Agency Costs, Executive Compensation, Bonding and Monitoring: A Stochastic Frontier Approach

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This paper investigates the impact of various forms of bonding, firm monitoring, and executive compensation on agency costs. After relating market value for 1,043 firm-year observations to a number of standard covariates in a stochastic frontier framework, the resulting one-sided inefficiency term is interpreted as a proportional proxy for firm-specific agency costs. Following Battese and Coelli (1995) firm-specific agency costs are related to a variety of additional covariates including firm governance structures, firm liquidity, information asymmetry, and various forms of executive compensation. Consistent with agency theory, it is found that cash compensation tends to increase agency conflict while restricted stock incentives and executive stock options tend to lower it. Moreover, firms with high liquidity and low information asymmetry exhibit a lower degree of agency cost.

JEL Classifications: G35, C23, D82, J33

I. INTRODUCTION

Separation of ownership and management does not come without costs. Berle and Means (1932) introduced the canonical agency problem by suggesting that dispersed ownership leads to less corporate monitoring. Jensen and Meckling (1976) further spurred the interest in the theoretical and empirical aspects of the modern theory of corporate finance by formalizing agency costs as a conflict of interest between managers and shareholders[1]. Habib and Ljungqvist (2005) find that the average firm underperforms its best-performing peers by approximately $1,432 million. They attribute the performance difference to agency costs in US corporations.

The corporate finance literature suggests several techniques by which agency conflict can be reduced, thereby reducing agency costs. The techniques can be distinguished between internal mechanisms, which include compensation contracts, bonding, and monitoring activities within the firm, and external mechanisms, which include monitoring activities by the capital market, legislators, investment professionals, and investors. Although different in nature, both mechanisms share a common objective: to align the utility of the manager with the utility of the shareholder.

The modern literature on executive compensation suggests that this objective can be achieved by tying the manager's compensation directly to firm performance or firm value. This, in turn, resulted in an increase in equity compensation in the latter part of the twentieth century. Hall and Liebman (1998) report only 30% of CEO's received new options grants in 1980 with mean salary of $655,000 and mean options grants of $155,000. The percentage grew to 70% in 1994 with mean cash pay of $1.3 million and mean options grants of $1.2 million. However, whether the objective is met and agency costs are reduced still remains open for at least three reasons.

First, there is no concrete theoretical or empirical consensus on the impact of different forms of compensation on managerial decisions and, thus, on agency costs.[2] The literature on principal-agent theory generally confirms that cash compensation alone does not provide sufficient incentives for the

[1] Other important contributions include Ross (1973), Fama (1980) and Jensen (2005).
[2] For detail discussion see Core, Guay and Larcker (2003), Murphy (1999)

manager to lower agency conflict. Equity compensation such as stock options and restricted stocks are generally seen as a more efficient solution among internal mechanisms because both align the interests of the manager and the shareholder by a common financial benefit, i.e. an increase in firm value. However, the effectiveness of equity incentives is still questioned.[1]

Second, the impact of large-percentage shareholders, also called "blockholders", as an external monitoring mechanism is still unresolved[2]. On one hand, blockholders have the incentive to act as monitors of the firm and to improve management, with the benefits shared with other shareholders. On the other hand, blockholders can also have private incentives to consume corporate resources or to otherwise go along with managerial decisions that might be deleterious to firm performance. Therefore, the relation between blockholders and agency costs is still ambiguous.

The last, and perhaps the major, obstacle is the fact that agency costs are largely unquantifiable. By definition, agency costs are the costs incurred by the firm due to agency conflicts. In reality, we know that agency costs manifest in various forms, e.g., as executive perks, drops in productivity, and loss of firm value. However, due to its multidimensional nature, it is difficult to measure agency cost in either absolute or relative terms. Previous studies on the subject have used qualitative factors to proxy for a component of agency conflict, e.g. ownership structure or board composition. Yet, these techniques are only proxies for conflict rather than an attempt to measure the actual costs. Ang, Cole and Lin (2000) found a clever solution to the problem by computing the deviations of expense and efficiency ratios from a benchmark of privately held firms.

However, the dynamics of a publicly listed firm are considerably different than a privately owned firm. For example, minority shareholders do not have the voting rights required for effective monitoring unless they act as a group, e.g., by threatening a class action lawsuit, which is costly. Moreover, a diverse shareholder group is still subject to free riding. Consequently, the findings of Ang, Cole and Lin cannot be easily extended to publicly held firms. Habib and Ljungqvist (2005) utilized a stochastic frontier

[1] See Jensen (2005)
[2] See Holderness (2003)

analysis, a common tool in productivity economics, to locate a benchmark for public firms. They use the inefficiency score that is a byproduct of the stochastic frontier analysis as a proportional measure of agency costs, and investigate how board composition and equity incentives influence agency costs.

We also employ the stochastic frontier approach to analyze a panel of 1,043 firm-year observations to estimate the agency costs for over 180 publicly traded US firms. Utilizing the technique pioneered by Battese and Coelli (1995), we simultaneously estimate a firm-value frontier and the relationship between agency costs and various forms of executive compensation, firm governance, external oversight mechanisms, and other influences.

Our paper complements the agency theory literature and extends Habib and Ljungqvist (2005) by directly testing the effects of internal and external mechanisms on agency costs. Whereas Habib and Ljungqvist (2005) focused on the effects of board of directors and different managerial incentives, we empirically study the effects of agency costs within the Jensen and Meckling (1976) framework.

To preview our results, firms do not appear to provide executive compensation contracts at an optimal level: we find that cash compensation tends to increase while equity compensation tends to reduce agency costs, and managerial power increases agency costs. However, managerial bonding efforts tend to lower agency costs. While effects of monitoring have been extensively researched, we are not aware of any other empirical paper on bonding issues. We find that more blockholder ownership tends to increase agency costs but a greater breadth of firm ownership tends to reduce agency costs. Finally, we find that firms with less information asymmetry tend to have lower agency costs.

II. HYPOTHESES DEVELOPMENT

The traditional view of executive compensation, also known as the optimal contracting view, claims that executive contracts are designed such that the principal-agent conflict is minimized. The argument relies on the fact that the board of directors, as shareholder representatives, will determine a contract that aligns the shareholder and manager interests and in turn maximizes firm value. If contracts are optimal then there should be no statistically significant relationship between executive compensation and agency costs in a reduced form model. However, the empirical evidence on the issue is mixed. Some

empirical studies find that incentive levels are at a sub-optimal level and performance can be improved by improving incentives (Mason, 1971; Morck et. al. 1988; Leonard, 1990; Abowd, 1990). Others find that incentives and firm value are at equilibrium (Demsetz and Lehn, 1985; Himmelberg, Hubbard and Palia, 1999). In line with the optimal contracting view we form the following testable hypothesis:

Hypothesis 1: There is no relationship between the level of executive compensation and agency costs.

The optimal contracting view is not without its weaknesses. The basis of the argument is that a board of directors acts in the best interests of the shareholders and executive compensation is set to minimize the agency conflict, implicitly equating the marginal benefit to the marginal costs of reducing agency costs. However, there is a growing literature suggesting that U.S. boards of directors are ineffective in this arena, primarily because board culture discourages conflict with the CEO (Jensen, 1993). Board ineffectiveness can also result from the CEO's influence over director appointments and perks (Crystal, 1991; Bebchuk and Fried, 2003). Thus, compensation contracts may be optimized not for the principal-agent relationship, but for the CEO's personal utility.

Bebchuk, Fried and Walker (2001) and Bebchuk and Fried (2003) argue in favor of another executive compensation view: rent extraction. According to the rent extraction view, managers are part of the agency conflict problem. Specifically, a manager with "power over the board" can influence executive pay beyond the optimal level and extract rents from the firm. Empirical evidence supporting this view suggests a negative relationship between CEO pay and the level of corporate governance (Core, Holthausen and Larcker, 1999; Hartzell and Starks, 2002).

We expect firms with a "dictatorship" style of management to suffer from rent extraction. Since the rent extracted is beyond what shareholders are willing to pay, it is considered a portion of agency costs. Therefore, a testable hypothesis with respect to rent extraction is formulated as:

Hypothesis 2: There is no relationship between managerial power and agency costs.

Not all forms of incentives are equally likely to reduce net agency costs, primarily because of differences in shareholder and manager risk aversion. According to the principal-agent theory, shareholders, who have the ability to diversify their investment portfolio, are considered risk-neutral

while managers, who are unable to diversify their human capital, are considered risk-averse. Thus, shareholders want their agents to take on riskier projects with anticipation of higher return. As the performance of the projects undertaken by the manager, typically measured by accounting earnings, subsequently determines the manager's level of compensation, the manager prefers a compensation structure that entails less personal risk and vulnerability to earnings volatility. Therefore, given a certain level of compensation, the manager will favor a higher percentage of fixed cash payment along with lower-risk investment projects[1].

To alleviate the agency conflict and to motivate the manager to undertake riskier projects, shareholders may benefit from granting equity compensation, including stock options and restricted stocks. Datta et. al. (2001) document that managers with greater equity-based compensation engage in risk-increasing acquisitions that earn higher returns. Frye (2001) provides evidence that firms with more equity-based compensation tend to perform better. Kole (1997) finds that restricted stocks are common in R&D intensive industries. Alternatively, Ryan and Wiggins (2002) report a positive relationship between stock options holdings and R&D investment and negative relationship between restricted stocks and R&D investment. Overall, the findings suggest that optimally structured pay packages may provide managers with suitable incentives to engage in value-maximizing investments, thereby reducing agency costs.

Nevertheless, it is important to recognize the potential for managerial misbehavior in connection with equity compensation. Yermack (1997) finds evidence suggesting that managers time stock options grants prior to release of good company news. Similarly, Aboody and Kasznik (2000) and Carpenter and Remmers (2001) also document findings suggesting that managers exploit company news in favor of their options grants and exercise dates. Rock (1999) finds that insider ownership remains unchanged in spite of massive options awards.

The effect of various types of executive compensation on agency costs remains an open empirical question. We therefore formulate the following testable hypothesis:

[1] See Amihud and Lev (1981), Haugen and Senbet (1981) and Smith and Stulz (1985)

Hypothesis 3: There is no relationship between the proportion of an executive's compensation that is restricted stocks or stock options (i.e., equity compensation) and agency costs.

Agency costs can be reduced through the presence of large-block shareholders, also known as blockholders. With a large stake in the firm and hence significant voting rights, blockholders can directly and indirectly influence the decision making process of the firm. Whether these influences reduce or increase agency costs remains unanswered. On one hand, as blockholder ownership increases blockholders have a greater incentive to increase firm value through better monitoring. Consequently agency costs would be reduced and firm value increased. Shleifer and Vishny (1986) find that blockholders play an active role in monitoring management. Agrawal and Mandelker (1990, 1992) find evidence suggesting better monitoring at firms with higher institutional ownership. Similarly, Denis, Denis and Sarin (1997) document that executive turnover is positively related with the presence of outside blockholders. Moreover, firms with large blockholders tend to outperform their peers with relatively fewer outside blockholders (Denis and Serrano, 1996; Bhagat, Black and Blair, 2001). The findings suggest that blockholders are effective monitors in the firm and the benefits are shared along with other shareholders.

On the other hand, blockholders may have private interests that need not coincide with those of other shareholders. A dominant blockholder can use his voting power to extract firm resources or to enjoy corporate benefits not enjoyed by other minority shareholders. If so, then agency conflict may be even worse with blockholders than without. In fact, a conflict of interest between large and small shareholders has been documented in previous research (e.g. Shleifer and Vishny, 1997; La Porta et. al., 1998; Morck, Stangeland and Yeung, 2000). Moreover, a few studies find that a greater concentration of control rights has a negative effect on firm value (e.g. Morck, Shleifer and Vishny, 1988; Claessens et. al., 2002). Hence, these studies suggest that blockholders may enjoy private benefits of control, which in turn can widen the agency-conflict gap.

The role of blockholders is ambiguous, as it depends if their interests are aligned with that of the managers or that of the shareholders. In the former situation, their presence adds to the agency costs, while in the latter they reduce agency costs. We therefore formulate the following testable hypothesis:

Hypothesis 4: There is no relationship between blockholder ownership and agency costs.

In addition to monitoring efforts, agency costs can be mitigated through bonding efforts by the manager (Jensen and Meckling, 1976). Bonding costs are those the manager takes upon himself to reduce agency conflict; that is, efforts undertaken at the expense of his own utility. In practice, bonding is almost impossible to observe or quantify. Therefore we use two alternative measurements to proxy for bonding efforts. The first is advertising expenditures by the firm. Grullon, Kanatas and Weston (2004) find that advertising improves firm visibility in the market and Easterbrook (1984) argues that agency costs are lower for firms with higher visibility because they will be under greater scrutiny from investors and regulators. Hence, a manager who expends effort to make her firm more visible is simultaneously attracting more attention from potential monitors.

The second proxy is the asset utilization or efficiency ratio calculated as annual sales over total assets. Ang, Cole and Lin (2000) argue that a firm with a lower sales-to-total assets ratio incurs higher agency costs, all else equal. This can be a result of the manager's lack of effort, which results in lower revenues, or the consumption of executive perquisites, which results in the firm purchasing unproductive assets. We therefore expect a negative relationship between advertising expense and agency costs and an inverse relationship between the sales-to-asset ratio and agency costs. In this context, we formulate the following testable hypothesis:

Hypothesis 5: There is no relationship between bonding efforts and agency costs.

In addition to improved firm visibility, lessening the degree of information asymmetry between managers and shareholders can reduce agency costs.

III. METHODOLOGY

A. Agency Costs and Stochastic Frontier Analysis

Consider firm value as defined by Jensen and Meckling (1976):

(1) $Q_{it} = Q_{it}^* - AC_{it}$,

where Q_{it} is the observed value of firm *i* at time *t*, Q_{it}^* is value of firm *i* at time *t* under minimum or no agency costs and AC_{it} are the agency costs incurred by firm *i* at time *t*. By assumption, $AC \geq 0$ measures the net agency costs that the firm incurs as a result of misalignment of principal-agent objectives.

Define Q as a twice-differentiable concave function of a *(1 x k)* set of inputs X and a *(k x 1)* set of parameters ß and AC as a twice-differentiable convex function of a *(1 x m)* set of explanatory variables Z and a *(m x 1)* set of parameters d. Vector Z is a set of incentive and monitoring variables that affect the agency costs of the firm. Together, Q and AC provide an additively separable determination of firm value:

(2) $Q_{it} = f(X_{it}, ß) - g(Z_{it}, d)$.

The framework of Jensen and Meckling (1976) suggests that agency costs incurred by the firm are one-sided: they are zero or they are positive. This, however, requires an empirical methodology that can accommodate this assumption. The stochastic frontier model developed by Battese and Coelli (1995) allows for the simultaneous estimation of a proportional proxy for agency costs and to study the relationships between agency costs and various incentives and monitoring variables.

The intuition for applying the stochastic frontier approach to firm value is that a point on the frontier represents the maximum value a firm could obtain given its fundamentals and no agency costs. The difference between the realized firm value and the maximum firm value can be the result of white noise, comprised of random elements beyond the control of the firm's principles or agents, and systematic agency costs. The stochastic frontier methodology allows for a distinction between the two.[1] The Battese and Coelli (1995) stochastic frontier can be expressed as follows: $Q_{it} = f(X_{it}, ß)exp(e_{it})$, for $i = 1, \ldots, n$, $t = 1, \ldots, T$, and where $e_{it} = v_{it} - u_{it}$, $v_{it} \sim N(0, \sigma^2_v)$, $u_{it} = Z_{it}d + w_{it}$, $u_i \sim N^+(Z_{it}d, \sigma^2_u)$ and $w_{it} \sim i.i.d.\ (0, \sigma^2_w)$.

[1] Battese and Coelli (1995) generalized the stochastic frontier model of Agner, Lovell and Schmidt (1976) so that the mean of the one-sided error component can vary with firm-specific variables rather than being constrained to a constant, as in Stevenson (1980). Moreover, the Battese and Coelli extension also allows for time-specific effects, allowing for full exploitation of panel data.

Q_{it} is the value of firm *i* at time *t* given a vector of firm fundamentals and characteristics, X, and parameter vector β. The composite error term, ε_i, consists of a white noise error term, v_i, and a half-normal random variable, u_i, with variance s_u^2. Net agency costs, u_{it}, are related to a set of variables, Z, not necessarily mutually exclusive of X, and a parameter vector δ. The error term, w_{it}, is white noise whereas u_i is half normal, which implies that $E[u_{it}] = Z_{it}\delta \geq 0$.

Following Battese and Coelli (1993), the log-likelihood of observation Q_{it} is:

$$\ln L = \sum_{i=1}^{n}\left\{-\frac{1}{2}\ln(2p) - \frac{1}{2}\ln(s_e^2) - \frac{1}{2}\left[\frac{(e_{it}+m_{it})^2}{s_e^2}\right] - \ln\left[\Phi\left(\frac{m_{it}}{s_e g^{1/2}}\right)\right] + \ln\left[\Phi\left(\frac{(1-g)m_{it} - g e_{it}}{\left[s_e^2 g(1-g)\right]^{1/2}}\right)\right]\right\}$$

where $\sigma_e^2 = \sigma_v^2 + \sigma_u^2$, $g = (\sigma_u^2 / \sigma_e^2) \in [0, 1]$, and $\Phi(\cdot)$ is the cumulative density function of the standard normal distribution.

The parameter γ, originally introduced by Battese and Cora (1977), facilitates a comparison of random variables u_{it} and v_{it}. If γ is zero then the variance of the inefficiency term, here interpreted as the variance of net agency costs is zero and the model reduces to the traditional mean response function. As γ approaches one then the deviations from the frontier are characterized more so by inefficiency or systematic agency conflict effect rather than white noise.

Utilizing the one-sided portion of the composite error term one can then compute the efficiency level of firm *i*. Specifically, Battese and Coelli (1988) proposed that the conditional expectation of the level of efficiency can be expressed as

(3) $E(\exp(-u_{it}|\,\varepsilon_{it}) = E(\exp(-\mu_{it} - w_{it}\,|\,\varepsilon_{it}) =$

$$\left\{\exp\left[-m^* + \frac{1}{2}s^{2*}\right]\right\}\left\{\frac{\Phi\left(\frac{m^*}{s^*} - s^*\right)}{\Phi\left(\frac{m^*}{s^*}\right)}\right\}$$

where $m^* = (s_v^2 m_{it} - s_e^2 e_{it}) / (s_v^2 + s_e^2)$, and $s^* = (s_e^2 s_v^2) / (s_v^2 + s_e^2)$.

The efficiency scores can be interpreted as proportional measures of net agency costs. Once they have been calculated, the second step in the analysis is straightforward. The estimated efficiency

measures are related to a set of variables that can vary over time and across firms. This analysis is undertaken simultaneously with the estimation of the stochastic frontier, thereby increasing accuracy and efficiency. Standard inference can then be applied to the estimated relationships between the variables in Z and the efficiency measures. Those covariates that have positive (negative) coefficients reduce (improve) the efficiency of the firm, i.e., increase (decrease) net agency costs.

IV. The DATA and Empirical Specification

Our initial sample consists of all the companies that appear in the *ExecuComp* database. The database reports compensation data for the top five executives of each firm in the S&P 1,500 index from 1992 to 2001. Since the focus of our research is on agency conflict, we include only firms with available CEO compensation. For years and firms that *ExecuComp* reports more than one CEO, we manually check SEC fillings to identify the acting CEO for those particular years and firms. Next, the sample is combined with an improved version of blockholder database used by Dlugosz et al. (2004). The dataset contains standardized data for approximately 1,900 companies. The data were "cleaned" for biases and mistakes usually observed in blockholder research[1]. The data are reported from 1996 to 2001. We also merge our firms with the *Governance Index* database by Gompers, Ishii and Metrick (2003). Thus, our sample is reduced to firms overlapping the three databases from 1996 to 2000. Lastly, we obtain accounting data from the *Compustat* database.

We then perform a filtering process. To be included in the final sample, a firm's annual sales is no less than $10 million and the book equity for the fiscal year is positive. We also require that all observations must have compensation data on (1) total cash compensation, (2) restricted stocks granted, and (3) stock options granted. We eliminate companies with missing values for any of these measurements. Moreover, we exclude firms that report zero for all three types of compensation. This process generates a final sample of 1,043 firm-year observations over the period 1996 – 2000.

We obtain data to estimate the frontier, defined as the greatest firm value for given fundamentals assuming zero agency costs. A firm's market equity is defined as its price multiplied by the number of

[1] See Dlugosz, Fahlenbrach, Gompers and Metrick (2004)

shares outstanding. As in Fama and French (1993), we compute book equity as the book value of shareholder's equity, plus balance sheet deferred taxes and investment credits (if available), minus the book value of preferred stock (if available). Data on total assets, sales, long-term debt, hard spending or capital expenditures (CAPEX), research & development, intangible assets and dividends were collected directly from *Compustat*.

Next, we gather data used to explain the variance of the one-sided error term from the stochastic frontier methodology. We measure executive compensation using the percentage of total compensation which is cash, including salary and bonuses, the percentage of compensation that is restricted stocks, and the percentage of compensation that is stock options, valued by the Black-Scholes formula. The Black-Scholes volatility is also obtained from *ExecuComp*.

Panel A of Table 1 reports the descriptive statistics for our sample. As the means and medians for many variables indicate, the sample suffers from left skewness; firm market capitalization ranges from $11 million to $500 billion with mean (median) of $14 million ($3 million), mean (median) net sales in the sample are $7 billion ($3 billion), while mean (median) long-term debt is approximately $2 billion ($600 million). Consistent with Habib and Ljungqvist (2005), the median company reports zero R&D and advertising expenditures.

The statistics for the governance index suggest that, on average, firm power is evenly distributed with no manager having total control.[1] The average CEO in our sample received $6 million in total compensation, $3 million in stock options compensation, and restricted stocks compensation of approximately $1 million. Panel B of Table 1 displays the executive compensation structure during the 1996 – 2000 period. The mean for the percentage of restricted stock grants is approximately 2% over the sample period, whereas the average percentage of CEO cash compensation shows a steady decline from 37% in 1996 to 25% in 2000. At the same time the percentage of stock options grants increased from 12% in 1996 to approximately 19% in 2000. Not surprisingly, the highest average amount of stock-options

[1] Governance index or "G" is the proxy for balance of power between managers and shareholders. A firm with $G < 5$ is considered a "democratic" firm while a firm with $G > 14$ is considered a "dictatorship" firm. See Gompers, Ishii and Metrick (2003) for more detail.

compensation was in the information technology sector[1]. Panel C of Table 1 presents the variables used in the stochastic frontier analysis after a log-transformation[2].

We use Tobin's Q or the market-to-book ratio to proxy for firm value. Therefore the stochastic frontier function is defined as $Q_{it} = f(X_{it}, b)exp(v_{it} - u_{it})$.

Employing a log transformation and adding fixed effects for sectors and time we obtain the following estimating equation:

$$\begin{aligned}(4)\quad \ln(\text{Market Value}_{it}) = {} & b_0 + f_{ij} + t_t + b_1\ln(\text{Book Value}_{it}) + b_2\ln(\text{Sales}_{it}) + b_3\ln(\text{Total Assets}_{it}) + \\ & b_4\ln(\text{Long-Term Debt}_{it}) + b_5\ln(\text{CAPEX}_{it}) + b_6\{\ln(\text{CAPEX}_{it})\}^2 + b_7(\text{R\&D}_{it} / \text{Sales}_{it}) + \\ & b_8(\text{R\&D}_{it} / \text{Sales}_{it})^2 + b_9(\text{Intangibles}_{it} / \text{Total Assets}_{it}) + b_{10}(\text{Dividends}_{it} / \text{Sales}_{it}) + \\ & b_{11}(\text{Dividends}_{it} / \text{Sales}_{it})^2 + v_{it} - u_{it,}\end{aligned}$$

where ϕ_{ij} is a fixed effect for firm *i*'s industry *j*, and τ_t is a fixed effect for year *t*. The squared terms in the equation capture non-linear effects. Panel A of Table 2 summarizes our firm value determinants along with expected results. The economic meaning and predicted signs of the remaining variables are as follows.

- Tobin's Q: The log of book equity is a control factor from the log transformation of Tobin's Q.
- Sales: The log of sales measures firm size and the expected relationship between size and value of the firm is positive. However, to control for a firm's asset base we also include the log of the firm's total assets which captures the diminishing nature of the relationship between size and firm value (Demsetz and Villalonga, 2001).
- Long Term Debt: Long-term debt scaled by total assets proxies for firm leverage. The expected sign is indeterminate because on one hand, high leverage implies higher interest expense and higher cost of equity, which can lower firm value. On the other hand, high leverage can proxy for monitoring activities by creditors, which might correspond to higher firm value. Thus the relation between firm value and leverage is ambiguous.
- Capital Expenditure: Capital expenditure is a measure of "hard spending" and investment opportunities. Similar to Habib and Ljungqvist (2005), we expect a positive relation between "hard spending" and firm value. To control for non-linear effects, we also include the quadratic term.

[1] By sector compensation results are not reported but are available upon request

[2] The log transformation is common in stochastic frontier analysis (see e.g. Aigner, Lovell and Schmidt, 1977; Battese and Cora (1977); Battese and Coelli (1993)).

- R&D and Intangibles: R&D expenses and Intangibles proxy for intangible assets or "soft spending". Morck, Shleifer and Vishny (1988) and McConnell and Servaes (1990) found that Tobin's Q may not capture all growth opportunities and "soft spending" of the firm. We expect a positive relationship between R&D and firm value. The relationship between intangibles and firm value, however, is indeterminate.

- Dividends: Unlike most traditional dividend policy views, Arnott and Asness (2003) find that higher dividends result in higher earnings growth. We use the ratio of dividends to sales to proxy for earnings growth**,** yet the expected sign of the coefficient sign is indeterminate.

We estimate the net benefits of monitoring and incentives on agency costs using equations (5) and (6):

(5) $u_{it} = \delta_0 + \delta_1 \ln(\text{Total Compensation}_{it}) + \delta_4(\text{Governance Index}_{it}) + \delta_5(\text{Sum of Blockholders}_{it}) + \delta_6(\text{Advertising}_{it} / \text{Sales}_{it}) + \delta_7(\text{Sales}_{it} / \text{Total Assets}_{it}) + \delta_8 \ln(\text{Number of Shareholders}_{it}) + \delta_9(\text{OPTIONS}_{it}) + \delta_{10}(\text{Black-Scholes Volatility}_{it}) + w_{it}$

(6) $u_{it} = \delta_0 + \delta_1(\text{Total Cash Compensation}_{it}) + \delta_2(\text{Restricted Stocks}_{it}) + \delta_3(\text{Stock Options}_{it}) + \delta_4(\text{Governance Index}_{it}) + \delta_5(\text{Sum of Blockholders}_{it}) + \delta_6(\text{Advertising}_{it} / \text{Sales}_{it}) + \delta_7(\text{Sales}_{it} / \text{Total Assets}_{it}) + \delta_8 \ln(\text{Number of Shareholders}_{it}) + \delta_9(\text{OPTIONS}_{it}) + \delta_{10}(\text{Black-Scholes Volatility}_{it}) + w_{it.}$

Equation (5) tests the relationship between total compensation and agency costs while equation (6) delves further and tests whether the structure of compensation influences agency costs. The variables in equations (5) and (6) proxy for the following:

- Compensation structure: If agency costs are reduced through total compensation, we expect δ_1 in equation (5) to be negative. On the other hand, if cash compensation increases agency costs, we expect δ_1 in equation (6) to be positive and if equity compensation reduces agency costs, we expect δ_2 and δ_3 in equation (6) to be negative.

- Managerial power: Following Gompers, Ishii and Metrick (2003), we measure managerial power with the governance index. The higher the governance index the weaker is the level of shareholder power in the firm and hence, the higher is the agency cost. Therefore, we expect δ_4 to be positive.

- Monitoring effect: We proxy for effect of monitoring activities on agency cost with percentage blockholder ownership. However, given that the effect of blockholders on the firm is unresolved, the expected sign on δ_5 is indeterminate.

- Bonding effect: We use two different measurements as surrogates for bonding mechanisms: sales-to-total assets and advertising. Following Ang, Cole and Lin (2000), we expect a negative relationship

between managerial bonding effort and agency cost; hence, we expect δ_7 to be negative. Following Grullon, Kanatas and Weston (2004), we expect firms with more public exposure to have lower information asymmetry, i.e., δ_6 is expected to be negative.

- Control variables: We include three control variables. The first is a dummy variable which equals 1 if the company has options listed and 0 otherwise. Kumar, Sarin and Shastri (1998) document that firms with listed options tend to have lower information asymmetry; the demand for quality information is marginally higher for firms with listed options because options are superior speculative vehicles. This in turn would lower the degree of information asymmetry and reduce agency costs; hence we expect δ_9 to be negative. The second variable is the number of shareholders. Similar to advertising expenditures, we expect firms with more shareholders to have more public exposure, lower information asymmetry, and therefore lower agency costs; the expected sign of δ_8 is negative. The third variable is the level of total risk of the firm. We use the implied Black-Scholes volatility reported by the firm as a proxy for total risk. Muelbroek (2001) argues that managers are more concerned with total risk because of their personal interests in the firm. Investors, on the other hand, are more concerned with the systematic risk due to their ability to diversify. Hence, we expect a positive relationship between total risk and agency cost.

Panel A and Panel B of Table 2 summarizes firm inputs and the determinants thought to influence agency costs and the expected signs of the parameter estimates. The estimates obtained from equations (16) and (17) are inherently reduced form in nature. A positive parameter estimate implies that the marginal cost of the particular variable is greater than the marginal benefit, suggesting that, on average, firms would be more efficient if *less* of the activity were undertaken. On the other hand, a negative parameter estimate implies the marginal benefit of the variable is greater than the marginal cost, suggesting that, on average, firms would be more efficient if *more* of the activity were undertaken.

VI. ESTIMATION RESULTS

Table 3 reports the results from estimating the stochastic frontier model specified above. For comparison purposes, we also include robust OLS results for firm value. Column A of Table 3 reports regression results using the Ordinary Least Squares method; Column B presents outputs using the Battese and Coelli (1995) method. We note that the OLS coefficients support the same qualitative conclusions as the stochastic frontier analysis.

The estimates in Panel A of Table 3 are consistent with previous findings; all variables have the anticipated sign and are statistically significant. Consistent with Agrawal and Knoeber (1996) and Habib and Ljungqvist (2005), firm value increases significantly with book equity, sales, and total assets, but

decreases significantly with leverage. Our findings suggest that firm value has a non-linear relationship with both research and development (R&D) and the earnings growth rate, measured as dividends over sales.[1] We find a positive and significant relationship between firm value and the level of capital expenditure. The sign of the quadratic of capital expenditure is negative, suggesting diminishing returns, but the parameter is statistically significant only at the 10% level. Lastly, firm value appears to be invariant to the level of intangible assets in the firm.

We also investigate firm values across sectors and years. In contrast with Habib and Ljungqvist (2005), sample firms in the utility sector exhibit relatively lower firm value. The difference can be due to sampling years; Habib and Ljungqvist's dataset describes firms from 1992–1997. Information technology firms exhibit higher firm value during our sample period and the year dummy variables indicate a positive trend in firm values during the sample period; the highest value being in 2000.

Panel B of Table 3 provides the results focusing on the determinants of agency costs using the Battese and Coelli (1995) method. Battese and Cora (1977) decomposed the composite variance into the inefficiency component and the noise component, embodied in the parameter gamma in Panel B of Table 3. Approximately 80% of the composite error variation is due to the one-sided error term, i.e., agency costs, while the remaining 20% represents white noise. In interpreting the results, note that a negative coefficient indicates a narrowing gap between the firm's frontier value and its observed value, or a reduction in net agency costs, whereas a positive coefficient indicates a widening gap between the two, or an increase in net agency costs.

Equation 1 of Panel B shows that the relationship between the level of CEO total compensation and agency costs is negative and significant. Equation 2 of Panel B presents the results relating agency costs to various forms of compensation, measured as percentage shares of total compensation. As the p-values indicate, all variables are significantly different from zero. In particular, given a certain level of CEO total compensation, a higher portion of cash compensation leads to greater agency costs, suggesting

[1] Specifically, we find that firm value is maximized when R&D is approximately 28% of sales and dividend payout is 23% of sales

that lower cash compensation as a percentage of total compensation would reduce net agency costs and increase firm value. Alternatively, we find that equity compensation, both restricted stocks and stock options, reduces agency costs suggesting that firm value would be increased if these forms of compensation were increased relative to cash compensation.

As compensation packages are designed by shareholders who can diversify and face only systematic risk but managers can not diversify, controlling for the compensation of systematic risk, we should expect a positive relation between total risk and agency cost. The parameter estimate for Black-Scholes volatility is positive and highly significant which confirms our expectation,

A Chi-square test of the null hypothesis that cash compensation, stock option compensation, and restricted stock compensation have equal impacts on agency costs yields a test statistic 51.39, indicating rejection of the null at the 1% level. Additionally, we test for a statistical difference between the impact of restricted stock compensation and stocks options compensation. The resultant Chi-square statistic 1.59 indicates that we cannot reject this hypothesis at the 10% level; there seems to be no statistical difference between the effects of stock options compensation and restricted stock compensation on net agency costs.

The results in Column B of Table 2 indicate that excess managerial power (governance index) corresponds with lower firm value. Gompers, Ishii and Metrick (2003) find that firms with stronger (weaker) shareholders (managers) rights have higher firm value. The positive coefficient on firm governance suggests a positive relationship between managerial "dictatorship" and agency costs, supporting the managerial rent extraction argument of Bebchuk and Fried (2003).

There is a positive relationship between blockholder ownership and agency costs; we reject the null that higher blockholder ownership results in lower agency costs. We further explored the relationship between the percentage of outside blockholders and agency costs by strictly focusing on outside

ownership.[1] We find that the coefficient for outside blockholders is also positive and significant at the 1% confidence level, supporting the private-benefit hypothesis of Barclay and Holderness (1989).[2]

Advertising expenses and the efficiency ratio both have statistically significant negative coefficients. The negative coefficient for advertising implies that firms that make themselves more visible tend to have lower agency costs. The number of shareholders, which proxies for liquidity and exposure, also supports the visibility argument. Our findings are consistent with the market monitoring and liquidity arguments of Easterbrook (1984) and Grullon, Kanatas and Weston (2004).

Our second bonding variable, the efficiency ratio, captures managerial effectiveness in deploying the firm's assets. A firm with a lower bonding efficiency ratio has greater agency costs, on average. As Ang, Cole and Lin (2000) point out, the reasons can be due to management's poor investment decisions, insufficient efforts, or excessive executive perquisites which result in the firm purchasing unproductive assets. Our findings confirm Ang, Cole and Lin's conclusions regarding the agency costs of private firms: firms with higher managerial effort exhibit lower agency cost.

Finally, we test the impact of information asymmetry on agency costs. We expect options listings to reduce information asymmetry and thus lower agency costs. The coefficient on the options dummy is negative and statistically significant at the 1% level. This suggests that a firm with options traded has lower agency costs, consistent with Kumar, Sarin and Shastri (1998). It is also interesting to look at inefficiencies among different sectors and years. The results concerning agency costs reveal that information technology firms exhibited higher agency costs (at the 5% significance level) during the sample period whereas utility firms tended to have lower agency costs (at the 10% significance level).[3] Moreover, there was a steady increase in the magnitude of the year dummy coefficients indicating increasing agency costs over the sample period. Managers increasingly extracted rents from their firms during the buildup to the market correction in late 2000; whether the rent extraction was a cause or an

[1] Results not reported but available from the authors upon request
[2] Barclay and Holderness (1989) were the first to offer evidence in favor of private benefit hypothesis of large shareholders.
[3] Results for year and sector dummy variables are not reported but are available upon request

effect (or both) is an important question that merits further investigation. Table 4 reports a summary of firm efficiencies by sectors and by years. The results confirm the downward trend of firm efficiency from 1996 through 2000.

VII. CONCLUSIONS

Utilizing appropriate internal and external monitoring mechanisms can mitigate agency conflict. Ever since Jensen and Meckling (1976), agency theorists have recognized the importance of executive compensation and external monitoring in motivating and aligning the interest of managers and shareholders. There has been little empirical research, however, on how those mechanisms actually affect agency costs. This is primarily because of the unquantifiable nature of agency costs.

In this paper we employ stochastic frontier analysis of firm value that distinguishes between random noise and a one-sided inefficiency term, which we interpret as a proportional measure of firm specific agency costs. Following the Battese and Coelli (1995) methodology we relate the estimated agency costs to specific internal and external determinants.

We find a negative relationship between executive compensation levels and agency costs. This finding is supported by the intuition proffered by Shleifer and Vishny (1997), Zingales (1998) and Core and Larcker (2002) that although firms contract optimally, transaction costs prohibit continuous contracting and executive compensation contracts gradually deviate from the optimal level.

As managers can use their power to exploit shareholders, causing the value of the firm to deviate from its maximum possible value, we test for a relationship between agency costs and managerial power. The results suggest a positive relationship between the two, which we interpret as evidence supporting managerial rent extraction. We also find a negative relationship between manager bonding efforts and agency costs, consistent with Jensen and Meckling (1976).

We also investigate whether the distribution of executive compenstation between cash, restricted stocks, and stock options influences agency costs. This distinction is important given recent policy initiatives targeting the use of equity-based executive compensation such as the Sarbanes-Oxley Act of 2002. The empirical results suggest that a greater proportion of cash compensation is related with greater

net agency costs but that the greater proportion of restricted stocks and stock options are inversely related to net agency costs. This introduces a somewhat counter-intuitive but nevertheless theoretically plausible conclusion. If the proximate cause of the accounting scandals of the late 1990s and early 2000s was excessive agency costs, then the results here suggest that the accounting scandals may not have been a result of *too much* equity compensation but rather of *too little* equity compensation. This tentative conclusion cannot stand in isolation and future research into this possibility is clearly warranted.

Examining the effect of large-block shareholders on agency costs, we find that a higher percentage of blockholder ownership is positively related with agency costs. We interpret this as evidence of the private benefit hypothesis of blockholder ownership. We also find that firms with a large breadth of ownership tend to have lower agency costs. Finally, we find that firms with lower degree of information asymmetry exhibit lower degree of agency costs.

An important area for future research is which form of equity compensation is most effective in reducing agency costs. The empirical results presented herein suggest no statistically significant difference between the impact of restricted stocks and stock options compensation on reducing agency costs for the sample firms. However, there is a strong distinction between the effect of cash compensation and equity compensation on agency costs; the former increases whereas the latter reduces agency costs. Therefore, future research might focus on more fully identifying the impacts of these various forms of executive compensation on the costs *and* benefits with respect to agency costs rather than the net effects identified here.

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Table 1 Descriptive Statistics

Table 1 presents sample descriptive statistics. The statistics include mean (Mean), standard deviation (St. Dev.), maximum value (Max), median (Med) and minimum value (Min). Panel A reports firm characteristics along with characteristics of agency costs determinants. Panel B reports change of compensation structure with time. Panel C presents the statistics in normalized form.

	Mean	Median	St. Dev.	Min	Max
PANEL A					
Firm characteristics (in millions)					
Market Value	14,182.00	3,280.46	38,883.94	10.94	508,329.50
Book Value	2,862.16	1,265.09	4,980.18	18.57	50,492.00
Sales	7,372.67	2,910.00	12,326.92	92.73	128,051.00
Total assets	10,629.26	3,179.27	31,435.34	61.66	437,006.00
Long-term debt	1,989.89	607.03	5,384.49	0.19	82,132.00
CAPEX	515.34	161.25	1,247.46	1.27	15,502.00
R&D	161.01	0.00	500.11	0.00	4,575.00
Intangibles	952.86	157.97	2,561.11	0.00	33,090.00
Dividends	192.56	40.00	524.74	0.00	5,647.00
N = 1,043					
Agency cost determinants					
Total compensation ($ M)	6.36	2.91	23.06	0.03	655.45
Cash compensation ($ M)	1.59	1.25	1.37	0.00	16.70
Restricted stocks ($ M)	1.10	0.00	20.28	0.00	650.81
Stock options ($ M)	3.02	0.94	9.47	0.00	152.31
Governance index	10.03	10.00	2.75	3.00	16.00
Sum of blockholders (%)	19.14	17.00	15.54	0.00	91.20
Outside blockholders (%)	14.08	11.85	13.48	0.00	90.10
Advertising expense ($ M)	118.22	0.00	432.50	0.00	3,704.00
Efficiency ratio	1.13	1.00	0.74	0.15	5.77
Number of shareholders (in thousands)	43.57	10.97	120.35	0.45	1,148.57
Black - Scholes volatility	0.30	0.27	0.11	0.12	0.74

Table 1 - Continued Descriptive Statistics

Executive compensation structure by year

	Mean	Median	St. Dev.	Min	Max
PANEL B					
1996					
Cash compensation	0.375	0.363	0.245	0.008	1.000
Restricted stocks	0.015	0.000	0.058	0.000	0.684
Stock options	0.116	0.062	0.153	0.000	0.822
1997					
Cash compensation	0.337	0.298	0.244	0.004	1.000
Restricted stocks	0.019	0.000	0.048	0.000	0.323
Stock options	0.137	0.065	0.165	0.000	0.857
1998					
Cash compensation	0.283	0.250	0.217	0.000	0.957
Restricted stocks	0.022	0.000	0.085	0.000	0.970
Stock options	0.164	0.099	0.177	0.000	0.941
1999					
Cash compensation	0.258	0.217	0.206	0.001	0.979
Restricted stocks	0.018	0.000	0.050	0.000	0.397
Stock options	0.194	0.141	0.183	0.000	0.783
2000					
Cash compensation	0.253	0.219	0.193	0.001	0.955
Restricted stocks	0.019	0.000	0.046	0.000	0.244
Stock options	0.188	0.142	0.184	0.000	0.948

Table 1 - Continued Descriptive Statistics

	Mean	Median	St.Dev	Min	Max
PANEL C					
Firm characteristics					
Log of Market Value	8.10	8.10	1.65	2.39	13.14
Log of Book Value	7.13	7.14	1.29	2.92	10.83
Log of Sales	2.19	2.30	0.88	0.00	4.28
Log of Total Assets	8.14	8.06	1.41	4.12	12.99
Log of Long-term Debt	6.27	6.41	1.82	-1.65	11.32
Log of CAPEX	5.10	5.08	1.50	0.24	9.65
R&D/Sales	0.02	0.00	0.05	0.00	0.39
Intangibles/Total assets	0.11	0.06	0.13	0.00	0.67
Dividends/Sales	0.02	0.01	0.03	0.00	0.22
N = 1,043					
Agency cost determinants					
Log of total compensation	8.01	7.98	1.09	3.26	13.39
Cash compensation	0.48	0.47	0.25	0.00	1.00
Restricted stocks	0.06	0.00	0.13	0.00	0.99
Stock options	0.35	0.34	0.26	0.00	0.98
Governance Index	10.03	10.00	2.75	3.00	16.00
Sum of blockholders	0.19	0.17	0.16	0.00	0.91
Sum of outside blockholders	0.14	0.12	0.13	0.00	0.90
Advertising/SALES	0.01	0.00	0.03	0.00	0.18
Efficiency ratio	1.13	1.00	0.74	0.15	5.77
Log of number of shareholders	2.47	2.39	1.52	-0.81	7.05
Black - Scholes volatility	0.30	0.27	0.11	0.12	0.74

Table 2 Hypotheses Tests

Table 2 presents variable definitions along with expected signs. Panel A reports hypotheses and expected signs for firm determinants and Panel B reports hypotheses and expected signs for agency cost determinants.

PANEL A Expected relations between firm value and its potential determinants

Variable	Hypothesis Tested	Expected Sign	Variable Description
Book Value	Historical firm operations	(+)	Log of book equity
Sales	Profitability	(+)	Log of sales
Total assets	Size	(+)	Log of total assets
Long-term debt	Leverage	(-)	Log of long-term debt
CAPEX	Investment expenditure	(+)	Capital expenditure scaled by sales
Research and Development	Investment opportunity	(+)	R&D scaled by sales
Intangibles	Intangible assets	(+) or (-)	Intangibles scaled by total assets
Dividends	Earnings growth	(+)	Dividends scaled by sales

PANEL B Hypothesized relations between agency cost and its potential determinants

Variable	Hypothesis Tested	Expected Sign	Variable Description
Total compensation	Optimal contracting	insignificant	Log of total compensation
Cash compensation	Optimal contracting	insignificant	Cash scaled by total compensation
Restricted stocks	Optimal contracting	insignificant	Restricted stocks over total compensation
Stock options	Optimal contracting	insignificant	Stock options scaled by total compensation
Governance index	Managerial Rent Extraction	(+)	High index implies high managerial power
Sum of blockholders	Blockholder ownership	(-)	Percentage of blockholder ownership
Sum of outside blockholders	Blockholder ownership	(-)	Percentage of outside blockholders
Advertising	Bonding effort	(-)	Advertising scaled by sales
Efficiency ratio	Bonding effort	(-)	Sales over total assets
Number of shareholders	Liquidity effect	(-)	Log of number of shareholders
Options listings	Information asymmetry	(-)	1 if company has options listings 0 if company has no options listings

Table 3 OLS vs. Stochastic Frontier Analysis

Table 3 reports parameter estimates for OLS and stochastic frontier analysis. Panel A presents results for firm characteristics. The dependent variable is the log of market equity. Panel B reports the relationship between agency cost reduction mechanisms and the agency cost computed by stochastic frontier analysis. The dependent variable or proxy for agency cost is the distance between the theoretical optimal value and the actual value. Standard errors are in parentheses and *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively.

	OLS		Frontier Analysis			
			Eq. 1		Eq. 2	
PANEL A						
Firm value determinants						
Log of Book Value	0.517	***	0.369	***	0.368	***
	(0.054)		(0.047)		(0.051)	
Log of Sales	0.146	***	0.128	***	0.146	***
	(0.021)		(0.017)		(0.018)	
Log of Total Assets	0.544	***	0.423	***	0.508	***
	(0.061)		(0.051)		(0.053)	
Log of Long-term Debt	-0.160	***	-0.133	***	-0.135	***
	(0.019)		(0.017)		(0.018)	
Log of CAPEX	0.229	***	0.190	***	0.240	***
	(0.059)		(0.058)		(0.061)	
Log of CAPEX squared	-0.008		-0.003		-0.009	
	(0.006)		(0.006)		(0.006)	
R&D/Sales	5.987	***	5.371	***	5.885	***
	(1.182)		(1.036)		(1.112)	
R&D/Sales squared	-13.947	***	-9.631	**	-10.344	**
	(4.440)		(3.854)		(4.179)	
Intangibles/Total assets	0.372	**	0.060		0.153	
	(0.165)		(0.136)		(0.145)	
Dividends/Sales	17.020	***	13.405	***	12.930	***
	(1.632)		(1.446)		(1.532)	
Dividends/Sales squared	-43.376	***	-35.452	***	-27.889	**
	(11.028)		(10.129)		(11.153)	
Constant	-0.631	***	1.898	***	1.072	***
	(0.221)		(0.284)		(0.280)	
Sector dummy variables	Yes		Yes		Yes	
Year dummy variables	Yes		Yes		Yes	
N	1,043		1,043		1,043	
Adjusted R square	0.89					
F-stat	341.70					

*** Significant at the 1% level ** Significant at the 5% level * Significant at the 10% level

Table 3 - Continued

	Frontier Analysis			
	Eq. 1		Eq. 2	
PANEL B				
Agency cost determinants				
Log of total compensation	-0.358	***		
	(0.026)			
Cash compensation			0.478	***
			(0.175)	
Restricted stocks			-0.600	**
			(0.255)	
Stock options			-0.320	*
			(0.165)	
Governance Index	0.015	*	0.023	**
	(0.008)		(0.010)	
Sum of blockholders	0.333	**	0.436	**
	(0.145)		(0.179)	
Advertising/SALES	-4.429	***	-5.147	***
	(1.070)		(1.347)	
Efficiency ratio	-0.072	**	-0.113	**
	(0.036)		(0.045)	
Log number of shareholders	-0.093	***	-0.141	***
	(0.022)		(0.026)	
Options dummy	-0.202	***	-0.260	***
	(0.068)		(0.084)	
Black - Scholes volatility	1.211	***	1.448	***
	(0.275)		(0.334)	
Constant	3.104	***	0.038	
	(0.270)		(0.283)	
Sector dummy variables	Yes		Yes	
Year dummy variables	Yes		Yes	
N	1,043		1,043	
Adjusted R square				
F-stat				
Chi square	5,605.59		6331.59	
VAR(e)	0.28		0.36	
VAR(u)	0.22		0.28	
VAR(v)	0.06		0.07	
Gamma	0.80		0.79	

*** Significant at the 1% level ** Significant at the 5% level * Significant at the 10% level

Table 4 Firm efficiencies by year and by sector

Table 4 presents summary for efficiency scores across time and sector. The statistics include mean (Mean), standard deviation (St. Dev.), maximum value (Max), median (Med) and minimum value (Min). The units of measurements are in decimals.

	N	Mean	Median	St.Dev	Min	Max
BY YEAR						
1996	234	0.626	0.695	0.222	0.049	0.940
1997	231	0.617	0.690	0.228	0.037	0.915
1998	184	0.459	0.436	0.235	0.020	0.907
1999	187	0.401	0.348	0.220	0.028	0.913
2000	207	0.385	0.345	0.222	0.011	0.891
Total	1,043	0.507	0.520	0.248	0.011	0.940
BY SECTOR						
Consumer Discretionary	231	0.496	0.491	0.221	0.053	0.899
Consumer Staples	97	0.432	0.386	0.242	0.032	0.902
Energy	50	0.464	0.407	0.225	0.105	0.904
Financials	51	0.567	0.557	0.213	0.173	0.845
Health Care	93	0.626	0.675	0.217	0.075	0.913
Industrials	236	0.549	0.563	0.218	0.069	0.940
Information Technology	76	0.105	0.074	0.092	0.020	0.656
Materials	95	0.473	0.470	0.216	0.011	0.937
Telecommunications	17	0.806	0.833	0.114	0.489	0.915
Utilities	97	0.675	0.711	0.170	0.271	0.923
Total	1,043	0.507	0.520	0.248	0.011	0.940