# A note on the ownership-performance relationship: Evidence from a semi-parametric approach*

Chrisostomos Florackis[1]†, Alexandros Kostakis[2] and Aydin Ozkan[3]

[1] *University of Liverpool, Liverpool, UK*
[2] *University of York, York, UK*
[3] *University of Hull, Hull, UK*

October 19, 2007

**Abstract**

This study revisits the classical debate about the nature of the relationship between managerial ownership and corporate performance by using a semi-parametric estimation approach. The semi-parametric approach helps sidestep concerns associated with the potential mispecification of parametric models (e.g. the arbitrary choice of a fixed number and/or location of turning points) and enables us consider a wider range of non-linear behavior. The empirical results support the existence of only the initial alignment effect of managerial ownership (i.e. for levels lower than 15%), indicating also that no clear-cut conclusion can be reached for the shape of the ownership-performance curve at higher levels of managerial ownership. In general, our results cast doubt on recent studies that rely critically on fully parametric methods to estimate the ownership-performance relationship.

JEL classification: G32

Keywords: Corporate Performance, Managerial Ownership, Semi-parametric Approach.

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†Corresponding author. The Management School, University of Liverpool, Chatham Street, L69 7ZH, Liverpool, United Kingdom. Tel.: + 44 (7904) 952027. Fax: + 44 (1517) 953001. E-mail: C.Florackis@liv.ac.uk

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# 1 Introduction

The effects of managerial ownership on corporate performance have been the subject of an extensive theoretical and empirical investigation. The discussions on the subject focus on the agency problems arising from the separation of ownership and control (Berle and Means, 1932) and the misaligned incentives between managers and shareholders (Jensen and Meckling, 1976). It is argued that these problems have a negative impact on firm value where managerial ownership is proposed as a potential solution to the managerial agency problem. In this respect, Jensen and Meckling argue that the ideal level of managerial ownership is 100 percent, pointing to a linear relationship between managerial holdings and performance. However, it is argued that the relation between managerial ownership and performance is likely to be non-linear (see, e.g., Morck et al., 1988 inter alia). On one hand, managerial ownership can help align the interests of managers with those of shareholders by constraining the consumption of perks and the engagement in sub-optimal investment policies (incentive-alignment effect). On the other hand, it is argued that managers tend to exert insufficient effort, collect private benefits and entrench themselves at higher levels of managerial ownership, leading to a negative relationship between managerial ownership and performance (entrenchment effect).

Despite many valuable insights which earlier theoretical studies provide, there is no consensus in the empirical literature on the exact nature of the relationship between managerial ownership and corporate performance. McConnell and Servaes (1990) provide evidence that supports both the alignment and entrenchment effects, generating an inverse U-shaped relationship between managerial ownership and performance. Similarly, Morck et al. (1988) and Short and Keasey (1999) observe an alignment behavior at low levels of managerial ownership, an entrenchment behavior at intermediate levels. However, they also report a resurgence of the alignment incentives of managers at high levels of managerial ownership. Several other studies

adopt even more complicated functional forms to describe the relationship between ownership and performance. For example, Hermalin and Weisbach (1991) find an inverse W-shaped relationship, Cui and Mak (2002) report a W-shaped relationship whereas Davies et al. (2005) use a quintic structure that leads to a two-hump managerial ownership-performance curve.

In this paper we argue that there are mainly two reasons for the lack of consensus in the existing literature on the nature of the ownership-performance relationship. Firstly, there is clearly very little or no support in the theoretical literature for the view that there should be a resurgence of the alignment and entrenchment effects of managerial ownership at intermediate and high levels of managerial ownership. Secondly, and more importantly, the existing empirical studies mostly use tightly parameterized techniques (e.g. regressions with higher order polynomials or piecewise regressions), which *a priori* assume a fixed number and/or location of turning points. We argue that these approaches are inadequate to fully capture the true nature of the interaction between ownership and performance. What possibly happens is that higher order polynomials simply capture local stationary points in the ownership-performance curve, erroneously pointing to complex non-linear effects of managerial ownership.[1]

The main motivation of this paper stems from the inconsistent findings among earlier studies and the drawbacks in the methodologies employed. In an attempt to provide further insights into the nature of the ownership-performance relationship, we suggest the implementation of a non-parametric approach, which helps overcome the methodological inadequacies mentioned above. The main advantage of the non-parametric approach is that it imposes no pre-specified parametric form on the relationship and, therefore, enables the extraction of the maximum possible

[1]Some alternative explanations for the conflicting findings of performance studies concern with the "endogeneity arguement" (Demsetz and Lehn, 1985), the "adjustment costs arguement" (Cheung and Wei, 2006) and the use of different dependent variables as proxies for corporate performance (Palia and Lichtenberg, 1999).

information from the data. As a result, it captures more efficiently the true nature of the managerial ownership-performance relationship. It has been suggested (see, for example, Engle et al., 1986) that the case for a non-parametric specification is even stronger when the relationship under examination is highly non-linear.[2] Given the complex non-linear structures recently suggested in the literature, the ownership-performance curve constitutes an ideal framework to employ this methodology and test whether such non-linearity exists in the ownership-performance curve. Furthermore, a non-parametric approach is not as sensitive as ordinary least squares to the presence of outliers, enhancing more robust conclusions for the whole range of managerial ownership levels. In particular, the present study puts forward a semi-parametric estimation, which combines the features of the non-parametric and the parametric approaches. This flexible specification inherits the advantages of the non-parametric techniques, allowing us also to impose a parametric form on specific explanatory variables.

The empirical investigation is conducted using a large sample of UK listed firms over the period 2000-2004. The typical UK corporation is characterized by the absence of individual ownership, a profound but minimally recognized trend during the last decades, and its replacement by institutional ownership. Characteristically, according to the Office of National Statistics, there has been an increase in ownership of the UK equities by institutional investors from 30 percent in 1963 to almost 80 percent in 2004.[3] It is still argued that ownership by institutional investors is rather diffused and institutions usually lack both the power (e.g. due to inadequate voting rights) and the will (e.g. because the monitoring costs outweigh the benefits) to exert monitoring behavior (Florackis and Ozkan, 2007).[4] Therefore, managerial incentives

[2] See also Bertinelli and Strobl (2005) and Barrios et al. (2005) for the application of semi-parametric methods in different contexts.

[3] For an analytical discussion on the UK governance system and the evolution of ownership structure over the period 1999-2005 see Short and Keasey (1998), Franks et al. (2001), Ozkan and Ozkan (2004) and Florackis and Ozkan (2007).

[4] A typical example of an owner with no incentives to monitor is the case a financial institution

(e.g. through managerial ownership) are expected to play a critical role in aligning the interests of managers with those of shareholders and, hence, improving corporate performance.

Our findings are in line with our predictions, casting doubt on the standard approaches to investigate the ownership-performance link. Specifically, the results support only the initial alignment effect of managerial ownership, which is observed for managerial ownership levels lower than 15 percent. The evidence is far from conclusive for managerial ownership levels greater than 15 percent. The latter finding contrasts with previous findings in the literature, which, as mentioned above, indicate a specific complex relationship between managerial ownership and performance at intermediate and high levels of managerial ownership (for evidence from UK firms see Short and Keasey, 1999 and Davies et al., 2005).

For ease of comparison, we also utilize a standard parametric approach using the same sample. The results of the fully parametric models strongly support the initial alignment and entrenchment effects of managerial ownership, providing, though, mixed evidence regarding the subsequent turning points in the ownership-performance curve. Most importantly, the results are very sensitive to the order of the specified polynomial for the managerial ownership level. This confirms our concerns about the appropriateness of fully parametric methods in detecting the non-linearity on the ownership-performance relationship.

The remainder of the paper is organized as follows. Section 2 discusses the methodology utilized in this study. Section 3 describes the dataset and the variables whereas section 4 presents the empirical findings. Finally, section 5 concludes.

(e.g. a bank or an investment company) that holds a significant stake of a company but also has existing or potential business relations with the firm. In order to protect those relations, the board might be less willing to challenge management decisions.

# 2 Methodology

This section outlines the semi-parametric estimation procedure and makes the comparison with the fully parametric techniques. Let us denote corporate performance by $Q$ and executive ownership by $Exec$.[5] We collect all the other explanatory variables into a vector $X$, which has 1 as its first element, in order to allow for a constant in our model specification. Following Jensen and Meckling (1976), the early studies investigating the empirical determinants of corporate performance assume a linear parametric form for all the explanatory variables by estimating the following equation:

$$E(Q \mid Exec, X) = \beta' X + \gamma Exec \tag{1}$$

To allow for potential nonlinearity in the executive ownership-performance relationship, subsequent studies use executive ownership values up to the $p^{th}$ power as regressors. Such a specification implies that the conditional mean of $Q$ can be written as:

$$E(Q \mid Exec, X) = \beta' X + \sum_{i=1}^{p} \gamma_i (Exec)^i \tag{2}$$

This specification nests most of the earlier studies. For example, McConnell and Servaes (1990) estimate equation 2 by using $p$=2 whereas Short and Keasey (1999) set $p$=3. Subsequent studies include even higher order polynomials to capture more complex non-linear structures (e.g. Cui and Mak (2002) use p=4 and Davies et al. (2005) use p=5).[6]

This study puts forward a semi-parametric model, which allows us to relax the functional form on $Exec$ and still control for the other factors that determine cor-

[5] In this study, we restrict our attention to the amount of shares held by executive directors rather than focusing on the total level of managerial ownership, because executive directors are more likely to become entrenched. Therefore, we use the term executive ownership instead of managerial ownership.

[6] For an analytical discussion about the typical way in which non-linear models are estimated in corporate finance, see Chen et al. (2004).

porate performance. In this case, the conditional mean of our model is given by:

$$E(Q \mid Exec, X) \ = \beta^{'} X + f(Exec) \tag{3}$$

where $\beta^{'} X$ represents the parametric component and $f(Exec)$ the non-parametric one. The non-parametric component $f(Exec)$ is estimated using regression splines.[7] An important advantage of this approach in comparison to the piecewise regressions is that it does not prespecify cutoff points. The employed methodology minimizes the following objective function:

$$\min\{\frac{1}{n}\sum_{i=1}^{n}(Q_i - f(Exec) - \beta^{'} X)^2 + \lambda J\} \tag{4}$$

where $J$ represents the roughness of the function $f$ and $n$ the number of observations. Consequently, this expression exhibits the trade-off between fitting perfectly the data (the first term of the expression) and having a smooth approximating function $f$ (the second term). This trade-off is controlled by the parameter $\lambda$. As $\lambda \rightarrow \infty$, the penalty to the roughness of the function is so high that the optimal function $f$ is of linear form, since a linear function has zero roughness for the whole range of the dependent variable values. In this case, the minimization problem becomes identical to OLS. On the other extreme, if $\lambda \rightarrow 0$, then this methodology will provide a very rough approximating function $f$ that essentially fits each individual observation.

The optimal value of $\lambda$ is chosen using Generalized Cross Validation (GCV). According to this criterion, the optimal $\lambda$ minimizes the following expression:

$$GCV(\lambda) = RSS(\lambda)/(1 - (1/n)tr[A(\lambda)])^2 \tag{5}$$

where $RSS(\lambda) = e^{'}e$ is the Sum of Squared Residuals of the estimated model given $\lambda$ and $tr[A(\lambda)]$ is the trace of the projection matrix $A(\lambda)$ that satisfies $\widehat{Q} = A(\lambda)Q$

[7] An analytical discussion on the regression splines methodology is provided in Härdle (1990).

and $e = (I - A(\lambda))Q$. Instead of using smoothing splines as in Engle et al. (1986), we employ penalized regression splines. Even though the two approaches yield very similar results in practice, penalized regression splines use fewer parameters and are, therefore, computationally more efficient.[8]

Since the parameter estimators for each spline are conditionally normally distributed, confidence intervals for each parameter can be obtained (see Woods, 2000 for the properties of these estimators). These 'approximate 95% confidence intervals' are reported in the results. The semi-parametric model was estimated in R, using the *gam* function of the *mgcv* package.

# 3 Data and Variables

For the empirical analysis we use a large sample of UK listed firms over the period 2000-2004. Data on the market value of equity, book value of equity, total assets, total debt and industry classification are obtained from Datastream. We use the Hemscott Guru Academic to obtain detailed information on firms' board and ownership structure. We restrict our attention to non-financial firms because of the specific characteristics of the financial ratios of financial firms. We also drop the values for each variable that lies outside the $1^{st}$ and the $99^{th}$ percentiles. These criteria left us with 1,010 firms for the present analysis.

Corporate performance is measured as the ratio of the book value of assets minus the book value of equity plus the market value of equity to the book value of assets (Tobin's Q).[9] The first ownership attribute we consider is $Exec$ that represents the

[8] An analytic treatment for the properties and the implementation of this methodology is provided in Wood (2003). For robustness purposes, in addition to the Wood's thin plate regression spline, we use the cubic regression spline methodology and get similar results (results not reported).

[9] This measure has been extensively used in corporate finance literature as proxy for corporate performance. For robustness purposes, we also measure Tobin's Q as the ratio of market value of equity plus the book value of preference shares plus the book value of debt, all divided by total assets. The results are qualitatively similar.

percentage of shares held by executive directors.[10] In the parametric specifications we also include the terms $Exec^2$, $Exec^3$, $Exec^4$and $Exec^5$as regressors, which stand for the second, third, fourth and fifth power of $Exec$, respectively, to allow for the potential non-linearity.

Several variables related to the board structure of firms are also likely to influence corporate performance. In particular, as Yermack (1996) points out, large boards make coordination, communication and decision making more cumbersome than in small boards, which leads to a negative relationship between board size and performance. On the other hand, boards with significant proportion of non-executive directors and separated roles between the chief executive officer (CEO) and the chairman of the board (COB) can perform a significant monitoring function. Consequently, they can limit the exercise of managerial discretion (Byrd and Hickman, 1992). To control for these effects, we include the following variables in the model: BOARDSIZE, which is the number of directors on the board (in logarithm); NON-EXEC, which is the ratio of the number of non-executive directors to the total number of directors; and CEO_DUMMY, which is a dummy variable that takes the value of 1 when the roles of the Chief Executive Officer (CEO) and the Chairman of the Board (COB) are not separated and 0 otherwise.

The variable CONCENTR, which represents the percentage sum of stakes of all shareholders with equity ownership greater than 3 percent, is also included to capture the impact of ownership concentration on corporate performance. As it has been long realized, large shareholders have both the incentive and the ability to monitor management, protecting, hence, their investment (Shleifer and Vishny, 1986).[11] Finally, following earlier studies on the subject (see, for example, Short and Keasey, 1999 and Davies et al., 2005), we control for size, leverage and investment

[10] For ease of comparison, the most flexible parametric version of our performance model is identical to the one used by Davies et al. (2005).

[11] See, for example, Dahya et. al. (1998) for the importance of ownership concentration in corporate governance in the UK.

differences by including the variables LEVERAGE, which is the ratio of total debt to total assets, SIZE, which is firm's size proxied by the market value of equity (in logarithm) and INVESTMENT, which is the ratio of capital expenditures to total assets in the model. Industry dummies are also incorporated to capture industry specific effects.

Table 1 provides the descriptive statistics for the variables used in our analysis. The mean value for Tobin's Q is 2.10, whereas the executive ownership has a mean of 13.89 percent. The ownership concentration reaches, on average, the level of 34.61 percent. Moreover, the average proportion of non-executive directors is 47.65 percent and the average board size is 6.84 directors. We identify 131 firms out of the final 1,010 in which the roles of CEO and COB were not separated. Regarding the accounting variables, the average leverage ratio is 18 percent, the average market capitalization is £639 million and the average investment ratio is 6.4 percent.

# 4 Empirical Results

This section presents our empirical findings. For comparison purposes, we start by utilizing a parametric approach, which is similar to the one used in earlier studies. Then, we report the results derived from the semi-parametric analysis.

## 4.1 Parametric Analysis

In panel A of Table 2 we present the results of the parametric cross-sectional analysis. To control for potential endogeneity problems we follow the methodology proposed by Rajan and Zingales (1995). In particular, we measure the dependent variable in year 2004, while for the independent variables we use average values over the period 2000-2003. We start by estimating a linear specification (model 1). The results point to a positive and statistically significant (at 1 percent level) relationship between

executive ownership and corporate performance. This can be taken as evidence for the conjecture that executive ownership help align the interests of executive directors with those of shareholders, leading to an improved corporate performance (Jensen and Meckling, 1976).[12]

In Model 2 we attempt to capture the non-linear relationship between executive ownership and Tobin's Q by including the square term of executive ownership, $Exec^2$, as a regressor (i.e. we set p=2 in equation 2). The results provide strong support for both the alignment and the entrenchment hypotheses. The estimated coefficients of the variables $Exec$ and $Exec^2$ are statistically significant at 1 percent level. In particular, we find that the ownership-performance curve slopes upward until executive ownership reaches the level of 38.6 percent and then slopes downward. This turning point is almost identical to the turning point reported in McConnell and Servaes (1990) for US firms. Model 3, which sets p=3, allows for a cubic relationship between executive ownership and Tobin's Q. Consistent with the findings in Short and Keasey (1999), we find that the terms $Exec, Exec^2$and $Exec^3$ are positive, negative and positive, respectively, all statistically significant, pointing to a cubic relationship between executive ownership and Tobin's Q. However, the turning points identified in our model (28.18 percent and 64.54 percent) differ significantly from the ones reported in Short and Keasey (12.99 percent and 41.99 percent).

In Model 4, which sets p=4, we find that only the terms $Exec$ and $Exec^2$ are statistically significant, rejecting the cubic relationship indicated by model 3 but consistent with the curvilinear relationship indicated by model 2. Finally, the results

[12]The results concerning the remaining coefficients in that model are in line with our expectations. Consistent with the view that large boards make coordination, communication and decision-making more cumbersome relative to small boards, we find a negative relationship between board size and Tobin's Q. The results also reject the hypothesis that non-executive directors and large shareholders play a significant role in the governance of UK firms (i.e. the coefficients of NON-EXEC and CONCENTR are not statistically different from zero). This is in line with recent findings in Short and Keasey (1999) and Ozkan and Ozkan (2004). The rest of the estimated coefficients, except for the CEO_DUMMY, which is negative and significant as expected, have the hypothesized signs but they are statistically insignificant.

of model 5, which includes the $5^{th}$ power of executive ownership in the model, support the quintic structure proposed by Davies et al. (2005). Specifically, we observe the following four turning points in the curve: 13.39 percent, 24.53 percent, 48.76 percent and 72.26 percent. Except for the first turning point, the rest are very close to the ones reported in Davies et al. (2005) (7.01 percent, 26.0 percent, 51.4 percent and 75.7 percent). Despite the strong statistical significance of the coefficients, one should be cautious though in interpreting the results of model 5 as strong evidence for a non-linear relationship between executive ownership and Tobin's Q. Specifically, the last increasing part of the ownership-performance curve is supported by a very limited number of observations (n= 4 firms).

Overall, the parametric analysis shows that different econometric specifications lead to different inferences regarding the ownership-performance relationship. Specifically, while models 2 and 4 point to a curvilinear relationship, models 3 and 5 point to a cubic and quintic relationship respectively. Additionally, different models support considerably different turning points and, more importantly, some of the effects (e.g. the alignment effect for executive ownership levels greater than 72.26 percent of model 5) are supported only by a limited number of observations. Such conflicting findings raise doubts about the appropriateness of using arbitrarily higher-order executive ownership polynomials in a performance model for testing the non-linear aspect of executive ownership.

## 4.2 Semi-Parametric Analysis

In this section we employ the semi-parametric approach described in Section 2 to examine the relationship between ownership and performance. As mentioned earlier, this approach offers us the flexibility to relax the functional form of $Exec$ (i.e. the shape of the ownership-performance relationship is not *a priori* determined) and still control for other factors that may affect performance, such as ownership

concentration, non-executive directors, board size, CEO duality, leverage, size and investment.

The results of our analysis can be summarized as follows: As shown in Figure 1, which presents the net effect of executive ownership on performance as derived by the semi-parametric estimate and the corresponding confidence bounds, the results clearly point to a non-linear relationship between executive ownership and Tobin's Q. In particular, we observe the existence of a strong alignment effect for executive ownership levels lower than 15 percent (region A) and the possibility of several turning points in the estimated curve thereafter. The results, however, do not lead to strong conclusions on the relationship between executive ownership and Tobin's Q for intermediate and high levels of executive ownership due to the large confidence bounds. That is, although we actually observe a slight decline in the curve in regions B and D and a slight increase in regions C and E, these changes are combined with large confidence bounds and, in some cases, with a small number of observations (especially in regions D and E). These findings clearly contradict with those provided in recent studies that argue in favour of a complex non-linear structure for the ownership-performance curve throughout the whole range of executive ownership.[13]

Regarding the rest of the variables, the semi-parametric method yields almost identical coefficients with those obtained from the fully parametric models (see Panel B of Table 2). Specifically, there is evidence that board size is significantly negatively related with Tobin's Q. We also find that firms, in which the CEO and the COB roles are separated, display higher Tobin's Q ratios, *ceteris paribus*. The remaining

[13]To determine the extent to which the results are sensitive to the choice of the dependent variable, the model is re-estimated using an alternative Tobin's Q ratio, namely the market capitalization plus total debt to total assets (see Davies et al., 2005 and Silva and Majluf, in press). The results are quantitatively similar with the ones obtained so far. Furthermore, in addition to market performance, we put forward an accounting proxy of corporate performance, the return on assets, defined as net income plus the product of interests and (1-tax rate) all divided by total assets (see Silva and Majluf, in press). The results (not reported) do not change materially with respect to the impact of executive ownership on performance. However, the coefficient of board size becomes significant at the 5% rather than the 10% level. Also, the coefficients of the leverage and size variables become significant at the 5% and 1% levels respectively.

coefficients have the hypothesized signs but they are statistically insignificant.

In summary, the semi-parametric analysis provides strong evidence on the alignment effect of executive ownership but it does not support a specific complex non-linear relationship between executive ownership and corporate performance for intermediate and high levels of executive ownership, as recently proposed by Short and Keasey (1999) and Davies et al. (2005) for UK firms. Consistent with our earlier discussion, it seems that higher-order polynomials employed in parametric specifications simply capture local stationary points in the ownership-performance curve. Our findings suggest that significant coefficients estimates of these higher-order terms should not be used to draw strong inferences regarding the impact of executive directors' holdings on corporate performance.

# 5 Concluding remarks

Existing empirical studies on the impact of managerial ownership on corporate performance often utilize fully parametric techniques. In an attempt to capture the potential non-linear relation between ownership and performance these studies include higher order managerial ownership polynomials in the performance equation. To this end, statistically significant coefficients of these polynomials are perceived as evidence for a specific non-linear relationship between executive ownership and corporate performance.

Our main argument in this paper is that fully parametric techniques are not appropriate to investigate the exact nature of the ownership-performance relationship. As an alternative, we adopt a new approach by putting forward a semi-parametric approach which helps us sidestep concerns associated with fully parametric methods. In line with the current literature, the results of our analysis provide strong evidence for a significant association between executive ownership and firm performance. However, this occurs only at low levels of executive ownership (lower than

15 percent). On the other hand, we cannot reach any clear-cut conclusions for the shape of the ownership-performance curve at higher levels of executive ownership.

Clearly, our results cast doubt on the findings of prior research. We argue that fully parametric techniques are misspecified and inadequate to draw conclusions for the ownership-performance relationship. One important implication of our analysis is that one needs to take extreme care in pre-specifying a fixed number and/or location of turning points.

By identifying the use of inappropriate estimation techniques as an important reason why there is no consensus in the literature about the shape of the ownership performance curve, this study serves as a first attempt towards establishing a more pragmatic empirical model for corporate performance and its determinants. However, there is still scope for further methodological and conceptual improvements of performance models. For example, in terms of identifying alternative performance attributes, potential interrelations between the alternative corporate governance mechanisms available to firms (Florackis, 2005 and Lasfer, 2006) as well as interactions between corporate governance characteristics (e.g. managerial ownership) and environmental and organizational factors (Wu, 2007) could be considered.

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# List of Tables and Figures

**TABLE 1**: DESCRIPTIVE STATISTICS

| | Mean | Min | 25% | Median | 75% | Max |
|---|---|---|---|---|---|---|
| TOBIN'S Q | 2.10 | 0.17 | 1.08 | 1.47 | 2.25 | 18.43 |
| BOARD SIZE | 6.84 | 3 | 5.25 | 6.5 | 8 | 18.25 |
| NON-EXEC | 47.65 | 0 | 38.83 | 47.88 | 56.82 | 1 |
| CEO | 0.13 | 0 | 0 | 0 | 0 | 1 |
| CONCENTR | 34.61 | 0 | 20.06 | 33.21 | 48.53 | 84.85 |
| EXEC | 13.89 | 0 | 0.44 | 5.62 | 21.1 | 83.4 |
| LEVERAGE | 0.18 | 0 | 0.05 | 0.15 | 0.29 | 0.92 |
| SIZE | 3.99 | 0.8 | 2.40 | 3.73 | 5.27 | 10.8 |
| IVESTMENT | 0.064 | 0 | 0.022 | 0.040 | 0.069 | 0.875 |

Notes: Definitions for all the variables are provided in Section 3

**TABLE 2**: CROSS SECTIONAL REGRESSIONS PREDICTING TOBIN'S Q

Dependent Variable: **Tobin's Q**

| | *Panel A* (parametric) | | | | | *Panel B* (semi-parametric) |
|---|---|---|---|---|---|---|
| Indep. Variables | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
| CONSTANT | 2.029 (4.43)*** | 1.539 (3.17)*** | 1.376 (2.80)** | 1.261 (2.58)*** | 1.042 (2.09)** | 1.769 (3.54)*** |
| BOARDSIZE | -0.076 (−2.22)** | -0.081 (−2.36)** | -0.079 (−2.31)** | -0.078 (−2.27)** | -0.076 (−2.23)** | -0.078 (−1.85)* |
| NON-EXEC | 0.001 (0.21) | 0.004 (0.78) | 0.004 (0.88) | 0.005 (1.01) | 0.006 (1.23) | 0.005 (0.93) |
| CEO_DUMMY | -0.343 (−2.08)** | -0.401 (2.45)** | -0.401 (−2.45)** | -0.410 (−2.46)** | -0.418 (−2.52)** | -0.415 (−2.09)** |
| CONCENTR | 3.6e-4 (0.10) | 1.9e-4 (0.05) | 2.9e-4 (0.08) | -3.6e-4 (−0.10) | -5.9e-4 (−0.17) | 3.7e-4 (0.10) |
| LEVERAGE | 0.005 (0.74) | 0.006 (0.83) | 0.006 (0.84) | 0.006 (0.88) | 0.006 (0.92) | 0.006 (1.51) |
| SIZE | 0.014 (0.30) | 0.043 (0.97) | 0.055 (1.20) | 0.061 (1.31) | 0.069 (1.52) | 0.059 (1.19) |
| INVESTMENT | 0.609 (0.62) | 0.473 (0.49) | 0.387 (0.40) | 0.351 (0.36) | 0.249 (0.25) | 0.317 (0.31) |
| $Exec$ | 0.012 (2.82)*** | 0.051 (4.29)*** | 0.086 (3.39)*** | 0.122 (2.74)** | 0.218 (3.59)*** | See Figure 1 |
| $Exec^2$ | - | -6.6e-4 (−3.41)*** | -0.002 (−2.31)** | -0.005 (−1.67)* | -0.016 (−2.92)*** | - |
| $Exec^3$ | - | - | 1.56e-5 (1.78)* | 0.8e-4 (1.21) | 5.3e-4 (2.73)*** | - |
| $Exec^4$ | - | - | - | -4.5e-7 (−0.97) | -7.5e-6 (−2.66)*** | - |
| $Exec^5$ | - | - | - | - | 3.8e-8 (2.62)*** | - |
| Industry Dummies | Yes | Yes | Yes | Yes | Yes | Yes |
| $R^2$ | 2.40 | 3.53 | 3.83 | 3.97 | 4.38 | 5.82 |
| Number of firms | 1010 | 1010 | 1010 | 1010 | 1010 | 1010 |

Notes: This tables presents the results from the Parametric (Panel A, models 1-5) and Semi-pametric regressions (Panel B, model 6)) predicting Tobin's Q. Definitions for all the variables are provided in Section 3. All regressions include industry dummies. t statistics are reported in parentheses. For the estimation we use robust to heteroscedasticity standard errors. ***, ** and * indicate coefficient is significant at the 1%, 5% and 10 % levels respectively

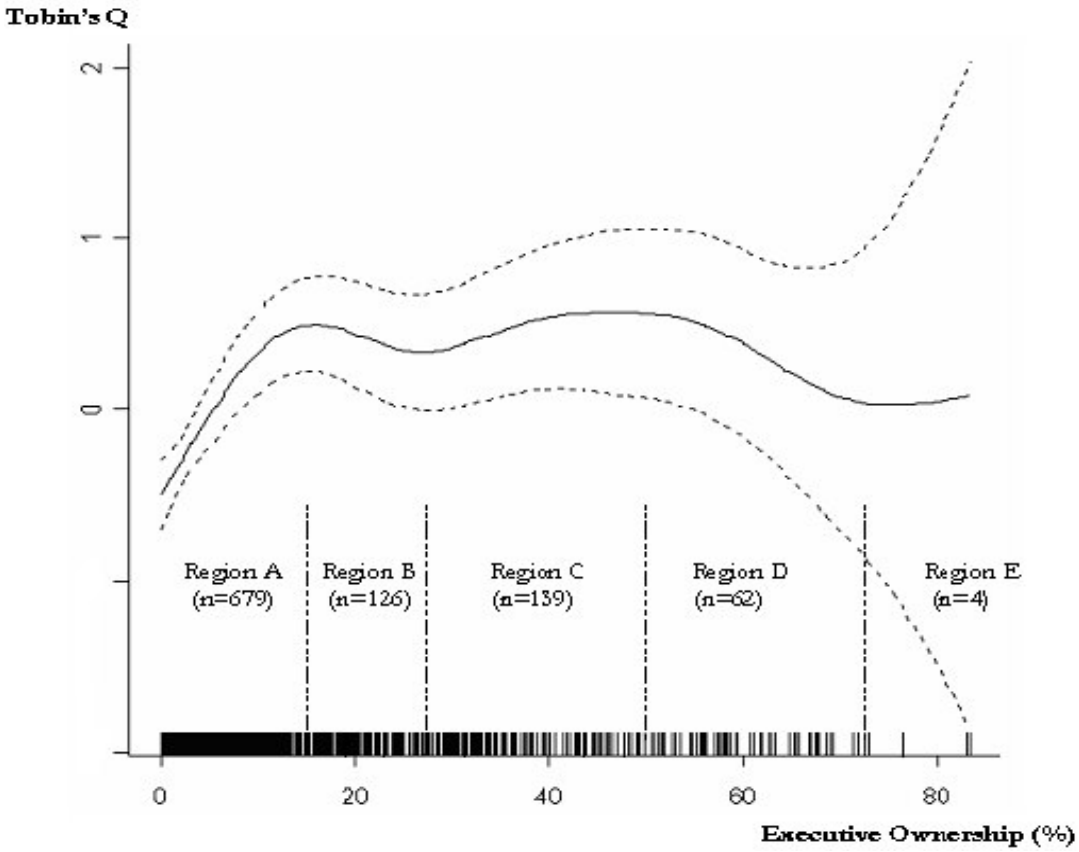


**FIGURE 1**: The net effect of executive ownership on Tobin's Q (semiparametric estimate). The continuous line corresponds to the estimate whereas the dotted lines correspond to the confidence bounds.