

## EXECUTIVE COMPENSATION AND INVESTOR CLIENTELE

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### Abstract

We provide a setting where due to a lack of sophistication, possibly arising from high opportunity costs of learning about accounting conventions and financial markets, naive (unsophisticated) investors are unable to decipher true executive compensation accurately. Expected compensation is therefore higher when such investors form a more significant clientele in the market for a firm's stock. Our model further suggests that increased information asymmetry between informed and uninformed traders may deter the entry of uninformed investors and keep executive compensation in check. Technologies that lower the cost of trading facilitate entry of relatively unsophisticated investors and raise expected compensation. In general, such compensation can be reduced through requirements that increase disclosure transparency. Empirical tests provide support to the key implication of the model that indirect executive compensation is higher in stocks with higher liquidity, which are likely to have greater unsophisticated investor participation.

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### 1 Introduction

Issues surrounding executive compensation have taken on increased prominence in recent times. According to Forbes, April 2007, "CEO Compensation," the total compensation of the chief executives of America's 500 largest companies reached \$7.5 billion, with an average of \$15 million.<sup>10</sup> In the list of those highly compensated executives, Steven Jobs from Apple ranked #1 by receiving a total compensation of \$646.6 million. Angelo Mozilo, Countrywide Financial, got a total compensation of \$142 million, ranked #7. At the bottom of the list, Google's CEO Eric Schmidt received \$ 0.56 million pay for the previous fiscal year, more than 1000 times less that of #1 on the list.

These numbers and ranks have attracted considerable attention from the academic world and efforts have been spent toward understanding the

nature of compensation, particularly since the work of Jensen and Murphy (1990). Specifically, much research (e.g., Aggarwal and Samwick, 1990, Barro and Barro, 1990, and Kaplan, 1994) has focused on pay-for-performance sensitivities across different companies. Aside from compensation levels, an additional issue relates to the lack of transparency about executive compensation packages. A recent article in the New York Times highlighted the case of Analog Devices where deferred CEO compensation was not disclosed for a number of years.<sup>11</sup> Also in the spotlight has been the apparent delinkage of compensation with financial performance.<sup>12</sup> Spurred by these concerns, the SEC has recently mandated clearer disclosure of executive compensation. Yet a third issue has been the levels of executive compensation in relation to average employee compensation. For example, Bebchuk and Fried (2003) indicate that the pay of the top five best-paid

<sup>10</sup>Total compensation here includes salary and bonuses; other compensation, such as vested restricted stock grants, LTIP payouts and perks; and stock gains, the value realized by exercising stock options. [http://www.forbes.com/lists/2007/12/lead\\_07ceos\\_CEO-Compensation\\_Rank.html](http://www.forbes.com/lists/2007/12/lead_07ceos_CEO-Compensation_Rank.html)

<sup>11</sup>"A 'Holy Cow' Moment in Payland," by Gretchen Morgenson, *New York Times*, February 19, 2006.

<sup>12</sup>See, for example, "Cendant Chief's Compensation Soared in 2005," by Ryan Chittum, *Wall Street Journal*, March 2, 2006, or "At Visteon, Bonuses Defy Gravity," by Floyd Norris, *New York Times* April 14, 2006.

U.S. executives amounts to as much as 10% of their company's profits. Bebchuk and Grinstein (2005) suggest that the dramatic growth of non-equity compensation in the 1990s has not been matched by a corresponding decrease in equity-based compensation.

In this paper, we analyze executive compensation with a perspective that relates corporate pay to another seemingly disparate set of phenomena, namely, the increased participation of investors in the financial markets. Chordia, Huh, and Subrahmanyam (2007) report that turnover increased by 500% over the 1980 to 2002 period, and average bid-ask spreads have declined steeply in recent years (Jones, 2002). At the same time, technologies like the advent of online trading, as well as secular regulatory events such as the lowering of the tick size, have increased access to the financial markets.<sup>13</sup>

Amongst market participants, individual investors represent the much less sophisticated clientele of shareholders. The recent decreases in trading costs documented in Jones (2002), among others, have likely attracted more trading by such small investors who appear content to trade in financial markets even though, on average, they lose money (see, for example, Kumar, 2006).<sup>14</sup> These individual investors are not likely to be sophisticated enough to actively participate in the governance of the companies in which they choose to invest. In addition, many institutions follow short-termist strategies like herding and positive feedback (Grinblatt, Titman, and Wermers, 1995), and mutual funds as a group do not realize significant abnormal returns (e.g., Daniel, Grinblatt, Titman, and Wermers, 1997). Further, as Black (1998) points out, while some pension funds with defined benefit plans have clear incentives to be involved in corporate governance, few other institutions participate in such governance by way of shareholder proposals and annual meetings. In sum, there is reason to believe that many individuals as well as institutions may not be sophisticated enough to understand the nuances of financial statements and influence governance.

Motivated by the above observations, the starting point for our framework is that managerial attempts to negotiate their compensation are linked to

the tendency of outside shareholders to monitor wages and total compensation (viz. Burkart, Gromb, and Panunzi, 1997, Hartzell and Starks, 2003, and Efendi, Srivastava, and Swanson, 2007).<sup>15</sup> For example, unsophisticated investors are unlikely to detect practices like spring-loading and backdating options (Lie, 2005) that essentially transfer wealth from shareholders to executives. Concealed arrangements, consisting of deferred compensation, post-retirement income guarantees, and stock option packages, are not only difficult to value but likely difficult to understand.<sup>16</sup>

The challenges faced by unsophisticated investors in properly deciphering compensation packages imply that, in equilibria where such agents are more active, expected executive compensation is greater than otherwise. Since such agents are more likely to find it worthwhile to trade when markets are more liquid or have greater trading activity, and are also likely to add to liquidity by their actions (Black, 1986), the model predicts that *ceteris paribus*, executive compensation will be positively related to trading volume and liquidity.<sup>17</sup> The analysis also suggests that technological innovations that make it cheaper to trade stocks increase the tendency of unsophisticated investors to be more strongly represented in the shareholding clientele, so that managers are more likely to successfully mask their compensation to outsiders and concomitantly increase their true compensation.<sup>18</sup> Increases in executive compensation may then simply be explained by decreases in the sophistication of the clientele who trades a company's stock.<sup>19</sup> We also show that while

<sup>15</sup>Our work, unlike that of Bolton, Scheinkman, and Xiong (2006), does not focus on the choice between short-term and long-term investment projects and their relation to investor clientele.

<sup>16</sup>A press release dated July 6, 2006 from Reuters notes that more than 50 companies' option granting practices are being investigated. See also <http://online.wsj.com/public/resources/documents/info-optionsscore06-full.html> for an updated list of companies currently under examination for options scandals. Other recent articles have focused on how details of compensation packages are difficult to decipher. Core, Guay, and Larker (2007) is one of many related studies that focuses on the role of media in bringing the levels and types of executive compensation to the attention of the public.

<sup>17</sup>In related work, Bhidé (1993) and Holden and Subrahmanyam (1996) suggest that short-term agents may be more active in more liquid stocks. In turn, Bhidé (1993) informally argues that trading costs may therefore be positively associated with corporate governance.

<sup>18</sup>An alternative interpretation is that technologies that make it cheaper to trade lead to an increase in short-term investors (individuals or others) who are less concerned with carefully monitoring executive compensation than the "traditional" institution.

<sup>19</sup>Gabaix and Landier (2006) explain the rise in executive compensation by linking it to a rise in market capitalization. In their model, top executives of larger firms are paid more

<sup>13</sup>Heaton and Lucas (1999) document the sharp increase in the number of shareholders in U.S. stocks during the 1990s.

<sup>14</sup>Small investor losses from trading may result from cognitive limitations or outside activities that create high opportunity costs of learning about financial markets as well as accounting rules and conventions. See, for example, Benartzi and Thaler (2001), Lo, Repin, and Steenbarger (2005), or Hong, Stein, and Yu (2007) for evidence regarding investor naiveté about financial markets. More generally, for evidence that agents often have naive notions about complex issues (such as scientific inquiry or the intricacies of scientific subjects such as physics), see Reif (1995).

an increase in the precision of private information held by sophisticated institutions decreases liquidity, it can keep executive compensation in check by deterring the entry of unsophisticated investors.

We test some empirical implications of our model using executive compensation data. Our model suggests both time-series and cross-sectional implications. The main time-series implication is that compensation should grow as liquidity and trading activity increase. In our view, this time-series implication is inherently difficult to test owing to other factors that may affect both variables over time. Thus, we instead provide evidence that executive compensation is cross-sectionally linked to trading volume and, more specifically, that indirect executive compensation is positively related to total trading volume, and negatively related to bid-ask spreads.<sup>20</sup> These results are consistent with the notion that stocks with greater participation by unsophisticated investors have greater levels of indirect compensation. Our conclusions survive a host of robustness checks, including controlling for firm size, procedures that address endogeneity, and different proxies for liquidity.

This paper is organized as follows. Section 2 presents a simple model of unsophisticated investors and sophisticated investors dealing with management that puts forth opaque financial statements that

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simply because they span a larger asset base. This model, however, explains neither why pay appears to be delinked from performance (Bebchuk and Grinstein, 2005, Bebchuk, Fried, and Walker, 2002), nor why there is an impetus to increase disclosure, presumably in response to efforts by management to hide true compensation (viz. Footnote 1). Some papers (e.g., Dow and Raposo, 2005) have attributed the rise in CEO pay to the greater incentives required due to increased uncertainty in recent times, but this argument has been challenged in a calibrated model by Gayle and Miller (2005). In a recent paper, Hermalin (2005) argues that tighter corporate governance increases CEO pay because there is less job security, but again, the issues surrounding concealment of compensation are not addressed by this argument. Furthermore, the evidence suggests that lack of adequate corporate governance, rather than too much of it, is the issue (Bebchuk and Fried, 2004). Another proposed explanation for the generally high levels of executive compensation is the tournament model of Rosen (1986) which suggests that CEO compensation may be seen as a "prize" for winning a within-firm tournament wherein participants accept low pay before the tournament begins in order to play in it. O'Reilly, Main, and Crystal (1988), however, do not find support for this theory. In sum, it appears that there is room in the literature for understanding corporate governance from different viewpoints.

<sup>20</sup>Our measure of indirect compensation consists of long-term incentive payouts (payments emanating from incentives set by management), option value grants, and all other compensation, which can include severance payments, debt forgiveness, payment for unused vacation, tax reimbursements, signing bonuses, 401K contributions, life insurance premiums, but excludes salary and bonus.

effectively conceal the actual amount of resources available for compensation. Section 3 endogenizes the entry decision of unsophisticated investors. Section 4 provides results to empirical tests, and Section 5 concludes. Proofs appear in the appendix.

## 2 The Basic Model

### 2.1 The Economic Setting

We consider a simple model of a firm with assets that are dedicated to executive compensation and an uncorrelated ongoing project that generates a random cash flow  $F \equiv \bar{F} + \delta$ , where  $\bar{F}$  is non-stochastic and positive, and  $\delta$  is a normally distributed variable with zero mean. For now, we assume there is no trading in claims on  $F$ ; we relax this assumption in the next section. The minimum payment required to keep the manager employed in order to generate  $F$  is a number  $L$ . Thus,  $L$  can be construed to represent a reservation level of managerial compensation -- without a minimum compensation of  $L$ , the manager quits and the firm ceases to exist. We assume that the manager's basic compensation level is fixed at  $L$  but that he has the opportunity to pay himself hidden compensation in addition to  $L$ .

There are two types of investor: Type U: unsophisticated investors, and Type S: sophisticated investors. While we make this sharp distinction within the model, our aim is simply to distinguish between active and sophisticated investors who can decipher compensation packages from company disclosures and less sophisticated or passive investors who cannot or are not willing to. The former class of agents includes activist institutions and financially trained and wealthy individuals. The latter class of investors includes relatively less "specialized" individual investors or their intermediaries for whom the deciphering of disclosures is challenging. The lack of investor sophistication can arise from limited cognitive ability, or a relative lack of knowledge about accounting procedures and a high opportunity cost of learning about such rules and conventions.<sup>21, 22</sup> We suppose that there is a

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<sup>21</sup>Our supposition, as that of scholars in psychology such as Wechsler (1958) and Jensen (1998), is that cognitive abilities vary in the cross-section of individuals; such differences can arise, for example, due to unequal access to quality education. We emphasize, however, that in no way should this paper be viewed as subscribing to the notion that there are *inter-group* differences in cognitive abilities.

<sup>22</sup>One might question why unsophisticated individuals do not simply hold mutual funds. Based on prior literature (Kumar, 2006, among others), we assume that individual investors derive some utility from trading, and will therefore trade as long as the sum of their expected profits from trading and the monetary-equivalent utility from trading exceeds entry costs.

representative Type U investor who, if present, holds a fraction  $\beta$  of the firm's shares; the remainder are held by the Type S --- active institutional investor.<sup>23</sup>

We model in a stylized fashion the outcomes on executive compensation that can obtain when different types of clientele hold shares in the company's stock. For brevity, however, we do not model in detail the specific process of governance, e.g., election of the board of directors by plurality or some other method.<sup>24</sup>

We denote the value of the assets used to pay compensation as  $W$ . We assume that there are two possible beliefs for  $W$ :  $H$  or  $L$ , with  $H > L$ . While the Type S investor knows that the true value of  $W$  is  $H$ , an outside Type U investor initially believes that  $W = L$ .<sup>25</sup> We allow for the possibility that the Type U investor undertakes a costly investigation, following which he deciphers the true realization of  $W$  with a positive probability. For now, we take the Type U's decision to investigate and his beliefs about  $W$  to be exogenous. We endogenize these in Subsection 2.3.

Before proceeding further, we note here that our aim is to model a situation where managers can pay themselves extra compensation above their reservation wage if unsophisticated investors mistakenly believe that resources available for compensation are lower than the true level of such funds. This is captured by postulating the scenario that the Type S knows that  $W = H$  while allowing for the possibility that Type U investor beliefs are anchored at  $W = L$ . The appendix shows that in the case not considered in our model, namely where the Type S correctly believes that  $W = L$ , no additional compensation beyond  $L$  is possible regardless of Type U investor beliefs.<sup>26</sup>

Governance is controlled by the investing clientele through a board of directors (BOD). In our framework, the role of the BOD is to simply offer responses to managerial payout proposals on behalf of the investors. The proposal that comes into force is that made by the majority of the BOD. Each category

of investor has a proportional share in the composition of the board and that share recommends responses by the category of investor it represents.

First, suppose that the Type S investor is the only shareholder. In this case, we assume a fraction  $\gamma$  ( $\gamma < 0.5$ ) of the BOD passively accepts the strategy proposed by the manager. The remaining fraction acts on behalf of the institution by following the accept/reject strategies the institution proposes. When the Type U investor is present, we seek to capture the phenomena resulting from the possibility of Type U having a majority say in the governance of the firm, rather than Type S investor. The Type U investor holds a fraction  $\beta$  of the shares and a proportion  $\beta$  of the BOD follows the accept/reject strategies proposed by the Type U investor. A fraction  $\gamma$  of the Type S share of the board remains passive in this case. We also assume that the fraction of the Type S share of the BOD that is active,  $(1-\gamma)(1-\beta)$ , is less than 0.5; i.e., the sophisticated investor is not able to control managerial strategies in the presence of the unsophisticated investor. This assumption is intended to ensure that when the Type U investor is present, the compensation outcome is the result of whether he finds it worthwhile to undertake costly investigation to ascertain the true value of  $W$ .<sup>27</sup>

## 2.2 Strategies

Managerial proposals involve the size of profit paid to the investors (after the executive compensation, the rest of the payoff on the project  $F$  is automatically passed on to investors and is not discretionary). The two allowable levels of this payout are zero and  $H - L$ . If the equilibrium payout is non-zero, it is apportioned between Type U and Type S investors in proportion to their holdings. The manager's strategy space is to propose one of the two levels of total payout. The investors' strategy space is to either accept the proposal or reject it and propose the other level of the payout. For technical reasons, in order to break ties in strategy preferences, we assume that opposing a managerial proposal causes an investor to incur an arbitrarily small cost of  $\epsilon > 0$ . We look for an equilibrium in pure strategies.

If the manager proposes a zero payout to the investors and it passes unopposed, then the manager pays himself a hidden compensation of  $H - L$ . It is evident that a proposal of a payout of  $H - L$  can only reduce the manager's compensation, therefore it

<sup>23</sup>The representative Type U investor can be viewed as a coalition of outside investors. In Section 3.3, we consider the case of multiple outside investors.

<sup>24</sup>See "Deal Spurs Embarrassment of Riches: Capital One's Acquisition Of North Fork Throws Focus On the Actions of Directors," *Wall Street Journal*, March 18, 2006, for details on the different voting procedures followed by corporations.

<sup>25</sup>Postulating a different initial prior for Type U investors complicates the analysis, but does not materially alter the intuition we seek to exposit.

<sup>26</sup>Also, in the spirit of the models of Barberis, Shleifer, and Vishny (1998), Daniel, Hirshleifer, and Subrahmanyam (1998), and Hong and Stein (1998), in our model, unsophisticated investors do not have perfect foresight expectations.

<sup>27</sup>We note that we do not claim that retail investors affect board composition; rather, our model is based on the possibility that greater retail investor participation simply changes the character of the (given) board. That is, an existing board member may become more passive as retail investor participation increases.

is at least a weakly optimal strategy to propose a zero payout. We therefore postulate that the manager always proposes a zero payout.

Consider first the equilibrium where the sophisticated investor is the only shareholder. Recall that the Type S investor knows the value of  $W$  to be  $H$ . Thus, if the Type S is the only shareholder, its optimal strategy is to reject the zero-payout proposal through the BOD and pay itself an immediate cash amount of  $H - L$ . Thus, in equilibrium, the managerial proposal is rejected and the compensation is  $L$ .

When the unsophisticated investor is present, the governance question is whether the surplus  $H - L$  is paid to the investors or covertly extorted by the manager as extra compensation. Recall that the unsophisticated investor is pivotal if he is present, so the Type S's response to managerial proposals can be ignored in the presence of the Type U investor. In cases where the Type U either does not investigate or investigates and finds the true value to be  $L$ , a majority of the BOD accepts the manager's zero payout proposal on the basis that there are no funds available to pay an immediate cash amount through dividends or other forms (because opposition is costly, the manager's proposal passes unopposed in equilibrium).<sup>28</sup> In this case, in equilibrium, the manager pays himself an extra compensation of  $H - L$  over  $L$ , i.e., a total compensation of  $H$ .

In the case where the Type U investor investigates and assesses the value of  $W$  to be  $H$ , because their optimal strategy is to reject the manager's proposal of a zero payout to shareholders, the investors capture the surplus through the BOD by way of an extra cash payment of  $H - L$ .

For convenience, Table 1 summarizes the board's response to the managerial proposal of a zero payout to shareholders, as well as the ensuing compensation within the model. In the table, as well as in the remainder of the paper, we consider the limiting case of  $\mathcal{E} \rightarrow 0$  for convenience. The Type U investor's entry decision is endogenized in the next section.

### 2.3 The Type U Investor's Decision to Investigate

<sup>28</sup>We assume that the investigation is done by the Type U investor, and his response to the manager's proposed compensation and payout is transmitted to the manager by way of the portion of the BOD attributed to him. An alternative interpretation is that the investigation is done by the Type U investor's apportioned BOD, and the Type U does not have the power to get rid of BODs who are not competent enough to decipher the true  $W$ . The analysis remains essentially unchanged under this alternative interpretation.

We now consider the equilibrium investigation decision of the unsophisticated Type U investor. At a cost of  $C_I$ , the Type U investor may investigate to ascertain the true value of  $W$ . If he does investigate, he concludes  $W = L$  with probability  $p$  and  $W = H$  with probability  $1 - p$ . We assume that the probability  $p$  of the Type U investor concluding  $W = L$  is a control variable for the manager.<sup>29</sup> We endogenize  $p$  by explicitly modeling a cost of obfuscating financial statements. We suppose that an external regulatory agency can investigate managerial disclosure after time 0 but prior to the release of the firm's true value at time 1. While the costs and benefits of the agency are not incorporated into the analysis, we suppose that if the manager is found to have masked the actual level of resources available for compensation (i.e., set a positive  $p$ ), the penalty incurred is a positive quantity  $C_r$ . The penalty captures the reputational and potentially monetary costs incurred by the manager after being discovered.<sup>30</sup> The probability the agency discovers misrepresentation by the manager is  $0.5kp^2$ , where  $k$  is a variable such that  $0 < k < 1$ . The notion captured by this parameterization is that an overly disingenuous assessment is more likely to be uncovered than one that is somewhat less extreme.<sup>31</sup> Thus, the expected cost of setting  $p$  is  $0.5cp^2$ , where  $c \equiv kC_r$ . We note that the quantity  $cp^2$  may also be construed as representing a psychic cost (that captures the inherent disinclination to be dishonest), as in Becker (1976); by way of this parameterization, the greater is  $p$ , the degree of obfuscation, the greater is the psychic cost. The costs of setting too

<sup>29</sup>In our setting, the manager has an incentive to understate  $W$ . Generally, managers are presumed to have an incentive to overstate total earnings in order to boost stock prices and thereby increase their compensation. While our mechanism does not allow for this type of misrepresentation, our analysis exemplifies the notion that misrepresentation can take various forms; for example, merely by showing low cash flow numbers but retaining the flexibility to issue options and deferred compensation packages, the manager can misrepresent the likely size of the eventual compensation package to the BOD. It would require the forecasting of future cash flow numbers to assess the extent to which such compensation would be possible, and managers would be able to manipulate beliefs about forecasts through disclosures such as annual reports.

<sup>30</sup>The modeling of this behavior is closely related to the approach of Subrahmanyam (2005).

<sup>31</sup>The notion that the actual level of resources is not verifiable with complete certainty is in the spirit of costly state verification models of Townsend (1979), Gale and Hellwig (1984), Larker and Weinberg (1989), Winton (1995), and Crocker and Morgan (1998).

high a  $p$  then have two interpretations: the first is that the manager's behavior is more likely to be discovered, and the second is that the psychic cost is greater.

Assuming the Type U investor is present and that he investigates, the manager maximizes his net expected extra payoff,

$$p(H - L) - 0.5cp^2,$$

which yields

$$p = \frac{H - L}{c}. \quad (1)$$

Since  $H > L$  and  $c > 0$ ,  $p$  is strictly positive. For  $p < 1$ , we need  $H - L < c$ , and we will assume that this condition holds. Furthermore, we will often treat  $p$  as a given parameter in the model, while implicitly recognizing its dependence on other parameters through (1). The expected compensation, assuming investigation, is  $L$  plus the expected extra compensation arising from concealing the true firm value. Denoting the mean compensation by  $E(W)$ , we then have

$$E(W) = \frac{(H - L)^2}{2krC_r} + L. \quad (2)$$

Now consider the Type U investor's problem. Note that this agent will investigate if

$$\beta(1 - p)(H - L) > C_I,$$

where  $C_I$  represents the cost of investigation to the Type U investor. Thus, in equilibrium, there will be investigation so long as

$$\beta[1 - c^{-1}(H - L)](H - L) > C_I, \quad (3)$$

which leads us to the following proposition.

**Proposition 1**

1. Ex ante expected executive compensation is lower when the Type U investor is not present as a stockholder.

2. If the Type U investor is present as a stockholder, expected executive compensation is higher when the Type U investor does not investigate than when he does.

The above proposition proves our basic result that if relatively nave Type U investors are present in the market, managers are able to randomize on the variable that represents their true compensation and hence raise the *ex ante* expected compensation.<sup>32</sup> In

<sup>32</sup>It may be worth considering if excessive compensation resulting from insufficient ability to decipher compensation packages can be addressed by takeovers by other companies or the removal of the CEO by large institutions. Such actions, however, are likely to be prohibitively costly. For example, the costs involved in mounting a takeover bid likely exceed the excess compensation of a few top executives. Further, removal of an entrenched CEO with a

the next section, we model the Type U investor's entry into the financial market.

**3 The Securities Market**

To model the link between financial markets and compensation, we now extend the model to account for trading on the firm's securities. The claims traded are on the project that pays  $F = \bar{F} + \delta$ , and not on the assets used for compensation (i.e.,  $L$ ). This separation helps maintain tractability but is of no other material consequence for the purposes of our intuition.<sup>33</sup>

**3.1 Endogenous Entry with a Single Type U Investor**

We will assume a standard adverse selection model of market microstructure for trading claims on the project with a payoff of  $F$ . Private information is possessed by the single Type S investor who observes  $\delta$  perfectly.<sup>34</sup> If the Type U investor is present, the noise demand is contributed by this agent and totals  $z$  where  $z : N(0, v_z)$ . As usual, the price  $P$  set by a risk-neutral market maker is a linear function of the total order flow  $Q$ , and takes the form  $P = \bar{F} + \zeta Q$ .<sup>35</sup> If the Type U investor does not participate in the market, then, in effect, there is no market because there is no liquidity or noise trading. Assuming the Type U investor participates (in the spirit of Admati and Pfleiderer, 1988, Kyle 1985, or Subrahmanyam, 1991), the illiquidity parameter  $\zeta$  in this market is given by

$$\zeta = \frac{1}{2} \sqrt{v_\delta v_z^{-1}}. \quad (4)$$

Note that the Type U investor earns negative expected profits in our setting since he has no private information. This is consistent with the work of Kumar (2006) and Odean (1998, 1999) who indicate that unsophisticated investors seem to actively trade stocks even if they earn inferior returns. We thus assume that the Type U investor directly derives utility from trading (as a consumption good) and that

sympathetic board is potentially a difficult undertaking. See, for example, Fisman, Khurana, and Rhodes-Kropf (2005), among others.

<sup>33</sup>Similar assumptions are found in Ozdenoren and Yuan (2007), and Subrahmanyam and Titman (2001).

<sup>34</sup>This information may be interpreted either as obtained from security analysis, or through "tips" from corporate insiders by way of social networks between institutions and wealthy corporate executives.

<sup>35</sup>For convenience, we assume that unlimited short-sales are allowed.

the monetary equivalent of this is  $K$ .<sup>36</sup> In addition, we suppose a fixed cost  $C_E$  has to be paid by the Type U investor to enter the stock market. This can be interpreted as the setup costs associated with opening a brokerage account and cognitive costs involved in familiarizing oneself with the equity markets and the trading process.

It is well-known that in our setting (see, e.g., Admati and Pfleiderer, 1988), the expected losses of the uninformed investor to the informed agents are  $\zeta v_z$ .<sup>37</sup> Also note that once the agent enters the market he has the option (but not the obligation) to investigate. These observations imply that the agent will enter into the market for the firm's stock if

$$K - C_E + \max[\beta(1-p)(H-L) - C_I, 0] > \zeta v_z, \quad (5)$$

where  $p$  is given by (1). When the agent does enter, there is more uninformed ("noise") trading, which leads increased trading volume and liquidity. The conditions that encourage entry are a low  $C_E$ , a high  $K$ , and a smaller standard deviation of information.

This leads us to the following proposition.

**Proposition 2**

1. The Type U investor enters the market whenever the cost of entry and the variance of the cash flows ( $v_\delta$ ) is sufficiently low, and the monetary equivalent of utility from trading is sufficiently high.

2. Expected executive compensation, trading volume, and liquidity are higher when the Type U investor enters the stock market than when he does not.

3. Given that the Type U investor enters the stock market, expected executive compensation is greater when the agent does not investigate than when he does.

Within our setting, if the Type U investor enters, he *de facto* obtains control of the firm's governance. This presents the problem that due to *naveté*, the agent may not be able to decipher compensation packages accurately, which, in turn, precludes the agent from forcing the compensation down to  $L$  and therefore leads to increased executive compensation on average. Note that policies that reduce the cost of financial market access, i.e., the parameter  $C_E$ , increase the parameter set under which the Type U investor enters. Therefore expected executive compensation is greater when the cost of entry is

lower. This argument suggests that easing access to financial markets by way of technologies such as online trading do create liquidity but have the possibly unintended consequence of introducing unsophisticated investors whose cognitive limitations or lack of sophistication allow managers to blur financial statements and thereby increase expected compensation.<sup>38</sup>

**3.2 The Effect of Signal Precision**

**3.2.1 The Quality of Private Information and Type U Investors**

We now consider an interesting extension of our basic setting when the Type S investor observes  $\delta$  with some noise. We suppose that the information signal is  $\delta + \varepsilon$  where  $\varepsilon : N(0, v_\varepsilon)$  and is independent of all other random variables. The illiquidity parameter  $\zeta$  is given by (see the appendix)

$$\zeta = \frac{v_\delta}{2} \sqrt{\frac{1}{(v_\delta + v_\varepsilon)v_z}}. \quad (6)$$

The above expression is decreasing in  $v_\varepsilon$ . The equivalent of (5) now becomes

$$K - C_E + \max[\beta(1-p)(H-L) - C_I, 0] > \frac{v_\delta}{2} \sqrt{\frac{v_z}{v_\delta + v_\varepsilon}}. \quad (7)$$

This leads us to the following proposition.

**Proposition 3** *An increase in the precision of private information reduces the parameter set under which the Type U investor participates in the financial market and therefore tends to reduce expected executive compensation.*

Basically, since the right-hand side becomes smaller as  $v_\varepsilon$  (which is inversely related to signal precision) becomes larger, increasing the precision of information makes it less likely that the Type U investor will enter. Thus, an increase in the precision of the private signal, that traditionally is supposed to hurt financial markets by increasing adverse selection, actually increases the likelihood that more sophisticated agents will be holding a firm's stock. This enables more effective control of executive compensation. Therefore, a benefit of more accurate private information (either as inside information or by way of advance access to an analyst's signal -- viz., Green, 2006) is that it allows for more successful managerial monitoring by deterring the entry of

<sup>36</sup>An alternative way to interpret  $K$  is as an unmodeled benefit of trading. A similar construct is used in Glosten and Milgrom (1985).

<sup>37</sup>To understand this, note that the losses are given by the negative of  $E[(F - P)z]$ . Substituting  $P = \bar{F} + \zeta Q$  yields the relevant expression.

<sup>38</sup>The role for financial markets in conveying information about investment choices is not present in our model. In other models, such as the one of Holmström and Tirole (1993), information from stock prices may be used to monitor self-interested managers, forcing them to make the appropriate investment choices.

unsophisticated traders.

### 3.2.2 The Effect of Policies that Reduce Signal Precision

Suppose regulatory authorities can preclude the trading on certain types of precise signals (e.g., by way of prohibiting trading on material information). Would it necessarily be optimal to enforce such regulations? Of course, a full analysis of this question requires consideration of fairness in the form of equal access to information. Abstracting from considerations of this type, consider the following tradeoffs in the context of our model. Increasing signal precision tends to deter the entry of unsophisticated investors. This allows for improved governance and thereby facilitates extra payments to shareholders while precluding extra executive compensation. Yet, it also reduces the liquidity of the financial market. Thus, the net effect is ambiguous.

To formalize the above notion consider that the regulatory authority seeks to maximize  $w(\zeta^{-1}) + (1-w)E(D)$ , where  $\zeta$  is the illiquidity parameter,  $E(D)$  is the expected extra cash paid to all investors out of  $W$ , and  $w$  is the weight that trades off the benefit between liquidity and the expected extra payment to the shareholders. In the base model,  $\zeta^{-1}$  is zero when the Type U investor is not present ( $\zeta \rightarrow \infty$  when the Type U investor is present). Consider two levels of signal noise variances,  $v_\epsilon^G$  and  $v_\epsilon^S$ , where  $v_\epsilon^G > v_\epsilon^S$ . Suppose policymakers can choose one of the two signal precisions by way of appropriate regulations on the types of information that can be traded upon.<sup>39</sup> Further, suppose that

$$\frac{v_\delta}{2} \sqrt{\frac{v_z}{v_\delta + v_\epsilon^G}} < K - C_E + \max[\beta(1-p)(H-L) - C_I, 0] < \frac{v_\delta}{2} \sqrt{\frac{v_z}{v_\delta + v_\epsilon^S}} \quad (8)$$

This implies that the unsophisticated Type U investor enters the financial market only when the signal noise variance is  $v_\epsilon^G$ . In this scenario, one can state the following proposition.

**Proposition 4** *If  $v_\epsilon^G$  is high enough and  $v_\epsilon^S$  is low enough such that (8) holds, and if*

$$p(1-w)(H-L) > 2wv_\delta^{-1} \sqrt{(v_\delta + v_\epsilon^S)v_z}, \quad (9)$$

then the optimal choice of the regulatory authority is the lower signal noise or higher signal precision represented by  $v_\epsilon^S$ .

<sup>39</sup>The assumption here is that it is prohibitively costly to trade on both types of information, so only one signal is available and it can have one of two levels of signal precision.

Thus, in cases where the weight placed on minimizing executive excess is large enough and the weight on liquidity is low enough, the optimal response of the regulatory authority indeed may be to allow trading on a signal with higher precision.

### 3.3 Many Type U investors

We now extend our analysis to include many Type U investors. For convenience, we use the model where the information about  $\delta$  is perfect. The assumptions about the BOD share controlled by Type U investors as a group and the fraction of the BOD that is passive remain unchanged from the previous section. Suppose that there are  $I$  Type U investors present in the stock market. Assume the noise demand is contributed to equally by each of the agents and thus totals  $Iz$ , where  $z : N(0, v_z)$ . This implies that the illiquidity parameter  $\zeta$  is given by

$$\zeta = \frac{1}{2I} \sqrt{\frac{v_\delta}{v_z}}$$

We assume that the total number of Type U investors is bounded above by  $M$ .

Each investor can investigate; the probability of any one investor concluding that  $W = L$  is  $p$ . Note that if  $J$  Type U investors investigate, the probability of any one investor uncovering the actual funds available is  $1 - p^J$ , i.e., one minus the probability of anyone discovering the same. For simplicity, we assume that if any one investor infers the true value of  $W$  (i.e.,  $H$ ), then this investor communicates with other investors and forms a coalition, which subsequently forces the payment of an extra dividend  $H - L$ .<sup>40</sup> Further, this facility is independent of the number of type 1 investors who trade in the financial market. If the compensation is indeed  $L$ , the payout received by each Type U investor is  $\beta I^{-1}(H - L)$ . We also assume that if the  $I$ 'th investor enters, all other agents who are not Type U investors change their strategies in a consistent fashion in response to this move, and the investor takes this into account when choosing to enter (as in Admati and Pfleiderer, 1988).

Under the preceding conditions, assuming  $I - 1$  investors are already present, and  $J - 1$  of those investigate, it follows from (3) that an  $I$ 'th investor will enter if

<sup>40</sup>More complicated communication rules are possible; for example, one could require a critical mass of investors to conclude that  $W = L$  before the compensation is forced to  $L$ . Modeling such rules, however, would detract from the central points we wish to make.

$$K - C_E + \max[\beta I^{-1}(1 - p^J)(H - L) - C_I, 0] > (2I)^{-1} \sqrt{v_\delta v_z}, \quad (10)$$

where the value of  $p$  (from a simple modification of (1)) is the  $J$ 'th root of  $(H - L)/c$ . It can be seen from the above condition that if  $K - C_E > 0$ , then, so long as  $M$  is sufficiently large, there will always exist an equilibrium where all  $M$  Type U investors enter the market. If  $C_I$  and  $v_\delta$  are large, however, there also may exist an equilibrium where none of the agents enter because illiquidity and investigation costs with just one investor may be too high to make it worthwhile for the first agent to enter.

An issue in the equilibrium where all  $M$  agents enter is that of how many choose to investigate. Note, however, that if the cost of investigation is lower than  $\beta M^{-1}(1 - p^M)(H - L)$  (as will be the case, for example, when  $C_I$  is zero), they all will investigate. Rather than analyze several equilibria of this setting, for brevity we report the following proposition of interest:

**Proposition 5**

1. Assuming that  $K > C_E$ , the equilibrium under which all Type U investors enter exists as long as the maximum number of such investors is sufficiently large.

2. Expected executive compensation is higher in the equilibrium where all Type U investors enter the stock market than in that where no Type U investor enters.

3. Given that all Type U investors enter the stock market, expected executive compensation is smaller if they all investigate than when nobody does.

In general, when the population of Type U investors is large, it will be more likely that they all enter for two reasons. First, their presence makes the market more liquid, which benefits them all. Second, the investors are more likely to discover the true compensation if there are more of them. The countervailing force is that when there are more Type U investors, they receive less of the share of the surplus  $H - L$  generated when managerial manipulation is discovered. The basic result, that Type U investors increase expected compensation, survives in this scenario as well.

### 3.4 Implications

To develop cross-sectional implications using the above analysis, we rely on the model as well as out-of-model arguments. We conjecture that managers of complex firms are more likely to conceal compensation than those of focused firms because Type U investors are less able to decipher the complicated accounting statements of such firms with

multiple lines of business. This implies that cases of obfuscated disclosures and covert compensation are more likely to arise in large firms than in small, concentrated firms. In formal terms, the parameter  $c$  (related to the probability of detection) is likely to be small for diversified firms. Thus, true compensation is likely to be more difficult to decipher for larger, more diverse, corporations. Closer investigation following increased transparency should reveal greater levels of hidden compensation for such companies (e.g., in the form of hard-to-detect deferments and retirement packages).

Proposition 2 indicates that trading activity and liquidity are positively related to executive compensation, because active, liquid markets tend to be highly populated by uninformed, unsophisticated investors. An additional implication relates to how we expect the utility from trading  $K$  to vary across Type U investors. Lottery-type stocks with high skewness and volatility (as defined by Kumar, 2006) may provide greater monetary-equivalent utility from trade (i.e.,  $K$  may be greater in such stocks), leading to a more unsophisticated clientele and hence more blurred levels of compensation and excessive compensation packages.

## 4 Empirical Tests

### 4.1 Basic Regressions

One of our main arguments is that there should be more cases of obfuscated compensation in firms that are more actively traded (more liquid) and more complex. Since not all cases of obscured compensation are detected, the theory is inherently difficult to test. However, our theoretical results suggest that the characteristics of the firm may play a role in executive compensation. Specifically, our analysis predicts that executive compensation is positively related to trading activity and proxies for firm liquidity.<sup>41</sup>

Our goal in this section is not to perform a full-fledged empirical analysis, but to provide some rudimentary evidence that sheds light on our theoretical model. We focus on fiscal year 2005, the most recent year for which we could obtain compensation data (results from additional years of data are discussed in the next subsection). We also restrict ourselves to NYSE/AMEX stocks for two reasons. First, as will be seen, our variables require voluminous transactions data, and this restriction keeps our exercise manageable. Second, we wish to

<sup>41</sup>Indirect compensation can be viewed as ancillary parts of remuneration such as long-term incentive payouts, severance payments, payment for unused vacation, tax reimbursements, 401K contributions, life insurance premiums, and so on. We define this term precisely later in this section.

exclude very small Nasdaq stocks with possibly error-prone compensation and trade data. Because our phenomena are likely to be less strong in stocks listed on NYSE/AMEX, owing to the fact that listing on these exchanges is subject to more stringent disclosure requirements, this restriction works against the likelihood of finding support for our hypotheses.

Compensation and shareholding data are from the executive compensation (Execucomp) database on Wharton Research Data Services (WRDS). These data are collected from each company's annual proxy, which must be filed 120 days after each company's fiscal year end. Execucomp collects data for up to 9 executives per firm for a given year, though over 80% of companies in our sample report data for only 5. As the dependent variable in our first set of regressions, we use the logarithm of each firm's average total current compensation across executives. Total compensation (reported in millions of dollars) is comprised of salary, bonus, long term incentive payouts, option grants and all other compensation. Our regressors are at the firm level so we choose to have firm-level averages rather than executive-level data. Because average compensation is likely to be lower in firms with more executives (i.e., additional executives are probably paid less than the top five), we use two versions of the dependent variable; the first averages data for the top five executives (ranked by total current compensation), while the second averages data across all executives whose compensation levels are reported by Execucomp.

Our arguments also suggest more specific predictions about *indirect* compensation: namely, that such compensation, which is more difficult to understand than total compensation, will be greater not only in stocks that have greater active participation from Type U investors but also in those that attract greater interest from Type U investors. Thus, we employ the ratio of indirect compensation relative to total compensation as an additional dependent variable. Our measure of indirect compensation consists of long-term incentive payouts (payments emanating from incentives set by management), option value grants, and all other compensation, which can include severance payments, debt forgiveness, payment for unused vacation, tax reimbursements, signing bonuses, 401K contributions, life insurance premiums, but excludes salary and bonus.

The controls are as follows. We include log total annual dollar volume (in billions of dollars) as a measure of liquidity. As proxies for a variable that is likely to attract Type U investor interest, we use the standard deviation and skewness of daily returns over the year (Kumar, 2006). We capture firm complexity by the number of business segments (obtained from Compustat) and firm size, measured by book value of total assets (obtained from COMPUSTAT, in billions

of dollars) as of the end of the year.<sup>42</sup> We also include the compounded stock return over the past thirty-six months as a link to an incentive mechanism whereby managers receive greater compensation when their stock performs well. To mitigate the problem of endogeneity, all control variables are measured as of the year 2004, while our dependent variables are measured as of 2005.

The total sample consists of 803 firms. Table 2 presents summary statistics associated with our variables. We retain in our sample those firms that report data for at least five executives. The compensation variables and firm size show considerable skewness (the mean is in each case is quite different from the median), justifying the use of logarithmic transformations for these variables.

To distinguish the effect of trading activity from firm size, we form portfolios sequentially sorted into quintiles based on book assets and trading volume. Based on the previous year's firm size, measured by the total assets of the firm at the end of 2004, the sample is sorted into 5 quintiles. Within each size quintile, we further partition the sample by the annual total trading volume in 2004. We then document the average compensation for each of the 25 portfolios.

The sort results shown in Table 3 clarify the relation between the executive compensation and the trading volume and company size. The average and median of the total compensation, reported in Panel A and B, increase with the size of the company quite consistently across different trading volume quintiles. The evidence is also persistent in indirect compensation in Panel C and D, measured as a percentage of total compensation. Trading volume is able to explain the higher executive compensation well across all the size quintiles, except that the mid-sized firms the executive compensation tends to reach its peak for the second largest volume quintile. T-test and Median-Test are performed to compare the location of quintile 1 and quintile 5's mean and median, and the results are statistically significant. From the perspective of economic significance, note that within the smallest firm quintile, indirect compensation in the most actively traded firms is about five times greater relative to that in the least actively-traded ones. Overall, the results indicate that both total and indirect compensation bear a positive relation to trading activity independent of firm size.

In Table 4 Panel A we report the results from the cross-sectional regression of total executive compensation on volume and our control variables. In the middle panel, we average total compensation over the top five executives (ranked by total compensation), and in the rightmost panel, we average over all executives. Within both regressions, we find that trading volume is strongly and positively

<sup>42</sup>Using market capitalization as a measure of firm size does not substantively alter the results.

related to compensation along with size measured by the log scale of company assets, and the adjusted  $R^2$ , just under 56%, appears healthy. The number of business segments, which is another proxy for the complexity of the firm's operations, turns out to be insignificantly negative. Additionally, executive compensation is significantly positively related to the 3-year compounded returns, which is consistent with existing literature. Overall, our results lend support to the notion that executive compensation is higher for more actively-traded and more complex (i.e., larger) firms.

In Panels B and C, we use the turnover rate instead of total trading volume as the regressor which represents trading activity. The first turnover measure is defined by the ratio of dollar volume to the market capitalization at the end of 2004. The second turnover rate is computed by the ratio of share volume to the total shares outstanding as of 2004. Similar to the trading volume, the higher the turnover rate, the more the total compensation. However, here the number of business segments and the return volatility have significantly negative explanatory power for executive compensation. This result is surprising and deserves analysis in future research.

Results from using the indirect compensation measure as our dependent variable are presented in Table 5. In order to examine whether institutions are relevant in controlling hidden compensation, we also add institutional holdings as an additional regressor. This variable is measured as the logistic transform of the proportion of shares held by institutions as of the end of 2004. In the regression, the signs of the coefficients for return and return skewness remain positive, though not significant.<sup>43</sup> This is consistent with the notion that the base salary and bonus of the management are more strongly related to stock performance than indirect compensation. We also find that total volume is positive and significant at the 1% level.

We note that total volume may not necessarily be related to liquidity, and, in turn, the activity of small investors, as it might simply represent buying or selling pressures of large investors. For this reason, in unreported regressions, we use the bid-ask spread as a liquidity measure to test whether more liquid companies pay their executives higher indirect compensation. The spread is measured as the average quoted spread of each company across all intraday observations throughout 2004. The results confirm our thesis that stocks with low spreads, corresponding to higher liquidity, have greater executive compensation. The coefficient of the return volatility variable remains marginally significant, with a negative sign, while the institutional holdings is insignificantly positive.

<sup>43</sup>Including institutional holdings in the regression for total compensation does not alter our central results materially.

## 4.2 Some Robustness Checks

Though we find that total trading volume is positively related to indirect compensation, it is possible that an increase in volume in general does not cause greater executive compensation. For example, firms in which managers are able to extract more compensation may have poorer corporate governance or more entrenched managers which may result in shareholders wanting to unload their positions. Or, per Merton (1987), individuals may select stocks of companies with high name recognition (see also Frieder and Subrahmanyam, 2005). The CEOs of such companies may have greater salaries (and, even be well-known because of their salaries). Given such alternative interpretations of our results, we attempt to address the issue of causality. Note that by lagging the right-hand variables, we already have allayed this endogeneity concern to some extent. Nonetheless, we also perform the following two-stage least-squares estimation. In the first equation, we model indirect compensation as a function of the variables in Table 5. In the second equation, we model volume as a function of all the right-hand variables in the first equation except total volume, and add indirect compensation as an explanatory variable. Results from estimation of the system appear in Table 6. As can be seen, we obtain respective coefficients of 0.08 ( $t=6.23$ ) on trading volume, Return and Return skewness remain positively insignificant. Firm size has a marginally negative sign, both economically and statistically, -0.023 with a t-stat -1.90. There is no substantive change in the other coefficients. Thus, our results survive the system estimation that accounts for endogeneity.

The next concern is that we have used only the most recent year of data (2005) in our analysis. Extending our results to a long time-series presents problems because executive compensation data are available only since the mid-90s. Running panel regressions also raises the issues that the time-series response of compensation to clientele changes may be sluggish, and a handful of years may not be able to capture this effect. These caveats notwithstanding, we consider results from using a longer sample from 1997 to 2004. We chose this period for two reasons: First, tick size reductions beginning in 1997 may have attracted retail investors, and second, intuition suggests that technological innovations such as online trading became prevalent during the late 1990s.

We use our extended sample to conduct three exercises. Initially, we consider the cross-sectional correlation between the total average compensation of the top five executives and total trading volume over the period 1997 to 2005 (lagging the volume variables by one year). We find statistically significant correlations of 0.29, supporting our premise that changes in compensation are related to trading activity. Next, we conduct annual regressions

analogous to the last regression in Table 5 for the period 1997 to 2005, and the year by year regression coefficients are reported in Table 7. Among other results, note that the significance of institutional holdings has decreased over time. This may be a result of an increased tendency towards indexation, which may have reduced the influence of institutions on compensation. The result that is most relevant for our purposes is that trading volume is the only variable which has been consistently significant over time. Indeed, the Newey-West corrected coefficient of trading volume is 0.060 with a  $t$ -statistic of 19.84.

Overall, the preceding empirical results lend reasonable support to the ideas developed in our paper.

## 5 Conclusion

In this paper, we attempt to understand how investor clientele interacts with managerial compensation. In our framework, unsophisticated investors have difficulty in ascertaining true executive compensation from financial disclosures. An optimal extent of camouflage in managerial compensation is obtained by consideration of the degree of investor sophistication together with regulatory penalties. We show that the greater is retail investor participation, the greater is expected executive compensation. Our empirical analysis suggests that total and indirect compensation are positively related to trading volume. Indirect compensation is negatively related to bid-ask spreads. These results obtain after controlling for firm size, and are consistent with the postulated theoretical notion that stocks with greater liquidity and greater unsophisticated investor participation are associated with greater levels of direct and indirect compensation.

Our work implies that policies that improve access to capital markets can increase expected executive compensation because governance may pass to investors who are unable to decipher true compensation from disclosures. Greater precision of private information reduces liquidity but has a potential benefit in that it can discourage unsophisticated investors from participating in financial markets and thereby maintain a check on executive compensation. Increased penalties for fraudulent disclosures and increasing disclosure transparency can also lower expected executive compensation.

The analysis presented in this paper suggests many avenues for further investigation. First, it would be useful to identify the traders who create the volume in the market place. Is the volume contributed by the unsophisticated investors correlated with the higher level of executive compensation? Further, the relation between investor clientele and executive compensation in international settings is also of interest. For example, do countries with less

institutional dominance have higher levels of executive compensation relative to the average wage? When technological innovations make it cheaper to trade within a country, what happens to executive compensation? We leave such issues for future work.

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## Appendix

**Proof of Proposition 1:** If there is no investigation, the expected compensation is simply  $H$ . Furthermore, the right-hand side of (2) is less than  $H$  because the first term on the right-hand side, which equals  $0.5p(H - L)$ , is less than  $H - L$ .

**The Case when the true value of  $W$  equals  $L$ :** We provide a brief analysis of the equilibrium when the value of  $W = L$ . Our aim is to show that under reasonable suppositions, the equilibrium compensation in this case will equal  $L$  across all states. The prior belief of the individual remains  $L$ . If the individual does not investigate, the manager's proposal of a zero dividend is accepted. If the individual investigates, we assume that he correctly concludes that  $w = L$  with a probability  $p$  and  $w = H$  is probability  $1 - p$ . If the individual incorrectly concludes that  $w = H$  and rejects the zero dividend proposal, the manager has to incur a vanishingly small cost of  $\gamma \rightarrow 0$  to convince the individual that  $W = L$  (e.g., by opening up the "books"). Further, in this case the cost of misrepresentation positively varies with  $1 - p$  rather than  $p$ , because  $p$  here is the probability that the individual *correctly* concludes that  $w = L$ . Under these assumptions it is evident that the objective function of the manager is to choose  $1 - p$  to maximize

$$pL + (1 - p)(L - \gamma) - 0.5c(1 - p)^2 = -(1 - p)\gamma - 0.5c(1 - p)^2 + L,$$

which has the optimal solution of  $1 - p = 0$ , or  $p = 1$ , given that all parameters are positive. So, in this case, the individual investor always concludes that  $W = L$ , ensuring that the compensation remains  $L$  in all states.

**Proof of Proposition 2:** We first prove (4). The informed and noise traders submit market orders to the market maker who then quotes a price contingent on the net (combined) order flow of both types of traders. The informed maximizes his trading profit, given by

$$E[\{(F - P)x\} | \delta].$$

Given a linear pricing rule  $P = \bar{F} + \zeta Q$ , where  $Q = x + z$ , his order works out to be  $\delta/2\zeta$ . The market maker sets prices such that  $E(Q(P - v) | Q) = 0$ , so that  $P = E(v | Q)$ . From this, we have

$$\zeta = \text{cov}(\delta, Q) / \text{var}(Q).$$

We thus have

$$\zeta = \frac{1}{2} \sqrt{\frac{v_\delta}{v_z}}.$$

The proof of part 1 of Proposition 2 follows from a simple examination of the right-hand side of the condition in (5). When only the institution is the shareholder, there is no camouflage for the informed agent, so trading volume and liquidity are zero. Thus, if the Type U investor does enter the market, then compensation drops below  $H$  and volume trivially rises from zero to a positive number. Further, liquidity (the inverse of  $\zeta$ ) trivially increases from zero to the expression in (4). This proves Part 2. For part 3, it suffices to note that under investigation the compensation is greater than  $L$  but smaller than  $H$ .

**Proof of Equation (6):** The informed maximizes expected profits given by  $E[\{(F - P)x\} | \delta + \varepsilon]$ , where  $x$  is his chosen trade. Substituting for  $F$  and  $P = \bar{F} + \zeta Q$ , where  $Q$ , as in the proof of (4), is the order flow, it follows that his order equals

$$x = \frac{k(\delta + \varepsilon)}{2\zeta} \tag{11}$$

where

$$k \equiv \frac{v_\delta}{v_\delta + v_\varepsilon}$$

Let  $\beta \equiv k/(2\zeta)$ . Then  $\zeta$  is given by

$$\zeta = \frac{\text{cov}[\delta, \beta(\delta + \varepsilon) + z]}{\text{var}[\beta(\delta + \varepsilon) + z]}$$

implying

$$\zeta = \frac{v_\delta}{2(v_\delta + v_\epsilon)} \sqrt{\frac{v_\delta + v_\epsilon}{v_z}}$$

**Proof of Proposition 3:** The condition under which the Type U investor enters is given by

$$C_E - K + 0.5v_\delta \sqrt{\frac{v_z}{v_\delta + v_\epsilon}} < \max[\beta(1-p)(H-L) - C_I, 0]. \quad (12)$$

The left-hand side of this expression is decreasing in  $v_\epsilon$ , or increasing in signal precision. Thus, increasing precision decreases the parameter set under which the condition holds. Again, starting from a point where  $v_\epsilon$  is low enough where the Type U investor is present and increasing it high enough so that the Type U investor exits, expected executive compensation rises.

**Proof of Proposition 4:** If

$$K - C_E + \max[\beta(1-p)(H-L) - C_I, 0] < \frac{v_\delta}{2} \sqrt{\frac{v_z}{v_\delta + v_\epsilon^S}}, \quad (13)$$

then the Type U investor does not enter when the signal noise variance is  $v_\epsilon^S$ . If

$$K - C_E + \max[\beta(1-p)(H-L) - C_I, 0] > \frac{v_\delta}{2} \sqrt{\frac{v_z}{v_\delta + v_\epsilon^G}}, \quad (14)$$

the Type U investor enters the financial market when the signal noise variance is  $v_\epsilon^G$ . Now, if the Type U investor does not enter the financial market, then the illiquidity parameter is infinite so that  $\zeta^{-1}$  is zero. The expected dividend when the Type U investor is not present is  $H - L$ , whereas this quantity when the Type U investor is present is  $(1-p)(H-L)$ . From the regulatory authority's objective function and Equation (6), we then have that  $v_\epsilon^S$  is preferred if (8) holds, and

$$(1-w)(H-L) > w(2/v_\delta) \sqrt{(v_\delta + v_\epsilon^S)v_z} + (1-w)(1-p)(H-L).$$

The above condition reduces to Condition (9) in the proposition.

**Proof of Proposition 5:** For part 1, note that the entry condition for the  $I$ 'th investor is

$$(2I)^{-1} \text{std}(\delta) \text{std}(z) < K - C_E + \max[\beta I^{-1}(1-p^{J+1})(H-L) - C_I, 0], \quad (15)$$

where  $J < I$  is the number of agents who choose to investigate. If  $K - C_E > 0$ , then, as  $I \rightarrow \infty$ , the left-hand side of the above inequality goes to zero whereas the right-hand side remains positively bounded. Thus, so long as the maximum number of Type U investors,  $M$ , is high enough, an equilibrium where all  $M$  Type U investors enter the market exists. The proof of Parts 2 and 3 of Proposition 5 is a simple modification of that of Proposition 2.

**Table 1.** Managerial Proposals and Outcomes

This table presents the board of directors' response to the managerial proposal of a zero payout to the shareholders, as well as the ensuing managerial compensation.

Clientele	Type S	Type U + Type S		
Type U's investigation decision	-	Yes		No
Investigation outcome	-	$W = H$	$W = L$	-
Manager's zero dividend proposal	Rejected	Rejected	Accepted	Accepted
Hidden compensation	0	0	$H - L$	$H - L$
Total compensation	$L$	$L$	$H$	$H$

**Table 2.** Summary Statistics

This table presents the summary statistics for the data used in the empirical tests for our sample of NYSE/AMEX stocks. Total compensation (measured in 2005) is salary plus bonus plus long term incentive payouts, option grants and all other compensation, averaged across the top five executives for each firm. The other variables (all measured in 2004) are total dollar volume, number of business segments, return volatility (standard deviation of daily returns) and skewness over the year, the compounded stock return over the past thirty-six months, and total assets as of the end of the year (firm size). We also use two turnover rate measures, the ratio of dollar volume to the market capitalization (Turnover 1) and the ratio of share volume to the total number of shares outstanding (Turnover 2) in our robustness test.

Variable	Mean	Median	Std. Dev.
Total compensation (\$ millions)	2.622	1.711	2.800
Trading volume (\$ billions)	1.019	1.058	1.528
Number of business segments	3.260	3.000	1.855
Return volatility	0.018	0.017	0.007
Return skewness	0.036	0.098	1.155
Return	0.596	0.392	0.990
Firm size (Assets) (\$ billions)	13.230	2.441	59.957
Turnover 1	1.268	1.031	0.875
Turnover 2	1.699	1.393	1.194

**Table 3.** Total and Indirect Executive Compensation, based on Size and Volume

This table presents the results of executive compensation by portfolios based on the firm size and trading volume. Based on the logarithm of previous year's total assets, the sample is sorted into 5 quintiles. Within each size quintile, the sub-sample is partitioned into 5 sub-quintiles by the logarithm of total dollar trading volume. Total compensation (measured in 2005) is salary plus bonus plus long term incentive payouts, option grants and all other compensation, averaged across the top five executives for each firm. Indirect executive compensation using the sum of long-term incentive payouts (payments emanating from incentives set by management), option grants and all other compensation (excluding salary and bonus), as a proportion of total compensation. The sample includes all NYSE/AMEX stocks which remain in our former analysis. T-test is performed for the comparison of the sample means between two extreme quintiles, and corresponding t value is reported. Median-test is performed for the comparison of the sample medians between two extreme quintiles and corresponding Z value is reported.

Panel A Mean of Total Compensation							
		Firm Size					
		Small	2	3	4	Large	t-value
	Low	0.47	1.24	1.07	1.62	3.54	-4.81
	2	0.95	1.54	1.38	2.28	3.33	-5.34
Volume	3	0.93	1.38	2.17	2.41	4.43	-5.32
	4	1.16	1.68	3.02	4.32	5.46	-7.77
	High	1.38	2.41	2.71	4.54	7.54	-7.91
	t-value	-4.94	-2.34	-4.07	-4.95	-4.05	
Panel B Median of Total Compensation							
	Low	0.39	0.82	0.99	1.31	2.35	-7.44
	2	0.63	1.20	1.14	1.68	2.61	-5.95
Volume	3	0.77	1.31	1.92	2.25	3.75	-6.95
	4	0.98	1.48	2.14	3.20	4.47	-6.45
	High	1.13	2.04	1.83	3.51	6.14	-6.95
	Z-value	-5.46	-2.98	-2.97	-4.96	-4.96	
Panel C Mean of Indirect Compensation							
	Low	0.13	0.56	0.37	0.72	1.79	-3.96
	2	0.46	0.73	0.51	1.22	1.97	-3.70
Volume	3	0.27	0.61	1.17	1.22	2.74	-4.01
	4	0.53	0.83	1.66	2.14	3.08	-6.85
	High	0.70	1.53	1.17	2.99	4.40	-5.77
	t-value	-4.54	-2.20	-3.81	-4.72	-3.44	
Panel D Median of Indirect Compensation							
	Low	0.07	0.2	0.40	0.42	1.01	-5.46
	2	0.14	0.48	0.40	0.69	1.36	-4.46
Volume	3	0.18	0.39	0.83	1.17	2.15	-4.96
	4	0.40	0.64	1.36	1.70	2.50	-5.95
	High	0.60	1.01	0.69	2.45	3.47	-5.46
	Z-value	-3.47	-3.47	-1.98	-5.46	-3.97	

**Table 4.** Cross-Sectional Regressions for Total Executive Compensation

This table presents the results of individual stock executive compensation using the logarithm of total compensation (salary plus bonus plus long term incentive payouts plus option grants plus all other compensation) as the dependent variable. The main regressor is log total dollar volume in Panel A, turnover 1 (the ratio of total dollar volume to the market capitalization) in Panel B, and turnover 2 (the ratio of total trading volume to the number of shares outstanding) in Panel C. The other explanatory variables are return volatility (standard deviation of daily returns) and return skewness over the year, number of business segments, total assets as of the end of the year (firm size in billions of dollars), and the compounded stock return over the past thirty-six months. The second and third columns report results averaged across the top five executives (ranked by the dependent variable) within each firm. The fourth and fifth columns report results averaged by firm across all executives whose compensation levels are reported in the Execucomp database. The sample includes all NYSE/AMEX stocks, and the dependent variable is measured in 2005 whereas the independent variables are from the year 2004.

Panel A Trading Volume as Regressor				
Variable	Top five executives		All reported executives	
	Coeff.	<i>t</i> -stat.	Coeff.	<i>t</i> -stat.
Trading Volume	0.243	11.903	0.243	12.037
No. of Business Segments	-0.008	-0.700	-0.009	-0.735
Return Volatility	0.296	0.089	-0.451	-0.136
Return Skewness	0.041	2.298	0.044	2.460
Return	0.115	5.395	0.118	5.569
Firm Size (Assets)	0.214	9.801	0.211	0.753
Adjusted $R^2$	0.550		0.554	
Panel B Turnover Rate 1 as Regressor				
Turnover 1	0.230	5.700	0.227	5.665
No. of Business Segments	-0.025	-2.012	-0.026	-2.073
Return Volatility	-7.918	-2.093	-8.561	-2.281
Return Skewness	0.039	2.042	0.042	2.175
Return	0.141	6.217	0.143	6.386
Firm Size (Assets)	0.390	23.945	0.387	23.966
Adjusted $R^2$	0.491		0.493	
Panel C Turnover Rate 2 as Regressor				
Turnover 2	0.236	5.775	0.235	5.797
No. of Business Segments	-0.025	-1.991	-0.025	-2.042
Return Volatility	-9.604	-2.472	-10.310	-2.677
Return Skewness	0.033	1.733	0.036	1.875
Return	0.132	5.809	0.135	5.976
Firm Size (Assets)	0.384	23.397	0.381	23.419
Adjusted $R^2$	0.492		0.494	

**Table 5.** Cross-Sectional Regressions for Indirect Executive Compensation

This table presents the results of individual stock indirect executive compensation using the sum of long-term incentive payouts (payments emanating from incentives set by management), option grants and all other compensation (excluding salary and bonus), as a proportion of total compensation as the dependent variable. The explanatory variables are log total dollar volume, return volatility (standard deviation of daily returns) and return skewness over the year, the compounded stock return over the past thirty-six months, the number of business segments, total assets as of the end of the year (firm size in billions of dollars), and the logistic transform of the proportion of stock held by institutions. The middle panel reports results averaged across the top five executives (ranked by the dependent variable) within each firm. The rightmost two columns provide results averaged by firm across all executives whose compensation levels are reported in the Execucomp database. The sample includes all NYSE/AMEX stocks, and the dependent variable is measured in 2005 whereas the independent variables are from the year 2004.

Variable	Top five executives		All reported executives	
	Coeff.	<i>t</i> -stat.	Coeff.	<i>t</i> -stat.
Trading Volume	0.065	7.839	0.064	7.829
No. of Business Segments	-0.002	-0.433	-0.002	-0.379
Return Volatility	-2.461	-1.869	-2.387	-1.822
Return Skewness	0.008	1.088	0.008	1.111
Return	0.010	1.124	0.008	0.983
Firm Size (Assets)	-0.011	-1.214	-0.011	-1.214
Institutional Holdings	0.007	0.912	0.007	0.904
Adjusted $R^2$	0.155		0.154	

**Table 6.** Two-stage Least Squares Estimation for Determinants of Indirect Executive Compensation

This table presents the results of individual stock indirect executive compensation using the sum of long-term incentive payouts (payments emanating from incentives set by management), option grants and all other compensation (excluding salary and bonus), as a proportion of total compensation as the dependent variable. The explanatory variables are log total dollar volume, return volatility (standard deviation of daily returns) and return skewness over the year, the compounded stock return over the past thirty-six months, the number of business segments, total assets as of the end of the year (firm size in billions of dollars), and the logistic transform of the proportion of stock held by institutions. Two-stage least squares estimates are presented with relative small order volume modeled as a function of all of the determinants of indirect compensation except total volume. This table reports results averaged across the top five executives (ranked by the dependent variable) within each firm. The sample includes all NYSE/AMEX stocks, and the dependent variable is measured in 2005 whereas the independent variables are from the year 2004.

Variable	Top five executives		All reported executives	
	Coeff.	<i>t</i> -stat.	Coeff.	<i>t</i> -stat.
Trading Volume	0.079	6.231	0.079	6.219
No. of Business Segments	0.000	-0.096	0.000	-0.044
Return Volatility	-2.370	-1.794	-2.296	-1.748
Return Skewness	0.009	1.217	0.009	1.239
Return	0.008	0.917	0.007	0.778
Firm Size (Assets)	-0.022	-1.902	-0.022	-1.898
Institutional Holdings	0.003	0.372	0.003	0.367
Adjusted $R^2$	0.133		0.132	

**Table 7.** Cross-Sectional Regressions for Indirect Executive Compensation, Year by Year

This table presents the results of individual stock indirect executive compensation using the sum of long-term incentive payouts (payments emanating from incentives set by management), option grants and all other compensation (excluding salary and bonus), as a proportion of total compensation as the dependent variable. The explanatory variables are log total dollar volume, return volatility (standard deviation of daily returns) and return skewness over the year, the compounded stock return over the past thirty-six months, the number of business segments, total assets as of the end of the year (firm size in billions of dollars), and the logistic transform of the proportion of stock held by institutions. Panel A reports results averaged across the top five executives (ranked by the dependent variable) within each firm. Panel B reports results averaged by firm across all executives whose compensation levels are reported in the Execucomp database. The sample includes all NYSE/AMEX stocks, and the dependent variable is measured in year  $t$  whereas the independent variables are from the year  $t - 1$ .

Panel A: Top 5 Executives										
Variable		1997	1998	1999	2000	2001	2002	2003	2004	2005
Trading Volume	Coeff.	0.05	0.05	0.05	0.06	0.07	0.05	0.06	0.08	0.06
	t-stat	6.74	6.61	7.19	8.84	10.30	8.19	8.65	9.62	7.83
No. of Business Segments	Coeff.	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	t-stat	2.87	1.20	0.25	-	-1.02	0.40	0.42	-	-
Return Volatility	Coeff.	3.24	2.75	0.76	0.82	0.98	1.37	-	0.02	-
	t-stat	2.93	2.60	0.95	1.06	1.41	1.94	-	0.02	-
Return Skewness	Coeff.	0.00	0.00	0.01	0.01	0.03	0.01	-	-	0.01
	t-stat	-	-	1.11	1.49	4.22	0.61	-	-	1.09
Return	Coeff.	0.27	0.45	-	-	-	-	-	-	-
	t-stat	0.02	-	0.00	0.01	0.00	0.00	0.00	0.01	0.01
Firm Size (Assets)	Coeff.	1.96	-	-	1.93	1.63	-	0.29	0.95	1.14
	t-stat	0.00	0.79	0.26	-	0.00	0.09	-	-	-
Institutional Holdings	Coeff.	0.36	0.34	0.27	-	0.49	0.38	-	-	-
	t-stat	0.03	0.03	0.03	0.25	0.02	0.02	0.02	0.01	0.01
	t-stat	3.11	3.41	3.12	0.86	1.86	1.78	2.58	1.36	0.91
Panel B: All Reported Executives										
Variable		1997	1998	1999	2000	2001	2002	2003	2004	2005
Trading Volume	Coeff.	0.05	0.05	0.05	0.06	0.06	0.05	0.06	0.07	0.06
	t-stat	6.52	6.50	7.21	8.95	10.01	8.48	8.29	9.53	7.82
No. of Business Segments	Coeff.	0.02	0.01	0.00	0.00	-0.01	0.00	0.00	0.00	0.00
	t-stat	2.87	1.18	0.13	-	-1.18	0.37	0.37	-	-
Return Volatility	Coeff.	3.31	3.13	0.97	0.92	1.08	1.46	-	0.19	-
	t-stat	3.03	3.01	1.23	1.21	1.56	2.11	-	0.22	-
Return Skewness	Coeff.	0.00	0.00	0.01	0.01	0.03	0.01	-	-	0.01
	t-stat	0.36	0.33	1.25	1.24	4.09	0.66	0.01	0.01	1.11
Return	Coeff.	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01
	t-stat	1.91	-	-	2.05	1.66	-	0.34	0.99	1.00
Firm Size (Assets)	Coeff.	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-
	t-stat	0.29	0.21	0.28	-	0.36	0.22	-	-	-
Institutional Holdings	Coeff.	0.03	0.03	0.03	0.01	0.01	0.02	0.02	0.01	0.01
	t-stat	3.08	3.22	3.19	0.58	1.46	1.88	2.91	1.55	0.90