated as exogenous, and on the database used, since such a limited sample cannot lead to robust results.

Recently, Kapopoulos and Lazaretou (2007) relaxed some of the theoretical and sample constraints imposed in Karathanassis and Drakos (2004) by employing a simultaneous equation framework for 175 listed firms in 2000. The empirical findings suggested that a more concentrated ownership structure relates positively to higher firm profitability. They interpreted the results as supporting the notion that the larger the ownership concentration, the more effectively management behaviour is monitored. Despite the fact that the size of the sample is adequate enough to draw conclusions, a more sophisticated approach requires the elaboration of a longer period of time.

## 3. Data and variable definitions

Our data consisted of a representative sample selected from the total number of firms listed on the Athens Stock Exchange for the period 2000–2004. Annual data on ownership structure were manually collected from corporate annual reports while performance data were taken from DATASTREAM. The sample of firms employed in our study was subject to the following criteria: (a) the firms must have been quoted on the Athens Stock Exchange at least 1 year before year of analysis; (b) firms in the financial sector were excluded, (c) publicly owned utility firms were excluded and (d) firms that changed ownership structure due to mergers, acquisitions or takeovers were excluded. With these limitations and exclusions taken into consideration we obtained a large sample of firms consisting of 146 companies for 2000, 187 for 2001, 198 for 2002, 207 for 2003 and 216 for 2004, obtaining a total sample of 954 firm-years.

The key variables of interest are measures of ownership structure and firm performance. For ownership variables we focused on managerial ownership without neglecting the importance of other variable determinants to a firm's ownership structure. Following the Demsetz and Villalonga (2001) and Davies et al. (2005) studies, we investigated the role of Inside Managers, External Blockholders and Largest Shareholders irrespective of their position in the firm's management.[7] Furthermore, in our attempt to depict the patterns of the ownership structure in Greek Firms, we used a number of different ownership variables such as Board Ownership, Institutional Investor Ownership, CEO Ownership, Free Float, and Family Ownership. This was carried out in order to detect the presence and the extent to which the various identifiable individuals or stockholding entities were involved, since according to Karathanassis and Drakos (2004) the prevailing characteristics of ownership structure in Greece are fundamentally different from those of the developed Western economies such as the US and UK.[8]

The standard Tobin's Q ratio was chosen to measure corporate performance. In the present analysis, we used an approximation of Tobin's Q (Chung and Pruit, 1994; Perfect and Wiles, 1994) which requires only basic financial accounting information. The selection of control (instrumental) variables followed the paradigms of previous empirical studies, modified accordingly to suit certain characteristics of the Greek capital market (Table 1).[9]

## 4. The model

A number of studies over the last few years have attempted to solve the problem of endogeneity through the application of simultaneous equations as it is thoroughly shown in Bhagat and

[7] More specifically, Demsetz and Villalonga (2001) exploited the variables of managerial ownership and external Blockholder ownership in the firm performance equation and Davies et al. (2005) also added the Largest Shareholder variable to the same equation.

[8] The dominant features of Greek ownership are a high degree of concentration, remarkably high insider ownership (72%), low levels of institutional ownership (3–4%) with the degree of dispersion (free float) varying at low levels between 21% and 23%.

[9] Contrary to financial datasets provided for other markets, we found no reliable data (and if any, it was quite limited) concerning research and development expenditure, advertising expenditure, etc.

**Table 1**
Definition of variables.

| Variable | Definition | Source |
|---|---|---|
| Endogenous variables | | |
| man_own | Managerial Ownership. percentage of shares owned by inside directors of the Board | Annual reports |
| Q | Firm Performance. Tobin's Q approximation = (TMV + DEBT)/TA. TMV, is the year and total market value of the firm, comprising the market value of the common and the preferred stocks. DEBT, the year and book value of the firm's debt. TA, the firm's year and book value of total assets | Datastream |
| Exogenous variables | | |
| ln_assets | Log of Total Assets | Datastream |
| divp | Dividend Payout Ratio. The annual dividends per share divided by the Earnings per Share | Datastream |
| stdev | Standard Deviation of monthly stock returns | Datastream |
| debtoas | Total Liabilities over Total Assets | Datastream |
| ext_own | External Blockholders. Legal or natural persons (excluding institutional investors) who are detached from firm's management and whose stockholdings exceed 1% | Annual reports |
| Largest | Largest Shareholder. Percentage of shares owned by the Larger Shareholder | Annual reports |
| Other variables | | |
| Bod Own | Board Ownership. Percentage of shares owned by the Board of Directors | Annual reports |
| Out Own | Outside Ownership. Percentage of shares owned by the Outside Directors of the Board | Annual reports |
| CEO Own | CEO Ownership. Percentage of shares owned by the CEO | Annual reports |
| Inst Own | Institutional Investors ownership | Annual reports |
| FF | Free Float. The residual category that includes non-identifiable, shareholders, small individual, entities or group of shareholders, for whom we have no information and the respective ownership stake, is lower than 1% | Annual reports |
| Fam Own | Family Ownership. Percentage of shares owned by families | Annual reports |

Jefferis (2002). They argue that most studies, which have investigated the mechanisms of corporate governance, have not considered the endogeneity problem, and consequently they lack a correct interpretation of their empirical results.

Loderer and Martin (1997) and Demsetz and Villalonga (2001) removed the endogeneity problem by using systems of simultaneous equations. In applying this technique one should be cautious with regard to the specification of the model and the instrumental variables employed (Barnhart and Rosenstein, 1998), since there is no specific theoretical framework on the design of the econometric model with regard to the relationship between managerial ownership and firm performance.

Given the lack of theoretical background on the design of econometric models regarding the issues of corporate governance, we based the specification of our model on the one developed by Demsetz and Villalonga (2001). The system of equations consists of two equations, in which managerial ownership and corporate performance (Q) are the endogenous variables. Six explanatory variables were used in this study. The order and the rank conditions were satisfied and therefore the equation system was identified.[10]

$$man_own = a_0 + a_1 Q + a_2 \ln_assets + a_3 divp + a_4 debtoas + a_5 stdev + u_1 \quad (1)$$

$$Q = b_0 + b_1 man_own + b_2 ext_own + b_3 \ln_assets + b_4 debtoas + b_5 Largest + u_2 \quad (2)$$

Our first regression equation, considers managerial ownership (*man_own*) as a dependent variable. Following the standard agency literature, we chose Tobin's Q ratio as the measure of performance (Agrawal and Knoeber, 1996; Demsetz and Villalonga, 2001). Tobin's Q ratio Eq. (1) appears as an explanatory variable, consistent with the view that ownership structure affects firm performance, which in turn might determine ownership structure. Instrumental variables such as the size of the firm proxied by *ln assets*, the firm's leverage (*debtoas*), the dividend policy (*divp*) and the market risk (*stdev*),

[10] In a model of M simultaneous equations, in order for an equation to be identified it must exclude at least M-1 variables (endogenous as well as predetermined) appearing in the model. If it excludes M-I variables alone, the equation can just be identified. If it excludes more than M-1 variables it is over-identified (Gujarati, 2003).

were included in order to capture other determinants of managerial ownership factors (Demsetz and Villalonga, 2001).

More specifically, *ln assets* was set to proxy the size of the firm (Demsetz and Villalonga, 2001; Beiner et al., 2006). The plausible relationship between managerial ownership and firm size suggests that larger firm size requires more investment from an owner of a given proportion of equity; therefore, the variable *ln_assets* was expected to produce a negative indication. Leverage (*debtoas*), was included in the managerial ownership equation in order to monitor the likelihood that debt holders strongly influence the management of firms (Short and Keasey, 1999; Demsetz and Villalonga, 2001).

The exogenous variable *stdev* (Demsetz and Lehn, 1985; Loderer and Martin, 1997) satisfied the intuition that higher volatility creates stronger incentives for outsiders to take over managerial responsibilities. Therefore, managerial ownership should be positively related to volatility. The final instrumental variable used in the managerial ownership equation, was the dividend payout ratio (*divp*). Previous results on the relationship between managerial ownership and dividends have shown that a negative relationship exists.[11]

The second equation described a reverse causation in the relationship between firm performance and ownership structure in which managerial ownership was treated as endogenous. To deal with the likelihood that a set of factors may affect Tobin's Q, we searched for additional variables to be included in the regression. Thus, we included External Blockholder Ownership (*ext_own*) as an explanatory variable. In contrast to Demsetz and Villalonga (2001) we restricted consideration to the percentage of shares held by External Blockholders exceeding 1%. Furthermore, Demsetz and Villalonga (2001) calculated the percentages of the five larger shareholders, including the shareholders of the Board. They also argued that the correlation between Managerial Ownership and the five major shareholders reached 47%. Within the framework of this study we made a clear distinction between Managerial Ownership and the Ownership of the External Blockholders. Contrary to other studies, we chose to incorporate all significant External Shareholders (who are neither institutional investors nor have any relationship to the Board of Directors) holding more than 1%, as External Blockholders. No previous study has treated this variable in this way, since they all consider size to be of greater importance than presence. The reasoning behind this approach is that since the ownership structure in our sample appears less concentrated than the ownership pattern reported in the study of Karathanassis and Drakos (2004), one should expect that the role of External Blockholders might become more active either independently or in a proportion of Blockholders. Whatever the case, we attempted to investigate whether their role remains passive or if they exercise any kind of control.

Most of the previous works used the following instrumental variables as important determinants of Tobin's Q ratio: research and development expenditures as a proportion of sales revenues, advertising expenditures as a proportion of sales revenues, expenditures of fixed plant and equipment as a proportion of sales revenues, etc. Given the absence of reliable data, concerning the above variables for the Greek capital market, the inclusion of these variables was not feasible.

Following the valuation model advanced by Karathanassis and Drakos (2004), we included the following explanatory variables in the firm performance equation in addition to the external ownership (*ext_own*), the size of the firm (*ln assets*), the financial leverage (*debtoas*) and the largest shareholder (*Largest*). The variable *debtoas* appeared as an explanatory variable in the firm performance equation, in order to capture the value enhancing or value reducing effects of the differences that might exist between the interest obligations incurred when borrowing took place and the interest rates that prevailed during the period 2000–2004 (Demsetz and Villalonga, 2001). *Largest* Shareholder was included as an instrument for the impact of a founding or a dominant individual in corporate value. A similar approach was also adopted by Davies et al. (2005).

Further to the economic intuition the selection of the explanatory variables was also driven by the sample's sensitivity to the use of a subset of these variables. For example, while the inclusion of

[11] Jensen et al. (1992) examined the determinants of cross sectional differences in managerial ownership, debt and dividend policies, and found that high managerial ownership firms chose lower levels of both debt and dividends. Fenn and Liang (2001) analysed how corporate payout policy is affected by managerial stock incentives and they found a strong negative relationship between dividends and management stock options.

external blockholders as a material variable to the performance equation resulted from the model of Demsetz and Villalonga (2001), the variable related to the institutional shareholdings created serious problems to the explanatory power of the model.

## 5. Empirical results

### 5.1. Descriptive statistics

The first stage of the empirical analysis deals with the description of patterns of ownership structure in the listed firms at the Athens Stock Exchange. Apart from the static description within the period examined, a comparison with the average percentages of the shareholding groups discussed in Karathanassis and Drakos (2004) revealed a number of stylized facts about the evolution of each major group of shareholders.

Beginning with the ownership variables of the shareholders in the Board of Directors, we emphasized the low presence of the Non-Executive members (3.14%) and the constant level of both CEO and managerial ownership. More specifically, the mean ownership percentages of the Board of Directors' ownership (*Bod_own*), was 38.7%. The mean proportion of equity held by the executive members of the board (*man_own*) was 35.51%. The ownership percentage of the CEO (*CEO_own*) was 20.23%, corroborating perception of the significant role the owners have on the decision-making process.

Among the shareholders external to management, the group consisted of the External Blockholders (*Ext_Own*), indicating a noticeable shift to higher levels of ownership compared to their participation reported in Karathanassis and Drakos (2004), reaching an average of 21.58%. On the other hand, the presence of the Institutional Investors (*Inst_Own*) still remained insignificant at the levels reported in the same study (2.48%). The holdings of institutional investors varied at low levels, due to the fact that publicly owned utilities from the firms' financial sector were excluded.

The last two ownership variables included, are associated to the ownership percentages of the major shareholders and families. The descriptive statistics from Table 2 depicts that ownership percentages of the Largest Shareholder (*Largest*) are similar to the cumulative shareholdings of the members of the Board. This means that the dominant or major shareholders may appoint representatives as members of the Board to take care of their interests. This finding, along with the high ownership of the Largest Shareholder (38.06%) led to the model of the owner-manager firm. Finally the mean proportion of equity held by families (*fam_own*) was 25.51%.

The overall conclusion derived from the above discussion is that, despite the shift towards more diffused ownership over the last 10 years, the prevailing characteristics of the ownership structure of the firms listed in the Athens Stock exchange still differ significantly from the ownership patterns of the US and UK. On average, managerial ownership in the US and UK, varies between 9% and 13%, while the respective percentage for the Greek firms exceeds 35%. We also found a noticeable difference in the institutional shareholdings, their level of ownership being trivial compared to the respective ones in the US and UK peer groups, where institutional ownership varies between 37% and 52% and higher than 15%, respectively. Finally, it is worth noting that External Blockholder ownership exceeds 21% for the Greek firms while the presence of External Blockholders in US and UK firms ranges between 7.5% and 10%. However, recently Holderness (in press) cast doubt on the long standing stylized fact regarding the dispersed ownership of US public firms. He presented evidence that the absence of strong Blockholders is a myth. The empirical findings of his study indicated that among a representative sample of 375 listed firms, 96% of them had Blockholders. Moreover, these Blockholders owned an average of 39% of the common stock.[12]

The observed strong presence of External Blockholders compared to weak institutional shareholdings, might be attributed to the preference of individuals to manage a personal diversified portfolio, rather than invest in fund accumulation. If this is the case, one should expect that the role of External Blockholders might be more active in the sense that they should exercise (even implicitly) control over management.

[12] We thank an anonymous referee for bringing this recent evidence to our attention.

**Table 2**
Descriptive statistics.

| | Mean | Median | Standard Deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| Bod.Own | 38.70 | 41.64 | 27.84 | 0 | 92.7 |
| Man_own | 35.51 | 36.83 | 27.42 | 0 | 92.7 |
| Out.Own | 3.18 | 0.00 | 9.64 | 0 | 69.11 |
| CEO.OWN | 20.23 | 15.22 | 21.90 | 0 | 84.12 |
| Ext_own | 21.58 | 12.67 | 23.99 | 0 | 86.97 |
| Inst.Own | 2.48 | 0.00 | 6.19 | 0 | 50.9 |
| FF | 36.61 | 33.00 | 18.61 | 7.14 | 100 |
| Largest | 38.06 | 35.13 | 18.66 | 0 | 92.7 |
| FAM.OWN | 25.51 | 0.00 | 31.21 | 0 | 88.81 |
| (ln_assets) | 11.27 | 11.15 | 1.20 | 8.04 | 15.44 |
| divp | 0.08 | 0.04 | 0.17 | 0.00 | 2.60 |
| stdev | 0.16 | 0.15 | 0.07 | 0.01 | 0.59 |
| debtoas | 0.48 | 0.49 | 0.21 | 0.01 | 2.05 |
| Tobin's Q | 1.28 | 0.98 | 1.44 | 0.12 | 30.15 |

Board Ownership (Bod Own) is the percentage of shares owned by the Board of Directors. Managerial Ownership (man_own) is the percentage of shares owned by inside directors of the Board. Outside Ownership (Out Own) is the percentage of shares owned by the Outside Directors of the Board. CEO Ownership (CEO Own) is the proportion of shares held by the CEO. External Blockholders (ext_own) are legal or natural persons (excluding institutional investors) who are detached from firm's management and whose stockholdings exceed 1%. Institutional Investors ownership (Inst Own) is the proportion of shares held by Institutional Investors. Free Float (FF) is the residual category that includes non-identifiable, shareholders, small individual, entities or group of shareholders, for whom we have no information, and whose respective ownership stake is lower than 1%. Largest Shareholder (Largest) is the percentage of shares owned by the Larger Shareholder. Family Ownership (Fam Own) is the percentage of shares owned by families. Log of Total Assets (ln_assets). Dividend Payout Ratio (DIVP) is the ratio of the annual dividends per share divided by the Earnings per Share. Standard Deviation (stdev) of monthly stock returns. Debtoas is the proportion of Total Liabilities to Total Assets. Tobin's Q measures the firm performance The Tobin's Q approximation [(TMV + DEBT)/TA]. This is the sum of the total market value of the firm (TMV), comprising the market value of the common and the preferred stocks and the year and book value of the firm's debt (DEBT), divided by the firm's year and book value of total assets (TA).

However, according to the aforementioned argument, one might question whether the observed differences between the patterns of ownership structure across firms and over time can possibly affect the relation between managerial ownership and corporate performance. It may possible that the managers are acting as controllers-owners rather than executives who maximize their utility function or consider it more appropriate to coincide with shareholder interests. Moreover, it is debatable whether within this framework a non-executive shareholder can exercise efficient monitoring over inefficient management.

### 5.2. Regression results

To estimate the model of simultaneous equations specified in Eqs. (1) and (2) we employed the 2SLS and 3SLS econometric techniques.[13] However, we must note the following issues related to the treatment of the problem of endogeneity within this context. Simultaneous equations do not necessarily lead to the solution of the endogeneity problem since this is, in principal, a problem of omitted variables but it primarily deals with the simultaneous causation problem. An appropriate approach to tackle this problem is to take advantage of panel data techniques while dealing with simultaneity, given that we employed an unbalanced panel data between 2000 and 2004 (Arellano, 2003; Baltagi, 2008; Wooldridge, 2002, 2006). Moreover, Wooldridge (2002, 2006) underlined that in order to apply a simultaneous equation technique to panel data, a correct model specification is needed. Otherwise, the results are misleading.[14] Given the above concerns, we followed Demsetz and Villalonga (2001) and we

[13] For comparison purposes we also provide the OLS estimates of the system.

[14] We are thankful to an anonymous referee for bringing into our attention these issues. Moreover, Avery (1977), Baltagi (1980) and Prucha (1984) are among the very first studies to discuss the problems with simultaneous equations when dealing with endogeneity as well as heterogeneity.

constructed time-demeaning data for all variables. Consequently, we applied simultaneous equation estimation methodologies. Since our initial sample was unbalanced, we selected a common sample of 146 firms for the 5 years (a total of 730 observations) under consideration and the transformed model is given as follows:

$$(man_own)' = \alpha + \alpha_1(Q)' + \alpha_2(\ln_assets)' + \alpha_3(divp) + \alpha_4(debtoas)' + \alpha_5(stdev)' \quad (3)$$

$$Q' = \beta_0 + \beta_1(man_own)' + \beta_2(ext_own)' + \beta_3(\ln_assets) + \beta_4(debtoas)' + \beta_5(Largest)' \quad (4)$$

There are two issues linked to the estimation procedure. First, an important element for the performance of the instrumental variables estimator is that it crucially depends on the degree of instrument relevance between instruments and explanatory variables. Low relevance results in an increase in the inconsistency of the instrumental variables in each case where the instruments are not perfectly exogenous. Furthermore, even in the case where the instruments are perfectly exogenous, low relevance increases asymptotic standard errors and therefore reduces the power of the hypothesis tests (Bound et al., 1995; Staiger and Stock, 1997; Stock, 2002; Stock and Yogo, 2005).[15]

We tested the quality of the instrumental variables used in the present analysis with the application of the testing methodology developed by Shea (1997). This test amounts to the estimation of a multivariate model and then calculates the partial $R^2$ for each endogenous explanatory variable and the instruments.[16] In our case the number of explanatory variables $X$ in each equation is five and the number of instrumental variables $Z$, is six. A necessary condition for the application of this test is that the number of instruments is greater than or equal to the number of the explanatory variables and this implies that we take all instruments of both equations together. The first step involved the regression of the set of explanatory variables of the first equation on the set of the instruments and then saves the fitted values $\hat{X}$. The second step involved regressing the managerial ownership, $X_1$, variable on the four remaining instruments and save the residuals, $\tilde{X}_1$. In the third step we regressed $\hat{X}_1$ on the remaining instruments and saved the residuals, $\bar{X}_1$. Finally, we computed the sample squared correlation between $\bar{X}_1$ and $\tilde{X}_1$, which is equal to the partial $R^2$. We repeated the same testing procedure for the second equation in which case the firm performance was the $X_1$ variable.[17] Table 3 (panel A) reports the results of the implementation of the test for the relevance of our chosen instruments. The overall conclusion is that the instruments used in the present analysis were significantly relevant based on the calculated partial $R^2$.

Second, in order to determine the relationship between ownership structure and firm's performance it is crucial that we correctly determine which ownership variable is considered endogenous. Two candidates were taken into consideration: managerial ownership and external blockholders. Several previous works have considered the way firms operate and consequently the relation that exists between managerial ownership and executive compensation plans through stocks, as well as the greater access of management to inside information as an important element that makes managerial ownership the endogenous ownership variable. However, this is a rather ad hoc consideration. We conducted a statistical analysis to determine whether managerial ownership and/or external blockholders can be regarded as an endogenous or exogenous variable in our equations system. To this end, we employed an exogeneity test examined by Wu (1973) and Hausman (1978) whose null hypothesis stated that the OLS estimates are consistent. The alternative theory is that OLS estimates are not consistent and therefore the IV estimation is required.[18] When we are unable to reject the null hypothesis it can be inferred that the IV estimates are also consistent and therefore, the variable in question is considered exogenous. In the case where we reject the null hypothesis, this implies that we correctly use the IV methodology and that the corresponding variable is treated as endogenous. We applied

[15] We thank an anonymous referee for bringing into our attention the issue of statistical inference in the presence of weak instruments. Recently Andrews et al. (2008) have developed an efficient testing procedure in the presence of weak instruments.

[16] Shea (1997) shows that the partial $R^2$ "partials out" correlation among instruments and therefore is not subject to the Nelson and Startz (1990a,b) of standard $R^2$ in a multivariate context.

[17] In case that we also consider the variable External Blockholder Ownership as an additional explanatory variable then we conduct the test again with respect to the second equation by considering this time this variable as $X_1$ and calculating the sample squared correlation between $\bar{X}_1$ and $\tilde{X}_1$. In this case the vector of instruments has five elements.

[18] See also Greene (2008). Smith and Blundell (1986) and Connelly (1992) have developed similar exogeneity tests.

**Table 3**
Simultaneous equations estimation.

Panel A. Estimates and diagnostics[a]

| | 2SLS | | 3SLS | | OLS | |
|---|---|---|---|---|---|---|
| | (man own)′ | (Q)′ | (man own)′ | (Q)′ | (man own)′ | (Q)′ |
| C | 1.23 (0.31) | 0.48 (0.74) | **1.19(***) (0.00)** | −0.18 (0.89) | **0.86(***) (0.00)** | 2.91 (0.87) |
| (man_own)′ | | **5.04(**) (0.02)** | | **6.05(***) (0.00)** | | 0.51 (0.34) |
| (Q)′ | 0.18 (0.72) | | 0.15 (0.30) | | 0.01 (0.60) | |
| (ln_assets)′ | **−0.00(*) (0.05)** | 0.73 (0.19) | **−0.05(*) (0.05)** | 0.29 (0.54) | −0.03 (0.14) | 0.28 (0.17) |
| (divp)′ | −0.32 (0.52) | | **−0.30(*) (0.06)** | | **−0.34 (0.06)** | |
| (ext_own)′ | | **4.20(**) (0.01)** | | **4.16(**) (0.01)** | | **0.89(*) (0.08)** |
| (stdev)′ | 0.97 (0.17) | | −1.09 (0.11) | | −0.59 (0.36) | |
| (debtoas)′ | −0.16 (0.19) | 0.85 (0.20) | −0.15 (0.21) | −0.80 (0.22) | −0.13 (0.20) | −0.54 (0.19) |
| (Largest)′ | | **2.13(*) (0.05)** | | **3.64(*) (0.06)** | | **3.12(*) (0.07)** |
| SCC | 56% | 62% | 49% | 46% | 51% | 55% |
| Partial $R^2$ | 53% | 62% | | | | |

Panel B. Exogeneity test[b]

$$Q' = \beta_0 + \beta_1(man_own)' + \beta_2(ext_own)' + \beta_3(\ln_assets) + \beta_4(debtoas)' + \beta_5(Largest)' + \beta_6 resid$$

| Variable | (*man_own*) | (*ext_own*) |
|---|---|---|
| *t-statistic* | 3.61* | 1.28 |

[a] *Note*: Ordinary Least Squares (OLS), Two Stage Least Squares (2SLS) and Three-stage least squares (3SLS) regressions of Average Managerial Ownership (man_own)′ and Average firm performance (Q)′ on firm size (ln_assets)′, Dividend payout ratio (divp)′, External Blockholders (ext_own)′, Standard Deviation of monthly stock returns (stdev)′, Total Liabilities over Total Assets (debtoas)′ and Largest Shareholder (Largest)′ for the common sample of 146 firms for the years 2000, 2001, 2002, 2003 and 2004. Variable definitions are given in Table 1. SCC is the squared correlation coefficient. Partial $R^2$ is a test statistic due to Shea (1997) for testing the quality of all instruments with respect to the (man_own) and Tobin's Q variables. *p*-values are given in parentheses. (***) denotes statistical significant at 99% confidence level. (**) denotes statistical significant at 95% confidence level and (*) denotes statistical significant at 90% confidence level.

[b] *Note*: The exogeneity test is due to Wu (1973) and Hausman (1978). *t-statistic* denotes the *t*-statistic of the coefficient of the residuals obtained from a regression of the managerial ownership (external blockholder) variable on all instruments. The null hypothesis is that OLS estimates are consistent implying that the IV estimates are consistent as well. Statistically significant result imply that the null hypothesis is rejected and therefore the variable in question is considered as endogenous. If we are unable to reject the null hypothesis then the corresponding variable is treated as exogenous.

this exogeneity test to the second equation setting the vector of instruments at $Z = 5$. We conducted this test for the managerial ownership and the external blockholders variables. First, we regressed the managerial ownership variable on all instruments and we obtained the residuals. Then we estimated Eq. (4) with the inclusion of the residuals in the right hand side and we tested this the standard *t*-statistic to verify whether the coefficient of the residuals is statistically significant or not. We repeated this two step testing methodology for the case of the external blockholders variable as well. The results are reported in Table 3 (panel B), which depicts that we can reject the null hypothesis for the case of the managerial ownership and we are unable to reject the null hypothesis for the case of the external blockholders. Based on this statistical evidence, we took managerial ownership as the endogenous variable while the external blockholders was set to be exogenous.

Given that none of the instrumental variables was considered to be a weak instrument we consequently move on to the discussion of our estimation results, which are reported in Table 3 (panel A). First we considered the equation in which firm performance is the dependent variable and while focusing on the OLS estimates we observed that the coefficient of the managerial ownership variable is not statistically significant. A similar conclusion is reached with respect to the coefficient of the External Blockholders variable. These findings are at odds with Demsetz and Villalonga (2001), who reported that firm performance is always statistically dependent on at least one measure of ownership concentration. They found a positive relationship between managerial ownership and corporate value, and at the same time a negative link between the proportion of shares owned by the five largest shareholders and firm performance.

Second, we obtained very different results when we looked into the estimates of the 2SLS and 3SLS estimation methodologies. Specifically, when we applied the 2SLS estimation technique the coefficient of the managerial ownership variable was found to be positive and statistically significant, while the analysis using 3SLS reported similar results. These results differed from those reported by Loderer and Martin (1997), Cho (1998), Demsetz and Villalonga (2001) and Davies et al. (2005) who found that managerial ownership does not have a significant role in explaining corporate value. In our case, we argue that our findings are in line with those, which are based on the hypothesis of interests convergence (Morck et al., 1988; Short and Keasey, 1999). Under this hypothesis, managers are assumed to have greater incentives to maximise firm performance as managerial ownership increases.

An interesting finding was the evidence that external blockholder ownership appears to have a positive impact on Tobin's Q. This result contradicted the one reported by Karathanassis and Drakos (2004) who found poor statistical significance for the potential influence of External Blockholders on firm performance. A plausible interpretation of this difference could be the increase in shareholdings of the specific group over the last decade.[19] In addition, this result was consistent with the view that blockholders and managers consider that a strategic alignment could be beneficial for both of them. In other words, external blockholders choose to support management decisions since they consider themselves as simple investors rather than strategic partners (as might be the case for institutional investors).

When we turned our attention to the instrumental variables included in the firm performance equation, our results indicate a positive relation between the largest shareholder and Tobin's Q. Although Davies et al. (2005) did not find any statistical relationship between these two variables we argue that our findings are heavily influenced by the participation of major shareholders on the Board of Directors. Additional support for this argument relies on the fact that the proportion of shares owned by non-executive directors is substantially lower than those owned by shareholders with the largest investments (i.e. largest shareholders) acting as executive directors.

With respect to the managerial ownership equation the OLS estimate of Tobin's Q coefficient was statistically insignificant. It is worth noting that similar findings with the simple OLS method were also derived from the application of the simultaneous equations methods. The results reported in previous studies are contradictory. Loderer and Martin (1997) and Demsetz and Villalonga (2001) found that 2SLS estimates of Tobin's Q in managerial ownership equations are negatively significant. In contrast, Cho (1998) and Davies et al. (2005) documented a positive relationship between the two variables included in the managerial ownership equation.[20]

Finally, consistent with our expectations, we observed that the results indicated a negative relation between the size of the firm (*ln assets*) and managerial ownership. This finding may also be consistent with the view that larger firm size requires higher level of investments (Demsetz and Villalonga, 2001).

Overall, our findings suggest that managerial ownership and firm performance are correlated. In particular, we argue that this relation is positive and higher levels of managerial ownership correspond to higher levels of firm's performance. This result goes against the corresponding findings reported in the recent literature, which does not support a clear relation between management and performance.

The observed divergence of the results may possibly be due to the fact that managerial ownership in the Greek capital market (35%) is substantially high as opposed to most developed economies and this evidence may cast some doubts on the validity of the principal-agent problem for the case of the Greek economy. Such an argument is further based on the observation that it is rather difficult to expect a divergence of interests among managers and owners when only 25% of the firms in our sample report managerial ownership percentages lower than 15%. Certainly, this could put the inquiry of convergence or divergence of interests among managers and owners into question, when at these levels of managerial ownership those engaged with the management are major shareholders or simply owners of the firms.

[19] According to our study, External Blockholders participation averaged approximately 21%. In contrast, Karathanassis and Drakos (2004) reported that the average percentage of outside identifiable Blockholders appeared to be quite low.

[20] $R^2$ is not reported since it is not a reliable measure in 2SLS and 3SLS estimations. Instead, we reported the squared correlation coefficient.

A possible explanation for the existence of a positive relationship between managerial ownership and firm performance could not be based on the existence of stock bonus (free stock) or stock options. This would only apply to cases in which the levels of managerial ownership do not exceed 5%. Nevertheless, when (as in our case) managerial ownership reaches 35% on average, it is clear that we refer to managers – owners, whose personal utility function is not maximized through bonuses. On the other hand, the maximization of a business's profits, and consequently the increase in its performance, to some extent, is linked to the maximization of personal gain. In fact, the conclusions reached by Morck et al. (1988) indicated that levels of managerial ownership above 25% correlated positively with the firm's performance.[21,22]

Gomes (2000) offered an explanation that is also consistent with our findings. He argued that large shareholders who exert control over management (manager owners), prefer building their reputation, rather than expropriating minority shareholders. This reputation effect increases the value of the firm and decreases inefficiencies associated with agency problems. The model predicted that a significant component of the valuation of stocks in emerging markets, or generally in countries with no explicit corporate governance mechanism for protecting minority shareholders, can be attributed to the reputation effect.

## 6. Summary and concluding remarks

This paper investigates the relationship between ownership structure and corporate value for the case of the Athens Stock Exchange, which is considered as an emerging capital market. We attempted to contribute to the literature to resolve the matter of the lack of a definite answer on the existence and direction of such a relationship. The lack of a well defined theoretical framework and model specification makes the task of reaching an overall conclusion difficult even though previous works have employed alternative econometric methodologies as well as data from mature and emerging stock markets.

Recently, this failure has been linked to the endogeneity problem that arises between ownership variables and corporate performance. The present study takes into consideration the problem of endogeneity and applies simultaneous equations techniques coupled with panel data in order to examine whether this relationship holds for the Athens Stock Exchange. We used a sample of balanced panel data for 146 firms listed in the Athens Stock Exchange for 5 years, 2000–2004. We considered three important issues related to the estimation of the system of equations. First, we used time-demeaning data for all variables. Second, we explicitly tested for the quality of instrumental variables following the testing procedure developed by Shea (1997), and finally we tested for the endogeneity of the managerial ownership and external blockholders variable using the Wu (1973) and Hausman (1978) exogeneity test. In our analysis, we also took into consideration the differences that exist in the capital market of Greece with respect to the institutions that govern its operation as compare to those of the developed stock markets. These differences are evident in several aspects given that the operation of the Athens Stock Exchange is based on the compulsory legal framework for Corporate Governance (Law 3016/2002), rather than on the canonical framework of best practices (Cadbury Code, OECD principles). This has led to a higher degree of stock ownership concentration and limited number of mergers and acquisitions in the capital market of Greece.

[21] We have also examined the robustness of our results. To this end we estimated the equations system for each year in to investigate whether our estimates are sample dependent. These estimates have also produced very similar results to those for the whole period and therefore we argue that the estimates based on the full sample are robust. To save space the results are available upon request.

[22] An anonymous referee has suggested the examination of the possible relationship between managerial ownership and corporate performance by incorporating the adjustment cost approach that Cheung and Wei (2006) has recently employed. In this case incorporating the determinants of the adjustment costs in our model specification we account for the possibility that firms may face impediments in moving towards for their optimal ownership structure. Unfortunately, the determinants of the speed of adjustment of insider ownership, the information asymmetry, the number of insiders and information on the determinants of the speed of adjustment of Tobin's Q are not available for the Athens Stock Exchange and therefore, the application of this approach is not feasible.

In contrast to previous studies that mainly examined mature markets (see for example Loderer and Martin, 1997; Cho, 1998; Demsetz and Villalonga, 2001; Davies et al., 2005), the main finding of our analysis indicated that when managerial ownership is treated as endogenous, this leads to a positive impact on corporate value. This finding seemed to be consistent with the seminal paper of Jensen and Meckling (1976), which argued that high levels of managerial ownership help to align the interests of shareholders and managers. Positive correlation between performance and high levels of managerial ownership, was also reported in the studies of Morck et al. (1988) and Short and Keasey (1999) who supported the notion that management coincides with the shareholders' interests, at higher levels of ownership concentration.

Moreover, the External Blockholders variable was found to have a positive correlation with a firm's performance measures. This implies that there is a systematic relationship between profitability and ownership structure. In contrast to recent work by Davies et al. (2005), our results suggest that there is a positive relation between Largest Shareholder and corporate value. Moreover, consistent with the Demsetz and Villalonga study (2001), we argue that firm size relates negatively to managerial ownership.

Given the difference of our results with the majority of similar studies for mature markets we aim to provide some further explanations. Thus, our results on the relationship between managerial ownership and performance may possibly be due to the particularly high levels of managerial ownership in the firms listed in the Athens Stock Exchange. More specifically, managerial ownership in the Greek capital market exceeds 35% as compared to the degree of managerial ownership of the mature capital market, which, on average, is between 10% and 15%. Moreover, our findings support the existence of a strategic association between External Blockholders and insiders, the outcome of which has a positive impact on the value of the firm.

Although this evidence could also be linked with the convergence of interests' hypothesis we argue that this may not be the case for the Athens Stock Exchange. The reason is that convergence is the outcome of a long process of conflict of interests among managers and rational shareholders although it may be possible that in case that a convergence of interests is profitable then such a convergence may occur.

A final remark about our findings could be made in relation to the reputation effect discussed by Gomes (2000). The author argues that large shareholders who exert control over management (manager owners), prefer building their reputation, rather than expropriating minority shareholders. This reputation effect increases the value of the firm and decreases inefficiencies associated with agency problems. The model predicts that a significant component of the valuation of stocks in emerging markets, or generally in countries with no explicit corporate governance mechanism for protecting minority shareholders, can be attributed to the reputation effect. This may be the case for an emerging market such as the Athens Stock Exchange.

Future work that we would undertake in this area of corporate governance will focus on the possible relationship between family ownership and corporate performance since as we already discussed, family ownership percentages has been found to be approximately 25–27%. We would also provide further insights to the reputation effect in the Greek capital market by examining the dynamics of the ownership structure of Greek firms before and after initial public offering (IPO).

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