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CORPORATE OWNERSHIP STRUCTURE
AND FIRM PERFORMANCE:
EVIDENCE FROM GREEK FIRMS

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ABSTRACT

The Berle-Means thesis (1932) implies that diffuse ownership adversely affects firm performance. This paper tries to investigate whether there is strong evidence to support the notion that variations across firms in observed ownership structures result in systematic variations in observed firm performance. We test this hypothesis by assessing the impact of the structure of ownership on corporate performance, measured by profitability, using data for 175 Greek listed firms. Following Demsetz and Villalonga (2001) we model ownership structure, first, as an endogenous variable and, second, we consider two different measures of ownership structure reflecting different groups of shareholders with conflicting interests. Empirical findings suggest that a more concentrated ownership structure positively relates to higher firm profitability. We also find that higher firm profitability requires a less diffused ownership.

Keywords: Ownership structure; Firm performance

JEL Classification: G320; G340

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1. Introduction

In their path-breaking study, Berle and Means (1932) warned that the growing dispersion of ownership of stocks was giving rise to a potentially value-reducing separation of ownership and control. As a consequence, they expected an inverse correlation between the diffuseness of shareholdings and corporate performance. This analytical framework is based upon the view that shareholder diffusion makes it difficult for them to act collectively and hence to influence management to any great extent. Can the Board of Directors help rescue this situation? In some cases they might not have much influence and they also suffer from the same information problems that shareholders have – that is, management typically has much more information about the company than either board members or shareholders. And as in any principal-agent problem, managers can use their superior information to extract rents, to the detriment of shareholder value. Moreover, large compensation for board service may have actually acted as a disincentive for active management monitoring, given management control over the director appointment and retention process. Numerous legal reforms have been proposed for the development of strengthened board fiduciary duties or the stimulation of effective institutional shareholder activism. This is the theoretical underpinning underlying the current move towards equity-based compensation for corporate directors so as to provide them with a powerful personal incentive to exercise effective oversight (Bhagat *et al.* 1999).¹

In this paper we investigate whether there is evidence to support the notion that variations across firms in observed ownership structures result in systematic variations in observed firm performance in the context of a small European capital market. We test this hypothesis by assessing the impact of the structure of ownership on firm performance measured by profitability using data for 175 listed Greek firms in 2000, chosen randomly and covering all sectors. To the best of our knowledge, this paper is the first study of examining the existence of ownership-performance relationship in Greece.² The structure of ownership of Greek firms has not been

¹ Although the recent reforms arranged under the landmark Sarbanes-Oxley Act impose tougher auditing standards, opinion polls among the institutional investors and outside directors reveal that they prefer companies to move towards separating the roles of the CEO and the chairman of the Board (Felton, 2004).

² Recently, Karathanassis and Drakos (2004) examine whether corporate performance is affected by ownership structure using data for Greek listed firms. They find no support for a relationship between

extensively studied yet, nor has its impact on performance has been assessed. This paper tries to fill this gap.

In addition, this paper examines the case of a small European stock market. Much of the existing literature applies to economies with Anglo-Saxon types of financial systems (US, UK). The Greek context provides a financial system, recently liberalised, that is more bank-based, involving a relatively small stock market in which the issue of corporate governance does not have a long history. From this perspective, the Greek case provides unique information. The Greek stock market is mostly dominated by family-controlled firms. As is well known, in so-called “family capitalism”, the agency problem refers to the conflicting relationship between strong blockholders and weak minority shareholders (Morck and Steier, 2004). According to the data in La Porta *et al.* (1999), 65% of the 20 largest Greek firms are controlled by a few wealthy families, while 30% are state-controlled and only 5% are widely-held (i.e., they do not have a controlling shareholder) (see Figure 1). By contrast, in economies with Anglo-Saxon types of financial systems, the fraction of shares with no controlling shareholder is very high: 80% and 90% for the top 20 US and UK firms, respectively. Moreover, it has been shown (see CMC, 2001a; 2001b) that the Greek listed firms cannot be considered in any case as having a diffused ownership structure. The dispersion of shares is rather low. In particular, dispersion is about 36% when shareholders that own less than 1% are taken into account. This figure rises to 47% when shareholders that own at least 5% of outstanding shares are taken into account.³ These findings imply that few shareholders control the firm’s management. They also provide evidence that medium- and small-sized firms are usually controlled by a family and there is no separation of ownership and control.

Demsetz (1983) and Demsetz and Lehn (1985), among others, have documented that, when examining the effect that ownership structure has on firm profitability, the endogeneity of ownership structure should be accounted for. The work by Demsetz and Villalonga (2001) is motivated by the need to re-examine the relationship between ownership structure and firm performance taking into account

corporate value and insiders’ ownership. However, their sample includes relatively few firms (59) and they do not take into account the possible endogeneity of both ownership as well as performance.

³ The most diffused firms are financial services companies (49.9%), construction companies (48.3%) and health services companies (39.1%). The less diffused firms are the media sector (14.5%) and public sector companies (19.2%). Dispersion is measured as the percentage of shares owned by shareholders that hold stakes less than 1 and at least 5 per cent respectively.

not only the endogeneity problem but also different dimensions of ownership structures. In particular, they propose the fraction of shares owned by outside shareholders and by management should be measured separately because they reflect different groups of persons who may have different interests.

Following Demsetz and Villalonga (2001), we apply similar models to Greek-listed firms. This paper seeks to add to the extremely limited empirical evidence regarding this relationship in the context of a small European capital market. We model ownership structure, first, as an endogenous variable and, second, we examine two different measures of ownership structure: (a) the fraction of shares owned by insiders (top management, CEO, board members) and (b) the fraction of shares owned by important outside investors (see, also, Bhagat and Jefferis, 2002). Empirical findings suggest that a more concentrated ownership structure is positively associated with higher profitability. We also find that higher firm profitability requires a less diffused ownership.

The rest of the paper is structured as follows. Section 2 reviews the results of previous empirical research. Section 3 presents the two measures of corporate ownership structures used in our analysis. It also discusses the advantages and disadvantages of the two widely-used measures of firm performance, namely Tobin's Q and the accounting profit rate. Section 4 describes the model specification used in our empirical analysis, while the main findings are presented in Section 5. Section 6 concludes.

2. Literature review

The inverse relationship between ownership diffuseness and firm performance was first challenged by Demsetz (1983), who supports the endogeneity of ownership structure. The latter is considered as the outcome of strategic decisions of large shareholders and smaller investors in capital markets. In practice, the trading of shares in a publicly-held corporation reflects the desire of potential and existing owners to increase or decrease their stakes. Specifically, Demsetz (1983) argues that there is no reason to expect a systematic relationship between profitability and ownership structure. Rather, he views ownership structure as the endogenous outcome of share trading by profit maximizing shareholders. He argues that it is

unlikely a particular ownership would remain in existence (even allowing for the costs of trading shares), if it were not profitable. Say, for example, diffuse ownership structure did lead to poorer performance. In this case, we would expect to see shareholder structures emerge (through trading) which were more concentrated. In other words, firms undergo rapid and drastic changes in their ownership structure in response to their profitability. The implication is that the degree of share ownership concentration is endogenous.

Since Demsetz's work, numerous empirical studies investigating this issue have been published. Almost all provide evidence relating UK and US firms or Fortune 500 firms. While some empirical studies find a non-monotonic relation, in general, the evidence does not provide strong support for a relation between ownership and performance. Most of the studies rely on Tobin's Q as a measure of corporate performance, although a few also examine accounting profit rate, and all prefer managerial shareholdings as a measure of ownership structure.

In a seminal study, Morck *et al.* (1988) proposed a non-linear relationship between insider ownership and firm performance. By examining Fortune 500 firms for the year 1980 and using piecewise linear regression, they find a positive relationship between Tobin's Q and ownership structure for the 0 per cent to 5 per cent board ownership range, a negative relationship in the 5 per cent to 25 per cent range and a positive relationship for board ownership exceeding 25 per cent. They provide the following interpretation of this non-monotonic relationship; at low and high levels of ownership concentration, the incentive effect of ownership may dominate and lead to positive relation. At middle levels of ownership concentration, managers may feel entrenched in the sense of not being as concerned about losing their positions due to a takeover.⁴ However, their results are not robust to the use of accounting-based performance measures. McConnell and Servaes (1990) examine NYSE/AMEX firms for the years 1976 and 1986. They find an *inverted* U-shaped relationship between Tobin's Q and insider ownership (officers and directors). Hermalin and Weisbach (1991) consider the relationships among ownership, board structure and performance. They also find a non-monotonic relation between ownership and performance;

⁴ Firms with lower levels of shareholder concentration are more vulnerable to takeovers and hence managers have strong incentive to maximize shareholders value in order to protect against takeover – which can lead to job loss. At middle levels of management, it is a lack of concern about possible job loss or it is associated with the fact that any takeover would be unlikely to succeed.

positive between 0 per cent and 1 per cent, negative between 1 per cent and 5 per cent, positive between 5 per cent and 20 per cent, and negative beyond 20 per cent. Short and Keasey (1999) use the market value to book value of equity and the return on shareholders' equity as measures of firm performance and observe, in their sample of UK firms, a similar cubic relationship to the one found by Morck *et al.* (1988) between profitability and managerial ownership (directors).

As Demsetz (1983) had pointed out, empirical studies encountered the following problem – namely, ownership might be endogenous. Demsetz and Lehn (1985) provide evidence of the endogeneity of a firm's ownership structure. Chung and Pruitt (1996), using cross-section data in 1987, estimate a simultaneous equations model and find that executive equity ownership (CEO) positively affects Tobin's Q. Palia and Lichtenberg (1999) also observe a positive relationship between managerial ownership and total factor productivity (managers are defined as top officers and board members of a firm). Loderer and Martin (1997) employ a simultaneous equations model where they treat performance and ownership as endogenous for a sample of acquisitions. They find that insider ownership (officers and directors) is not a negative predictor of Q, but Q is a significant negative predictor of insider ownership. By contrast, in a simultaneous regression model with cross-section data in 1991, Cho (1998) reveals that performance is a positive predictor of insider ownership (officers and directors) but ownership does not predict performance. In the context of a panel data model, Himmelberg *et al.* (1999) find that managerial ownership (top management and directors) has a positive relationship with firm size and a negative relationship with the firm's idiosyncratic risk. Controlling for these variables and firm fixed effects, they also do not find any relation between ownership and performance. Demsetz and Villalonga (2001) consider both the endogeneity problem and the different dimensions of ownership structures. By estimating a 2-equation model for the US firms, they find that ownership is negatively related to debt ratio, unsystematic risk and performance. However, performance (defined as Tobin's Q or the accounting profit rate) is not found to be influenced by ownership (defined as managerial ownership (CEO, board of directors, top management) or ownership by the five largest shareholders). Welch (2003) applies the Demsetz and Villalonga (2001) model to Australian listed firms. Using a single equation model, she also considers a generalized non-linear model specification for the equation of

firm performance similar to that used by Morck *et al.* (1988). She finds limited evidence of a non-linear relationship between managerial share ownership and firm performance. More recently, Villalonga and Amit (2004) examine the impact of family ownership, control and management on firm value. They conclude that family ownership creates value only when it is combined with certain forms of control and management. Finally, in a study of Taiwan's electronics industry, Sheu and Yang (2005) find that insider ownership (executives, board members and large shareholders) has no influence on total factor productivity.

3. Corporate ownership structure and firm performance: data and sample selection

Inspection of ownership data reveals that the concentration of equity ownership in 175 Greek listed firms varies widely. Two measures of the structure of corporate ownership are used: the fraction of shares (voting rights) owned by a firm's shareholders, each of whom owns at least 5% of outstanding shares (important SH), and the fraction of shares owned by a firm's management (board members, CEO, top management), each of whom owns at least 5% of outstanding shares (managerial SH).⁵ Table 1 lists the frequency distribution of these measures of corporate ownership. We note that important SH ranges from 0% to 95.7% around a mean of 59.0%; managerial SH ranges from 0% to 86.8% around a mean of 32.2%. Simple inspection of the data also reveals that the fraction of shares owned by important shareholders equals or exceeds 30% in 161 firms (92%) of the 175 firms included in our sample. The fraction of shares owned by management is less than 30% for 85 firms of the 175 firm sample used (49% of the firms) and it is less than or equal to 10% in 70 firms.

In the regression analysis, we rely both on the percentage of shares owned by important outside investors and the percentage of shares owned by management. The distributions of these two variables are skewed. The coefficient of skewness is positive, implying that the distribution has a long right tail. To obtain a symmetric

⁵ The Athens Stock Exchange reports only the percentage of shares that is either equal to, or larger than, 5% of outstanding shares. To calculate managerial SH, we examine companies' annual reports that provide information about the potential interdependencies and interrelations among shareholders.

distribution, the raw data are converted to log values using the logistic transformation, i.e., $\log[\text{percentage ownership}/(100-\text{percentage ownership})]$.⁶

In our sample, the correlation between the two measures of ownership concentration is 0.54. This positive value indicates that many of the important shareholders are also defined as management shareholders since they have representation on corporate boards. The interests of these board members are unlikely to be the same as those of, what they call, “professional managers”, but instead, are more likely to coincide with other shareholders. This has the implication, as Demsetz and Villalonga (2001) point out, that management ownership is not a reliable measure of the strength of professional management in the firm’s operations because it combines groups of individuals (both true managers and board directors) both of whom may have different interests. Moreover, even though the correlation is positive, it is not sufficiently high to lead to the conclusion that one of the measures is redundant. This suggests that professional management does not hold enough shares so that it is in a position to ignore important shareholders. An inspection of the raw data reveals that, for less than 30% of the total firms in our study, the fraction of shares owned by important shareholders is exactly the same as the fraction of shares owned by management. This is explained by the fact that in these firms the family that owns a large fraction of the firm’s shares is also present on the corporate board. But, as Table 1 shows, it is less likely for professional managers to hold a large fraction of shares. In an attempt to take a more accurate picture of the ownership-performance relation, in the empirical analysis we use both measures.

In the empirical studies of ownership-performance relationship, two measures of firm performance are typically used. The accounting profit rate was used in the Demsetz and Lehn study (1985), while Tobin’s Q was used in most of the studies that followed (see, for example, Morck *et al.*, 1988; Cho, 1988; Loderer and Martin, 1997; Hermalin and Weisbach, 1988; McConnell and Servaes, 1990; and Demsetz and Villalonga, 2001). Tobin’s Q is defined as the firm’s market value divided by its assets, valued either at book or replacement value (Shepherd, 1990). The Q ratio is used as a proxy for the market valuation of the firm’s assets. The accounting profit

⁶ In the estimation procedure, we use both transformed and non-transformed variables of ownership. The empirical results seem to be unaffected by the transformation and, therefore, the general nature of the paper’s conclusions does not change.

rate is measured as the ratio of net income (after taxes) to the book value of equity. It is an estimate of what management has accomplished.

There are two major differences between these two measures of performance. Briefly, we note that the first difference relates to the time perspective. Tobin's Q, based on investors' evaluations of the likely future profitability of the firm, is forward looking; whereas, the profit rate is backward looking. Thus, a high Q ratio indicates success in the sense that the firm has deployed its investment to build up a company that is now valued more in the market than its book value. The second difference concerns accounting problems in measuring performance. The profit rate is measured by the accountant, "constrained by standards set by his profession" and, therefore, it is affected by accounting practices, such as the different methods applied to assess tangible and intangible assets. Different methods of depreciation can also influence (raise or lower) the recorded profit levels. In contrast, Tobin's Q is measured by investors and, thus, it is affected by their psychology, concerning estimates of future events (herd behaviour, mistakes, manipulations, etc.).⁷

Tobin's Q also suffers, like accounting profitability, from accounting artifact problems for several reasons. First, as the ratio of the firm's market value to the replacement cost of tangible capital approximates Q, it does not reflect the value investors assign to a firm's intangible capital nor does it include investments made in intangible assets. As Lindberg and Ross (1981) point out, Tobin's Q is high when the firm has valuable intangible assets in addition to tangible ones. Second, empirical studies in the area of the impact of ownership structure on profitability that use Tobin's Q do not measure the replacement cost of tangible capital. Instead, they use as a proxy the book value of total assets. Book values generally have serious problems of their own caused by inflation and arbitrary depreciation choices. Moreover, replacement costs are very difficult to appraise.⁸

⁷ For an analytical discussion of the aspects in which these two measures of firm performance differ and their advantages and disadvantages, see Smirlock *et al.* (1984) and Shepherd (1986).

⁸ According to the Lindberg and Ross model (1981) replacement cost can be measured by using a perpetual inventory method and making sensible adjustments for capital goods price inflation, the depreciation rate and technological progress. See also Dickerson *et al.* (2002) for a calculation of the replacement cost for the UK companies in manufacturing.

4. Model specification

We are interested in examining the relationship between the variation in ownership variables and firm profitability. To this end, we choose a random sample of 175 Greek listed firms. The firm sample covers all sectors of the Greek economy and the data refers to the year 2000. The sample includes utilities and financial institutions, which are part of the broader Greek public sector. Thus, a sub-sample excluding these firms is also examined.

The main objective is to discover if important SH and managerial SH are systematically related to firm performance. For this purpose, both variables appear as explanatory variables in the firm performance equation. However, as we have already noted, firm performance is not only determined by ownership structures but also may influence ownership structures. To deal with this issue, the econometric model is a simultaneous system of two equations, in which firm performance is the dependent variable in the first equation and ownership structure is the dependent variable in the second equation. It is estimated by ordinary least squares and two-stages least squares to detect whether different methods of estimation may affect the results.

Specifically, the estimated equations are as follows:

$$\text{Firm performance}_i = \text{constant}_1 + \alpha_{i1} \text{SH}_i + \beta_{i1} X_i + u_{i1} \quad (\text{eq.1})$$

$$\text{SH}_i = \text{constant}_2 + \alpha_{i2} \text{Firm performance}_i + \beta_{i2} Z_i + u_{i2} \quad (\text{eq.2})$$

where SH_i is a measure of corporate ownership structure for the i th firm, X_i and Z_i are control variables and u_{i1} and u_{i2} are error terms.

Concerning equation (1), we estimate it using both alternate measures of performance, namely Tobin's Q and the accounting profit rate. We approximate Tobin's Q taking the ratio of the firm's market value plus the book value of its debt to the book value of total assets.⁹ The set of explanatory variables includes both ownership variables, important SH and managerial SH, and we seek to examine whether ownership structures significantly affect profitability.

⁹ In our analysis, we do not follow Lindberg-Ross (1981) method to calculate the replacement cost of tangible capital, since it would require time-series data on individual firms which we do not have.

Previous empirical work includes additional variables in the regressions to control for the possibility that factors other than ownership structure may have an impact on Tobin's Q. Control variables include distribution expenses as a fraction of sales revenues, debt to book value of total assets (leverage) and the market concentration ratio. Distribution expenses are used to explain differences in measurements of Tobin's Q that are caused by accounting artifacts. Accounting practices do not treat intangible and tangible capital similarly. As noted, performance measure of Tobin's Q may be distorted because its denominator (i.e. the replacement cost of tangible capital or the book value of total assets) does not take into account the value of intangible assets.¹⁰ Leverage is included in the set of explanatory variables to capture the "value enhancing or value reducing effects of the differences that might exist between the interest obligations incurred when borrowing took place..." (Demsetz and Villalonga, 2001, p.221). In inflationary periods, debt sold in an earlier period will be paid back in money of a lesser value; in deflation, it will be paid back in money with a higher value. Two indicators of market concentration are alternatively used: the top four firm concentration ratio (CR4) and a Herfindahl measure of market structure (Hindex). CR4 is the sum of the four largest shares in the market, while Hindex is the sum of squared market shares of all firms in the market. Concentration indicators are used to account for the cross-firm variations in Tobin's Q of the profit rate that are due to cross-firm differences in pricing power. Firms that are more efficient and more aggressive in pricing have greater market shares. The usual finding in the industrial organization literature is that market structure positively relates to firm performance. Finally, dummy variables U, F, and Media¹¹ are also included for utilities and financial institutions, and media industries. U and F dummies control for the effect of "systematic regulation", while Media controls for the "amenity potential of the firms".

Regarding equation (2), the dependent variable is managerial shareholdings. Firm performance measures, either Tobin's Q or the accounting profit rate, appear as an explanatory variable so as to examine the possibility of reverse causation in the

¹⁰ Observable measures of these intangible assets include R and D expenditures, land, building and equipment expenditures or even distribution expenses. In our data set, distribution expenses cover mainly advertising and marketing expenses. However, data for capital and R and D expenditures do not exist for the most of the firms in our sample.

¹¹ The variable U takes the value 1 if a firm is a utility and zero elsewhere; F takes the value 1 if a firm is a financial institution; Media takes the value 1 if a firm is a media industry.

ownership-profitability relationship. Firm size as measured by the book value of total assets and leverage appear in the set of control variables in equation (2). Firm size enters to capture the effect of the “value-maximizing size of the firm”. The larger is the size of the firm, *ceteris paribus*, the larger one it’s capital resources and the greater the market value of a given fraction of shares. In other words, larger firm size requires more investment from a shareholder and, thus, implies a more diffuse ownership structure. Including leverage as an independent variable reflects the notion that management chooses not to hold as many shares if creditors may add to the monitoring management of the firm. Thus, high values of the debt-to-assets ratio should be associated with lower fractions of shares owned by large shareholders and, thus, the more diffused the ownership structure of the firm. Finally, as in equation (1), the dummy variables U, F and Media are included in the right-hand side of the equation.

Table 2 reports the mean values, standard deviations, maxima and minima of the variables in the 175 firm sample. Variable definitions and data sources are provided in a Data Appendix at the end of the paper.

5. Empirical results

The Berle-Means (1932) thesis implies that diffuse ownership adversely affects firm performance. We test this hypothesis by assessing the impact of the structure of ownership on profitability taking into account the endogeneity of ownership structure and modelling separately inside and outside ownership. Table 3 presents the results from the model estimation using Tobin’s Q as a firm performance measure when managerial ownership is taken into account. It uses the total sample size (175 firms) and compares OLS estimates to 2SLS estimates. Table 4 uses the smaller firm sample size (163 firms) excluding utilities and financial institutions. Focusing on OLS estimates for the profitability equation, we note that profitability is always statistically dependent on at least one measure of ownership structure. The regression coefficient of the fraction of shares owned by important outside investors takes a positive sign and is statistically significant. This implies that outside investor shareholdings affect positively Tobin’s Q ratio. This finding is consistent with what one would expect: greater ownership concentration by outside investors may lead to superior performance. The second measure of ownership concentration, namely the

fraction of shares owned by management, also has a positive effect on performance, although the coefficient is statistically significant at much lower levels of significance (10% or 15%). This result is consistent with the finding that the simple correlation coefficient between the two ownership variables is 0.54. Moreover, the results shown in the tables for the 2SLS estimates confirm the finding for the effect of ownership concentration on profitability. The coefficients of both ownership variables, important SH and managerial SH, have the correct positive sign and are statistically significant either at a much higher (1%) or a lower (10%) level of significance.

Another finding shown in Tables 3 and 4 is the negative effect of the debt-to-assets ratio on profitability. In all OLS and 2SLS estimates, leverage negatively affects profitability. The distribution-to-sales ratio is positive, as expected, but strongly insignificant. Market concentration consistently has a positive effect on profitability. The coefficient of the CR4 concentration index takes a positive sign and is sometimes statistically significant at the 10% level or better. However, when we adopt a Herfindahl indicator, our data do not support this finding.¹² The coefficient, even though has the correct sign, is everywhere insignificant. The picture is reversed when we estimate equation (1) with 2SLS. Nevertheless, the data do not seem to support the usual finding of industrial organization studies that profitability is partly driven by industry concentration.

One might expect that high profitability leads management to acquire more shares and, therefore, causes managerial shareholdings to be greater. OLS estimates show that Tobin's Q is empirically significant in explaining the variation in the structure of corporate ownership. In all regressions (of either sample size), the coefficient of Tobin's Q is positive and significant at a high level of significance. However, the results for the 2SLS equation estimates of the Tobin's Q cast doubt on this result. The 2SLS estimates are positive but hardly significant (lower than 15%).¹³

As Demsetz and Lehn (1985) have shown, the ownership structure of the media industry is more concentrated than that of industries concerning manufacturing, utility and financial firms. We find that the dummy variable Media is positive and

¹² The results obtained using the Herfindahl index are available from the authors upon request.

¹³ Before using any method to deal with endogeneity, we first test for the endogeneity of the ownership structure and firm performance by carrying out the Durbin-Wu-Hausman test (see Hausman, 1978). It is based upon a direct comparison of coefficient values and is carried out by running an auxiliary

significant at 5% (OLS estimate) or 10% (2SLS estimate). In the profitability equation it enters negatively but it is insignificant. The positive coefficient on media industry suggests that, *ceteris paribus*, ownership is more concentrated in media firms with non-profit maximizing goals relative to firms operating in other industries. In other words, the utility (U) and financial (F) dummies isolate the impact of “systematic regulation”. As shown in the tables, the OLS estimates for U and F dummies have the expected negative sign and are sometimes significant. These findings, however, are not confirmed by 2SLS estimates.¹⁴

Finally, OLS and 2SLS estimates suggest that size does not seem to be able to explain variations in ownership structure. Using the total firm sample size, the coefficient on firm size, as measured by the book value of total assets, is negative as expected, but insignificant. However, the picture changes when we exclude utilities and financial institutions; firm size becomes significant.

So far, we have treated only the fraction of shares owned by management as the endogenous component of corporate ownership structure. Equations (1) and (2) are re-estimated treating important outside investors shareholdings as the endogenous variable in equation (2). Tables 5 and 6 report the OLS and 2SLS estimates. As shown, both measures of ownership structure explain variations in Tobin’s Q. However, as OLS and 2SLS estimates reveal, the coefficient of Tobin’s Q is more strongly statistically significant in the ownership structure equation, implying that firm performance as measured by Tobin’s Q has a stronger effect on the fraction of shares owned by important outside investors than it does on managerial shareholdings. Therefore, as the findings suggest, important SH is likely to be more strongly endogenous.

The low value of the simple correlation coefficient between Tobin’s Q and the accounting profit rate (0.157) suggests that we cannot consider the two measures of performance to be redundant. Therefore, we can re-estimate equations (1) and (2) using the accounting rate of return as an alternative measure of firm performance in

regression (see also Davidson and Mackinnon, 1993). It is an asymptotic t-test with the null hypothesis of no endogeneity. The t-values found reject the null hypothesis.

¹⁴ The utilities dummy variable used refers to the public sector companies. Therefore, the findings concerning U dummy could provide useful policy implementation results, especially in the light of the ongoing debate in the Greek economy about the performance and efficiency of stated-owned companies.

place of Tobin's Q.¹⁵ We note that the coefficients that link ownership variables to firm profitability are weaker compared with the estimates obtained using Tobin's Q. Specifically, important shareholdings continue to have a positive and significant (although at a lower than 10% level) effect on profit rate, whereas managerial shareholdings are everywhere insignificant. Moreover, in all estimates of the ownership structure equation (of either sample size), the profit rate positively and significantly affects managerial shareholdings. Overall, the results provide no reason to alter considerably the conclusions we reach concerning the ownership-performance relationship.

6. Conclusions

This paper brings together various aspects of corporate finance and firm performance and examines whether variations across firms in observed ownership structures result in systematic variations in observed firm performance in the context of a small European capital market. We test this hypothesis by assessing the impact of the structure of ownership on performance using data for 175 Greek listed firms. We use two measures of performance – namely, Tobin's Q and the accounting profit rate - and consider two measures of ownership – namely, the fraction of shares owned by management and the fraction of shares owned by important investors. The paper is primarily motivated by a lack of evidence regarding the relationship between ownership structure and firm performance in Greek firms. Moreover, ownership is modelled as multi-dimensional and endogenously determined.

Empirical findings indicate that there exists a linear positive relationship between profitability and ownership structure. Both measures of ownership, managerial shareholdings and important shareholdings, positively influence Tobin's Q. The results suggest that the greater the degree to which shares are concentrated in the hands of outside or inside shareholders, the more effectively management behavior is monitored and disciplined, thus resulting in better performance.

The results from our study also yield evidence for the endogeneity of ownership structure. We find that profitability is a positive predictor of ownership structure measures, suggesting that the coefficient of a single equation model on

¹⁵ The results obtained using the accounting rate of return are available from the authors upon request.

ownership-profitability relationship is biased because of its failure to take into account the complexity of interests involved in an ownership structure. On the one side, Greek data reveal a significant positive impact of ownership structure on profitability. On the other side, there exists evidence that superior firm performance leads to an increase in the value of stock options owned by management or large shareholders, which if exercised, would increase their share ownership.

We also find that profitability is negatively related to the debt-to-assets ratio. This evidence reveals the existence of reducing effects of the differences between the interest obligations incurred when borrowing took place and the interest rates that prevailed during the sample period. The statistical insignificance of the relationship between profitability and distribution-to-sales ratio indicates that our model fails to explain differences in measurements of Tobin's Q that are caused by accounting artifacts. Lastly, we find that profitability is positively related to market concentration (measured by CR4 concentration ratio). This can be considered either as the result of scale economies in the most of the sectors of our sample or as a consequence of the fact that larger firms in markets with oligopoly structure are able to exercise market power. However, when we use the Herfindahl index as proxy for the degree of concentration, we cannot detect a strongly significant relationship with firm performance.

A striking evidence of our empirical analysis is the significant positive relationship found between media dummy and ownership structure. This result, in conjunction with the finding that the media dummy enters negatively the profitability equation (even though it is insignificant), means that firms in the media industry with high "amenity potential" could not be used to produce these non-profit amenities if they were less diffused. This result might explain the recent attempts of the Greek government to reform the corporate governance legislation so as to forbid concentration of a share above 1% in the hands of the same shareholder. This legal reform aims at excluding chiefly those that undertake the construction of public works from a strict management control of media firms so as to reduce corruption incentives.

A caveat is in order. As we have already mentioned, the Athens Stock Exchange reports only the percentage of shares that is either equal or larger than 5% of outstanding shares. According to the current institutional framework, firms do not

have the legal obligation to announce changes in voting rights for those owners with a share below 5%. Consequently, the lack of data for equity owners with a share below 5% imposes a constraint on our empirical analysis. It causes a discontinuity in the observations used in the construction of the ownership structure variable. A more rigorous definition of that variable would take into account the fraction of shares owned by a firm's shareholders or management, each of whom owns at least 1% of outstanding shares.

Suggestions for further research include the development and estimation of a generalized non-linear model specification. Some authors (Morck *et al.*, 1988; Welch, 2003) have estimated the relationship between managerial share ownership and profitability in the context of a non-linear single equation model. However, they do not control for the possible endogeneity of a firm's ownership structure. It might be interesting to address the issue of a non-monotonic relationship by developing a non-linear equation model taking into account both endogeneity and non-linearity. Further, the data sample used in this study covers a relatively large number of Greek listed firms for the year 2000. One would expect to calculate the variables for a longer period of two or five years so as to avoid the impact of the business cycle. Data availability is a serious constraint in our analysis. The Athens Stock Exchange started to publish information concerning the changes in voting rights only from 2000. Therefore, it might be informative to replicate the estimates using panel data for some years after 2000. In this case, however, the firm sample would change and the results might not be comparable.¹⁶ Also, firm coverage would be limited, since we require a minimum of a three-year presence for each firm in the sample.

¹⁶ Balance-sheet data are now available until 2003. In the period 2001-2003, many firms became new members of the Athens Stock Exchange Market.

Data appendix

We use the standard industry classification followed by the Athens Stock Exchange Market. Firms are selected from all sectors of the Greek economy. These are: Banks (5 firms), Insurance (3 firms), Leasing Companies (2 firms), Information Technology (10 firms), Telecommunications (3 firms), Oil Refineries (1 firm), Water Supply (1 firm), Passenger Shipping (3 firms), Shipyards (1 firm), Publishing and Printing (7 firms), Television and Entertainment (3 firms), Health (3 firms), Metals (9 firms), Metal Products (7 firms), Machinery and Appliances (2 firms), Cables (1 firms), Electronic Equipment (1 firm), Industrial Minerals (7 firms), Wholesale Trade (21 firms), I.T. Equipment (5 firms), Retail Trade (7 firms), Mobile Telephony Retail Services (1 firm), Food (13 firms), Tobacco (1 firm), Restaurants (3 firms), Textiles (10 firms), Clothing (3 firms), Real Estate (3 firms), Construction (15 firms), Chemicals (2 firms), Plastics and Rubber (5 firms), Paper and Packaging (1 firm), Wood and Cork Products (2 firms), Furniture (3 firms), Vehicle Manufacturing (1 firm), Motor Vehicle Trade and Maintenance (1 firm), Transport Rental Services (1 firm), Freight Forwarding (1 firm), Jewellery (1 firm), Fish Farming (3 firms), Agriculture and Farming (3 firms). It is worth noting that the sample includes 9 firms from the media industry, 10 from financial services and 2 utility firms.

Firm capitalization as a percentage of market capitalization ranges from 0.01% to 8.62%, around a mean of 0.46% with a standard deviation of 1.18%. Firm capitalization is below 0.5% of market capitalization for 149 firms, is between 0.5 to 1% for 13 firms, 2 to 5% for 9 firms and 5 to 9% for 4 firms in our sample. As the data for important and managerial shareholdings show, important shareholders have the ability to control management. Further, a simple inspection of the firms' annual reports reveals that in their majority the firms used in our sample are family-owned, where the family of the owner has the control of the management. Specifically, based on the voting rights and according to the identity of the largest direct owner, 75.4% of the firms in our sample are classified as family-owned, 5.1% as state-owned, 6.3% as private widely-held and 13.1% are held by a large shareholder.

Q: Tobin's Q. The numerator is the firm's market value of common stock plus the book value of its debt in 2000 (end-of-year). The denominator is the book value of total assets in 2000 (end-of-year). Annual data for the year 2000, in thousands euro. Source: Athens Stock Exchange Market, *Annual Statistical Bulletin, Trading of Bonds and Stocks*, 2001.

Prate: accounting profit rate defined as the ratio of net income to book value of equity (end-of-year). Annual data of net income and of equity (book value) for the year 2000, in thousands euro. Source: Athens Stock Exchange Market, *Yearbook 2001*, Balance Sheets.

Important SH: the logarithm of [percentage ownership/(100-percentage ownership)]. Percentage ownership is measured as the fraction of shares owned by a firm's important shareholders, each of whom owns at least 5% of outstanding shares. The data refer to 2000; voting rights measurement. Source: www.ase.gr.

Managerial SH: the logarithm of [percentage ownership/(100-percentage ownership)]. Percentage ownership is measured as the fraction of shares owned by a firm's management (top management, CEO, board members), each of whom owns at least 5% of outstanding shares. The data refer to 2000; voting rights measurement. Source: www.ase.gr.

Debt: Long-term liabilities to total assets. Annual data on liabilities and assets for the year 2000, in thousands euro (end-of-year). Source: Athens Stock Exchange Market, *Yearbook 2001*, Balance Sheets.

Firm size: total assets (end-of-year). Annual data for the year 2000, in thousands euro. Source: Athens Stock Exchange Market, *Yearbook 2001*, Balance Sheets.

Distr: distribution expenses to sales (end-of-year). Annual data for the year 2000, in thousands euro. Source: Athens Stock Exchange Market, *Yearbook 2001*, Balance Sheets, and Bank of Greece.

CR4: top 4 firm concentration index computed as the sum of the market shares of 4 largest firms in the market. Market share is computed as the ratio of total assets of the *i*th firm to total assets of all firms in the market (in thousands euro). End-of-year data for 2000. Source: Greek Financial Directory, ICAP, 2002.

Hindex: Herfindahl concentration index, computed as the sum of the squared market shares of all firms in the market. Market share is computed as the ratio of total assets of the i th firm to total assets of all firms in the market (in thousands euro). End-of-year data for 2000. Source: Greek Financial Directory, ICAP, 2002.

Media: It takes the value 1 if a firm is a media industry and 0 elsewhere.

F: It takes the value 1 if a firm is a financial institution and 0 elsewhere.

U: It takes the value 1 if a firm is a utility and 0 elsewhere.

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| Range (% shares) | Important SH | | | Managerial SH | | |
|---------------------|-------------------------|------------|--------------------------|-------------------------|------------|--------------------------|
| | Frequency (no firms) | Percentage | Cumulative Percentage | Frequency (no firms) | Percentage | Cumulative Percentage |
| 0-9.9 | 8 | 4.57 | 4.57 | 68 | 38.86 | 38.86 |
| 10-19.9 | 1 | 0.57 | 5.14 | 6 | 3.43 | 42.29 |
| 20-29.9 | 5 | 2.86 | 8.00 | 12 | 6.86 | 49.14 |
| 30-39.9 | 11 | 6.29 | 14.29 | 12 | 6.86 | 56.00 |
| 40-49.9 | 19 | 10.86 | 25.14 | 22 | 12.57 | 68.57 |
| 50-59.9 | 44 | 25.14 | 50.29 | 16 | 9.14 | 77.71 |
| 60-69.9 | 26 | 14.86 | 65.14 | 13 | 7.43 | 85.14 |
| 70-79.9 | 36 | 20.57 | 85.71 | 16 | 9.14 | 94.29 |
| 80-89.9 | 23 | 13.14 | 98.86 | 10 | 5.71 | 100.00 |
| 90-100 | 2 | 1.14 | 100.00 | - | - | - |

| Variable | N | Mean | Standard deviation | Maximum | Minimum |
|---------------|-----|--------|-----------------------|---------|---------|
| Important SH | 175 | 59.054 | 20.382 | 95.660 | 0.000 |
| Managerial SH | 175 | 32.218 | 29.308 | 86.800 | 0.000 |

Note: N is the number of observations. Important SH is the fraction of shares owned by a firm's important outside investors. Managerial SH is the fraction of shares owned by a firm's management.

| Table 2. Descriptive statistics | | | | | |
|--|----------|-------------|---------------------------|----------------|----------------|
| Variable | N | Mean | Standard deviation | Maximum | Minimum |
| Q | 175 | 2.184 | 2.459 | 24.555 | 0.161 |
| Important SH | 175 | 1.025 | 0.546 | 3.137 | 0.000 |
| Managerial SH | 175 | 0.517 | 0.557 | 2.025 | 0.000 |
| Prate | 175 | 0.060 | 0.317 | 0.712 | -3.837 |
| Debt | 175 | 0.058 | 0.108 | 0.538 | 0.000 |
| Firm size | 175 | 865.2 | 4300.7 | 43307.6 | 5.500 |
| Distr | 175 | 0.097 | 0.099 | 0.554 | 0.000 |
| CR4 | 175 | 0.390 | 0.207 | 0.978 | 0.102 |
| Hindex | 175 | 0.080 | 0.111 | 0.566 | 0.005 |

Note: Q is Tobin's Q, important SH is the fraction of shares owned by important shareholders converted to log values, managerial SH is the fraction of shares owned by management converted to log values, prate is accounting profit rate, firm size is total assets (in millions euro), debt is debt-to-assets ratio, distr is distribution-to-sales ratio, CR4 and Hindex are two alternative definitions of industry concentration. N is the number of firms. Variables' definitions and data sources are provided in the Appendix.

Table 3. Estimates of ownership-performance relationship (Full 175 firm sample size)

| Explanatory variables | OLS-estimates | | 2SLS-estimates | |
|--------------------------|--------------------|------------------------------------|--------------------|------------------------------------|
| | Q (eq.1) | Managerial shareholdings (eq.2) | Q (eq.1) | Managerial shareholdings (eq.2) |
| Constant | 0.174 (0.318) | 0.440 (6.969) | 0.374 (0.640) | 0.212 (0.831) |
| Important shareholdings | 1.372 (3.586) | | 1.398 (3.639) | |
| Managerial shareholdings | 0.297 (1.755) | | 0.258 (1.899) | |
| Distr | 1.769 (1.002) | | 1.598 (0.899) | |
| Debt | -3.245 (-1.962) | -0.147 (-0.387) | -3.051 (-1.826) | 0.041 (0.082) |
| CR4 | 1.521 (1.603) | | 1.007 (0.918) | |
| Q | | 0.045 (2.680) | | 0.134 (1.329) |
| Firm size | | -0.00002 (-0.148) | | -0.00003 (-1.092) |
| Media | -0.643 (-0.767) | 0.373 (2.045) | -0.524 (-0.615) | 0.347 (1.726) |
| F | -1.371 (-1.762) | -0.437 (-1.971) | -1.307 (-1.668) | 0.097 (0.244) |
| U | -1.342 (-0.801) | -0.456 (-1.200) | -1.184 (-0.701) | -0.243 (-0.573) |
| se | 2.284 | 0.528 | | |
| Adj-R ² | 0.177 | 0.131 | | |

Notes: Ordinary Least Squares and Two-Stages Least Squares estimation of ownership-performance relationship. *t*-statistics are in parentheses. *se* is the standard error of the estimate.

Table 4. Estimates of ownership-performance relationship (163 firm sample size -excluding utilities and financial services)

| Explanatory variables | OLS-estimates | | 2SLS-estimates | |
|--------------------------|--------------------|------------------------------------|--------------------|------------------------------------|
| | Q (eq.1) | Managerial shareholdings (eq.2) | Q (eq.1) | Managerial shareholdings (eq.2) |
| Constant | 0.064 (0.113) | 0.491 (7.366) | 0.303 (0.500) | 0.236 (0.887) |
| Important shareholdings | 1.563 (3.701) | | 1.602 (3.772) | |
| Managerial shareholdings | 0.179 (1.806) | | 0.116 (1.768) | |
| Distr | 2.226 (1.190) | | 2.052 (1.089) | |
| Debt | -3.669 (-2.105) | 0.067 (0.167) | -3.448 (-1.961) | 0.120 (0.234) |
| CR4 | 1.409 (1.438) | | 0.772 (0.684) | |
| Q | | 0.041 (2.429) | | 0.138 (1.360) |
| Firm size | | -0.00003 (-2.691) | | -0.00002 (-1.566) |
| Media | -0.687 (-0.798) | 0.367 (1.998) | -0.539 (-0.616) | 0.336 (1.662) |
| se | 2.343 | 0.533 | | |
| Adj-R ² | 0.161 | 0.112 | | |

Notes: Ordinary Least Squares and Two-Stages Least Squares estimation of ownership-performance relationship. t-statistics are in parentheses. se is the standard error of the estimate.

Table 5. Estimates of ownership-performance relationship (Full 175 firm sample size)

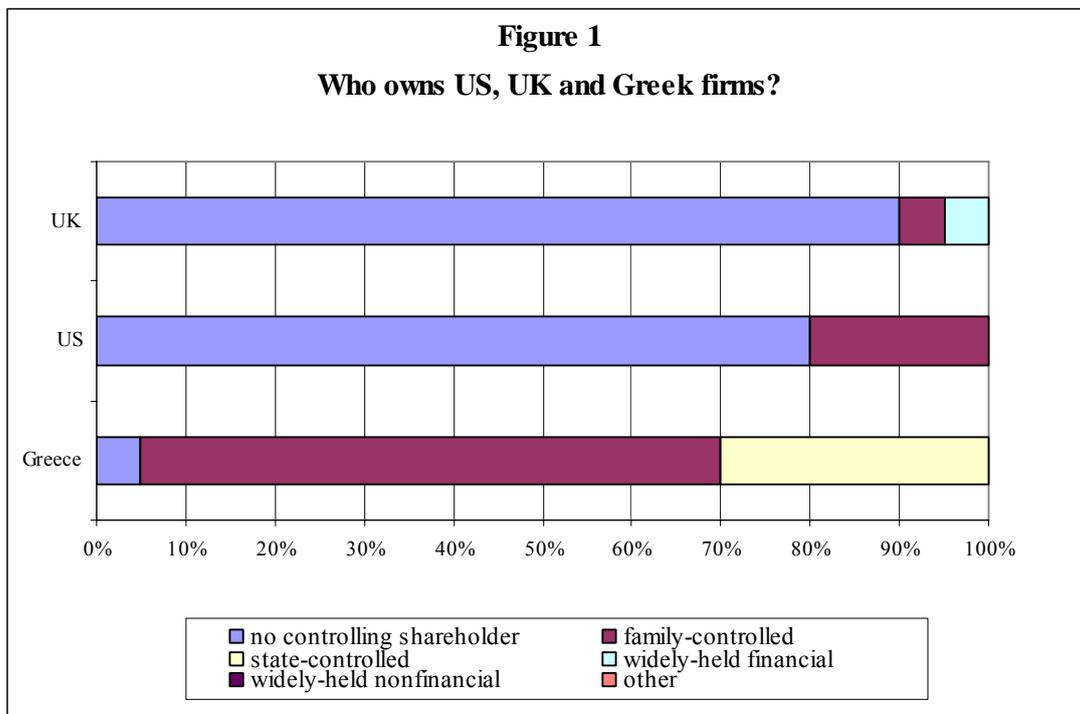
| Explanatory variables | OLS-estimates | | 2SLS-estimates | |
|--------------------------|--------------------|-----------------------------------|--------------------|-----------------------------------|
| | Q (eq.1) | Important shareholdings (eq.2) | Q (eq.1) | Important shareholdings (eq.2) |
| Constant | 0.174 (0.318) | 0.848 (14.301) | 0.374 (0.640) | 0.484 (1.775) |
| Important shareholdings | 1.372 (3.586) | | 1.399 (3.639) | |
| Managerial shareholdings | 0.297 (1.755) | | 0.251 (1.631) | |
| Distr | 1.769 (1.002) | | 1.598 (0.899) | |
| Debt | -3.245 (-1.962) | 0.153 (0.427) | -3.051 (-1.826) | 0.542 (1.016) |
| CR4 | 1.521 (1.603) | | 1.007 (0.918) | |
| Q | | 0.075 (4.761) | | 0.214 (1.987) |
| Firm size | | -0.00003 (-3.117) | | -0.00004 (-1.567) |
| Media | -0.643 (-0.767) | 0.377 (2.202) | -0.524 (-0.615) | 0.341 (1.589) |
| F | -1.371 (-1.762) | 0.256 (1.232) | -1.307 (-1.668) | 0.598 (1.411) |
| U | -1.342 (-0.801) | 0.169 (0.474) | -1.184 (-0.701) | 0.362 (0.799) |
| se | 2.284 | 0.496 | | |
| Adj-R ² | 0.177 | 0.202 | | |

Notes: Ordinary Least Squares and Two-Stages Least Squares estimation of ownership-performance relationship. t-statistics are in parentheses. se is the standard error of the estimate.

Table 6. Estimates of ownership-performance relationship (163 firm sample size - excluding utilities and financial services)

| Explanatory variables | OLS-estimates | | 2SLS-estimates | |
|--------------------------|--------------------|-----------------------------------|--------------------|-----------------------------------|
| | Q (eq.1) | Important shareholdings (eq.2) | Q (eq.1) | Important shareholdings (eq.2) |
| Constant | 0.064 (0.113) | 0.858 (13.797) | 0.303 (0.500) | 0.494 (1.783) |
| Important shareholdings | 1.562 (3.701) | | 1.602 (3.772) | |
| Managerial shareholdings | 0.179 (1.806) | | 0.116 (1.677) | |
| Distr | 2.226 (1.190) | | 2.052 (1.089) | |
| Debt | -3.669 (-2.105) | 0.334 (0.894) | -3.448 (-1.961) | 0.612 (1.144) |
| CR4 | 1.409 (1.438) | | 0.772 (0.684) | |
| Q | | 0.073 (4.634) | | 0.206 (1.946) |
| Firm size | | -0.00001 (-1.197) | | -0.00001 (-0.785) |
| Media | -0.687 (-0.798) | 0.382 (2.226) | -0.539 (-0.616) | 0.351 (1.661) |
| se | 2.343 | 0.496 | | |
| Adj-R ² | 0.161 | 0.159 | | |

Notes: Ordinary Least Squares and Two-Stages Least Squares estimation of ownership-performance relationship. t-statistics are in parentheses. se is the standard error of the estimate.



Note: Fraction of 20 largest firms with different types of controlling shareholders is shown for each country. A firm is categorized as narrowly-held (either directly or indirectly) if 10 per cent of the voting rights associated with shares in that firm are held by one shareholder or a group of shareholders.

Source: La Porta *et al.* (1999)

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