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**ESSAYS IN OWNERSHIP STRUCTURE, FIRM
VALUE AND INSIDER TRADING**

by

Ashis K. Dev

A dissertation submitted to the Graduate Faculty in Business in partial fulfillment of the requirements for the degree of Doctor of Philosophy, the City University of New York.

1996

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Abstract**ESSAYS IN OWNERSHIP STRUCTURE, FIRM VALUE
AND INSIDER TRADING**

by

Ashis K. Dev

Adviser: Professor Kishore Tandon

The dissertation consists of four related essays. In all the four essays the market for corporate control and the level of insider ownership play pivotal roles. First, we obtain a theoretical relationship between insider ownership and the value of the firm in a situation in which the insiders have infinitely high value of control and see how this relationship changes as parameters change. Second, we develop a more general model to obtain the relationship between insider ownership and firm value. The predictions of the theoretical model are tested on a data set called Stern-Stewart Performance 1000, after incorporating insider ownership data from Value Line. Third, the theoretical relationship between institutional ownership and firm value for different insider ownership levels is derived under different behavioral assumptions on the part of the institutional owners. The theoretical predictions are tested on the same data set after incorporating institutional ownership data. Fourth, optimal trading of shares by insiders when they receive private information that the stock is overvalued (or undervalued) is analyzed in a theoretical model. An asymmetry between purchases and sales by insiders of a firm is derived theoretically, leading to several empirical hypotheses.

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Chapter 1

OVERVIEW

The dissertation consists of four related essays. In all the four essays, the market for corporate control and the level of insider ownership play pivotal roles. First, we obtain a theoretical relationship between insider ownership and the value of the firm in a situation in which the insiders have an infinitely high value of control and see how this relationship changes as parameters change. Second, we develop a more generalized theoretical model to obtain the relationship between insider ownership and firm value. The predictions of the theoretical model are then empirically tested on a data set called Stern-Stewart Performance 1000, incorporating insider ownership data from Value Line. Third, the theoretical relationship between institutional ownership and firm value for different insider ownership levels is derived under different behavioral assumptions on the part of the institutional owners. The theoretical predictions are empirically tested on the above data set, after incorporating institutional ownership data. Fourth, optimal trading of shares by insiders is analyzed theoretically when they receive private information that the stock is overvalued (or undervalued). An asymmetry between purchases and sales by insiders of a firm is derived theoretically, leading to several empirical hypotheses.

In the first essay, we consider a theoretical model which is an extension of the Stulz model (1988). The key extension is that in the absence of a takeover threat, the firm value is not a constant but an increasing function of the level of managerial ownership.¹ Higher the stake of the managers in the firm, the more aligned are their interests with those of the shareholders at large. This managerial alignment effect (Jensen & Meckling, 1976) reduces agency costs and raises firm value. The model is analyzed to derive the relationship between managerial ownership and firm value.

The model shows that the relationship between managerial ownership and firm value follows qualitatively different patterns for different ranges of parameter values. While the pattern derived by Stulz is a special case, another one is similar to the pattern empirically observed by Morck, Shleifer & Vishny (1988). Our model is able to predict the empirical results of Morck, Shleifer & Vishny without taking recourse to the managerial entrenchment hypothesis put forth by them. We can rely on the managerial alignment hypothesis, which is based on much more theoretically sound agency cost arguments.

In the second essay, a theoretical model is developed incorporating the possibility of takeover and the managerial alignment effect (as insider ownership increases, agency cost due to conflict of interest between insiders and outside

¹ In this thesis, we use the terms managerial ownership and insider ownership interchangeably.

shareholders reduces). Not only do the outside shareholders decide whether to tender or not when a particular tender premium is offered, but insiders also decide whether or not to tender by balancing their value of control and wealth gains upon tendering. The value of control is not an exogenously given quantity but depends on the level of non-pecuniary benefits consumed by the managers and consequently varies with the level of insider ownership. Since managers may also tender, we are able to consider the case in which the firm has insider ownership of more than 50%. The outside shareholders are dispersed and their beliefs about the true share value have a uniform probability distribution. The optimal tender premium schedule for a rational bidder offering a two-tier takeover bid is derived.

Under very general parametric conditions, we derive the theoretical relationship between insider ownership and the value of the firm for the whole range of insider ownership. The theoretical relationship is non-linear. As insider ownership increases from zero to some value, the firm value steadily increases and thereafter, as insider ownership increases to 100%, the firm value falls. The general pattern derived from the model is consistent with the empirical observations of McConnell and Servaes (1990). The point of inflection i.e. the level of managerial ownership at which the firm value attains its peak, depends on the parameters of the model. In particular, one of the important parameters of the model is the extent of heterogeneity of belief about the true value of the firm among outside shareholders.

In the empirical analysis, a significant non-linear relationship is observed between firm value and insider ownership for a cross-section of 880 U.S. non-financial firms observed in 1992. The firm value increases as insider ownership increases from zero to about 45% and then falls as insider ownership increases beyond 45%. This is consistent with the predictions of the model. For a sub-sample of the large, well-analyzed firms, the firm value increases as insider ownership increases from zero to about 57% and then falls. For a sub-sample of the small, less analyzed firms, the firm value increases as insider ownership increases from zero to about 40% and then decreases. As we move from large firms to small firms, the point of inflection decreases (moves to the left) significantly. This observation is consistent with the predictions of the model.

The third essay deals with the relationship between ownership level of institutional investors and the value of the firm. This relationship is somewhat ambiguous in the literature (Pound,1988). Under the 'efficient monitoring hypothesis', institutional investors have greater expertise to monitor the managers than small investors and so there is reduction in agency cost of monitoring, leading to higher firm value. Under the 'conflict-of-interest' or 'strategic alignment' hypotheses, institutional investors and managers act in unison because of other profitable business relationships with the firm and there is a negative relationship between level of institutional ownership and the value of the firm. In

the model developed, we consider the effect of higher institutional ownership on firm value under each behavioral hypothesis.

The theoretical analysis shows that under efficient monitoring, higher institutional ownership increases firm value when insider ownership is low but the relationship is negative when insider ownership is high. The latter is in contrast with the commonly accepted notion that if institutional investors effectively monitor the managers, the firm value would increase with institutional ownership.

The theoretical model also implies that when institutional investors go along with the managers, higher institutional ownership increases firm value when insider ownership is low but has no effect on firm value when insider ownership is high. The implications are interesting because even though the institutional investors are not monitoring the managers but are aligning with them, there is no adverse effect on firm value. Instead the firm value increases in one range of insider ownership.

Most publicly held firms have low levels of managerial ownership. Thus the model predicts that in any cross-section of firms, the observed relationship between institutional ownership and firm value will be positive, irrespective of the behavioral assumption on the part of institutional investors. This prediction is in contrast with Pound (1988) and consistent with the empirical results of McConnell & Servaes (1990). However, the theoretical results presented here

show that an empirically observed positive relationship between institutional ownership and firm value cannot be taken as a confirmation of efficient monitoring.

The empirical analysis in the third essay shows a positive, significant relationship between institutional ownership and firm value for a set of firms contained in Stern-Stewart Performance 1000 database. In a sub-sample of firms with insider ownership of less than 45%, the relationship is positive and significant. However, for a sub-sample of firms with insider ownership greater than or equal to 45%, the relationship is negative but insignificant. This result shows that the level of insider ownership is an important determinant of how institutional ownership affects the value of the firm. This is consistent with our theoretical model which predicts that the relationship between institutional ownership and firm value depends not only on the behavioral assumption about institutional investors but also on the level of insider ownership.

In the fourth essay, we develop a model to analyze optimal insider trading for various levels of insider ownership when there exist potential contests for corporate control. The optimal premium schedule developed in the first part of the thesis forms the starting point of the analysis. Insiders with superior information about the prospects of the firm can earn excess profits from insider trading. At the same time, insider trading affects the ownership level of the

insiders which, in turn, affects the managers' ability to maintain corporate control. Although there are many studies on insider trading, most have focussed on market efficiency and none on the aspect of corporate control.

The theoretical model implies that insiders' optimal trading activity depends on the level of insider ownership. When their ownership is low, insiders do not always sell shares upon receipt of unfavorable information, but they always buy upon receipt of favorable information. This is because protecting the benefits of corporate control often outweighs the trading profits from sale of overvalued shares. However, when insiders own a large block of shares, they always sell (buy) upon receipt of unfavorable (favorable) information.

The analysis of the model yields four empirical hypotheses. First (H1): For firms with low insider ownership, the volume of purchase transactions by insiders is more than that of sales transactions. This asymmetry in insider trading between purchases and sales is consistent with reported empirical observations in the literature (Seyhun, 1988), considering that insiders of most publicly held firms own a small fraction of the shares.

Second, we also show the existence of a threshold such that insiders sell only when they perceive the stock to be substantially overvalued (i.e. above the threshold). This leads to the empirical hypothesis (H2): For firms with low insider ownership, the market's reaction (in terms of abnormal returns) to sales by

insiders is significantly greater, in magnitude, than its reaction to purchases by insiders. Third, as a complement to the second hypothesis, we derive the empirical hypothesis (H3): For firms with large insider ownership, there is no significant difference between the volumes of sales and purchases by insiders.

Fourth, stock sales by insiders are not all information driven. Insiders may sell due to liquidity needs or purposes of portfolio diversification. Incorporating this liquidity trade, which makes a sales transaction by insiders a noisy signal, we derive the empirical hypothesis (H4): Market's reaction to sales by insiders is significantly more negative for small firms than for large firms.

Chapter 2

MANAGERIAL ALIGNMENT, CORPORATE CONTROL AND FIRM PERFORMANCE

2.1 Introduction

Several studies have examined the relationship between managerial ownership and firm performance and therefore, firm value. Jensen and Meckling (1976) argue that larger managerial ownership aligns the interests of managers with those of outside shareholders, as managers suffer significant wealth loss if they do not seek to maximize value of firm. Thus the value of the firm increases as the managers' share of ownership increases. Leland and Pyle (1977) argue that managerial ownership conveys information to outside shareholders about managers' private valuation of the firm. Thus high level of share of ownership by management would be associated with high valuation of the firm by the market.

In contrast with this monotonic and positive relationship between managers' share of ownership and firm value, Morck, Shleifer and Vishny (1988) proposed the managerial entrenchment hypothesis. As the management's ownership increases from zero, managerial interest becomes allied more closely to outside shareholder interests; but when the managers' ownership is large enough to begin to give managers sufficient control over the firm, managerial

entrenchment begins to occur. Managers, secure in their controlling position, act in their own interests and not necessarily in the interest of the outside shareholders. The firm value falls as a consequence. As the managers' share of ownership becomes sufficiently large, the managers have too much at stake in the firm and would suffer substantial wealth loss if they acted in a manner other than value maximization. As a result, the firm value starts increasing beyond a point. The alignment/entrenchment sequence described above seeks to explain the empirical results of Morck, Shleifer and Vishny (1988).

Morck, Shleifer and Vishny (1988) study the relation between measures of firm performance and ownership stake of the board of directors, for a cross-section of firms. In their study, firm performance measures used are Tobin's Q and accounting profit rate (separately). The ownership stake is measured by the fraction of voting rights held by the board of directors. The authors show a strong significant relationship between insider ownership and Tobin's Q and a not so significant relationship between insider ownership and accounting profit rate. The relationship is non-monotonic. They found that as insider ownership increases from 0 to 5%, Tobin's Q rises; Q falls as ownership increases from 5% to 25% and again rises as managerial ownership increases beyond 25%.

The empirical evidence is only broadly consistent with the alignment/entrenchment hypothesis. But even under the entrenchment hypothesis, it is a

'puzzle' in the sense that ownership fraction of as low as 5% begins to give managers controlling powers compelling enough to cause firm value to fall, i.e. managers with ownership of as low as 5% start to feel secure enough to exhibit entrenchment behavior, and 'effective' managerial control of the firm occurs at about 25% managerial ownership, after which the firm value begins to rise.

The latter is not only surprising but also inconsistent with the main conclusion of Jarrell and Poulsen (1988). They examine the wealth effect on shareholders of dual-class recapitalization of firms, in which new stock with limited voting rights are exchanged for old (one share one vote) shares. They find that the largest wealth losses occur for those firms with insider ownership in the 30-55% range. However, if the managers of these firms already had effective control at 25%, there should not have been any negative effect on value from the additional concentration of voting rights in the hands of the managers.

Harris and Raviv (1988) and Stulz (1988) have developed theoretical models linking managerial ownership, amongst other financial characteristics of the firm, with takeover bids. The possibility of takeover bids has an effect on managers' performance and hence on the firm value. Israel (1992) develops a model for the optimal ownership structure, resulting from anticipated future takeover contests. As a result, the market for corporate control has a direct impact on the relationship between managerial ownership and firm value.

Stulz (1988) examines how managerial ownership affects firm value by influencing its attractiveness as a takeover target. In Stulz model, firm value initially rises as managerial control of voting rights increases and then falls. This theoretical result explains the empirical observations of Morck, Shleifer and Vishny (1988) only partially. As the fraction of voting rights controlled by managers increases from zero, firm value first increases and then falls. But the empirical observation that after falling, the firm value starts increasing once again, remains unexplained. Stulz predicts that, after reaching a peak, the firm value decreases continuously as managerial control of voting rights increases up to 50%.

Our model preserves part of Stulz's prediction that as the fraction of managers' ownership increases from zero, firm value first increases, reaches a local maximum and then starts falling. However, we find that unlike Stulz's model, firm value does not go on falling continuously but instead reaches a minimum and then starts rising well before managerial ownership attains 50%, under some suitably chosen parameter values. Thus, it is possible to explain the empirically observed pattern of the firm value as a function of managerial ownership, without recourse to the entrenchment behavior.

2.2 The Model

Consider an all equity firm with fraction α of shares owned by management and the remaining fraction $(1-\alpha)$ owned by large number of individuals as outside shareholders². Another firm (the bidder) acquires information about this firm (the target) and debates whether or not to make a bid. It is assumed that if the bidder's first attempt to acquire control of the target is not successful, then the potential synergy disappears³.

The takeover bid is the simplest 2-tier bid: the bidder offers to buy exactly half the shares at a total price of $0.5y + p$ and the rest at $0.5y$, where y is the value of the firm at $t - 1$ and p is the total premium offered by the bidder for half the outstanding shares. If the bidder is successful, it either purchases the remaining half shares at $0.5y$ or the value of the remaining shares continue to be $0.5y$. This amounts to a dilution of rights of the non-tendering shareholders in the

² Since in this analysis we will not be concerned with various types of contractual arrangements that bring about an increase in share of voting rights controlled by the managers, α can equivalently be looked upon as the fraction of shares controlled by the managers.

³ This assumption is made in order to focus on the main objective of this paper. It allows us to abstract from issues of free rider problem and economic game theoretic formulations that arise from possibility of future bids.

sense of Grossman and Hart (1980). The control of the target is guaranteed by possession of a simple majority of the shares⁴.

Let $s(p)$ be the proportion of outside shareholders tendering, once a bid with premium p is made. $s(p)$ is assumed to be independent of α . This implies that a firm does not attract different types (e.g., in terms of tax characteristics) of shareholders for different values of α . The bidder does not know what $s(p)$ is before the bid is made. We assume, however, that $s(p)$ is known to be uniformly distributed between $u(p) = u + p/b$ and $d(p) = d + p/b$, for all $p < p^0$. Here $b > 0$, $u > d > 0$, and it is assumed that $u > 0.5$. We also assume that the bidder never finds it profitable to offer a premium higher than p^0 . Further, the managers of the target firm are assumed to value control per se sufficiently so that the premium is too small for them to tender their shares. The expected supply curve of shares tendered is thus a linear function of premium p , with a slope of $1/b$.

Before the time of the bid, the value of the firm if there is no takeover bid is given by y , which is known to all. However, y depends on the share of managerial ownership α . Consistent with the managerial alignment hypothesis, we assume $y(\alpha)$ to be an increasing function of α , with a slope represented by

⁴Gaining control by proxy, examined by Harris and Raviv (1988), is ignored here.

$y'(\alpha) > 0$. At the time of the bid, both α and $y(\alpha)$ are known. Let Ev represent the expected value of v , the value the bidder can attain by gaining control.

Out of the total shareholders of the target firm, $(1-\alpha)$ proportion are outsiders. When a premium p is offered, a fraction $(1-\alpha) \cdot s(p)$ of the total shareholders tender. For a takeover bid with a premium p to succeed, $(1-\alpha) \cdot s(p)$ must exceed 0.5, or $s(p)$ must exceed $0.5 / (1-\alpha)$. Since $s(p)$ is distributed uniformly between $d(p)$ and $u(p)$, this probability of success is given by

$$N(p, \alpha) = [u(p) - 0.5/(1-\alpha)] / [u(p) - d(p)] \quad (2.1)$$

We assume that the managers of the bidding firm act in a way to maximize the expected value of the bid⁵. Thus the bidder chooses p to maximize

$$Z = [Ev - y(\alpha) - p] \cdot N(p, \alpha) \quad (2.2)$$

In Appendix 2.1, we solve this optimization problem and show that as managerial ownership (a parameter in the maximization problem) increases,

i.) the expected value of the bid to the bidder falls, and ii.) the probability of successful bid reduces.

⁵With this assumption, we ignore any agency problems between managers and owners of the bidding firm.

2.3 The Firm Value and α

The value of the firm at $t = 0$ is defined as the present value of the cash flows, discounted at a given rate R , which accrue to shareholders. This will be dependent on the managerial ownership α . Let it be represented as $V(\alpha)$. We ignore taxes in this analysis, so that $V(\alpha)$ corresponds to the value of the firm from the perspective of an investor who pays no taxes. The value of the firm is given by

$$V(\alpha) = (1+R)^{-1} [y(\alpha) + p(Ev-y(\alpha), \alpha) \bullet N(p(Ev-y(\alpha), \alpha))] \quad (2.3)$$

This holds for $0 \leq \alpha < 0.5$. For $\alpha \geq 0.5$, there is no threat or possibility of takeover, $V(\alpha)$ is determined solely by the function $y(\alpha)$. Taking derivative of $V(\alpha)$ with respect to α and following the steps in Appendix 1.1, and denoting $1/(u-d)$ as k , we get

$$\begin{aligned} (1+R)dV/d\alpha = & (k \bullet b/4) (1-\alpha)^{-2} [u(p) - 0.5/(1-\alpha)] \\ & + y'(\alpha) \bullet [1 - 0.5 (k/b) \bullet (Ev - y(\alpha))] \end{aligned} \quad (2.4)$$

The first term in (2.4) is positive for $0 \leq \alpha \leq \alpha_1$ where $\alpha_1 = 1 - (1/2u)$ and is negative for $\alpha_1 \leq \alpha \leq 0.5$. If y were independent of α , the second term would vanish and $V(\alpha)$ would first increase as α increases from 0 to α_1 and then

decreases as α increases further from α_1 to 0.5 and then remains at that minimum.

Our assumption $y'(\alpha) > 0$ implies that $y(\alpha)$ increases monotonically from $y(0)$ to $y(0.5)$ as α increases from 0 to 0.5. We further assume that synergy is sufficiently large, so that $E_v > y(0.5)$. For moderate values of b , when α is small $E_v - y(\alpha)$ will be large and the second term is expected to be negative. As α increases, the quantity $E_v - y(\alpha)$ decreases and so the second term is expected to change sign and become positive. Beyond $\alpha = 0.5$, there is no possibility of a takeover and $V(\alpha)$ follows the $y(\alpha)$ process which is increasing in α . In general, the left and right derivatives of $V(\alpha)$ will not equal at $\alpha = 0.5$.

When b is small, which corresponds to considerable homogeneity amongst shareholders, the second term is likely to be negative throughout and dominate, in magnitude, the first term. In this situation $dV/d\alpha$ is negative in the whole range $0 \leq \alpha \leq 0.5$ and falling in magnitude. As a consequence, firm value $V(\alpha)$ falls between $\alpha = 0$ and $\alpha = 0.5$. After that, the firm value follows $y(\alpha)$ process, which is increasing in α . Figure 2.1 depicts this situation.

When b is large, which corresponds to a lot of heterogeneity amongst shareholders about tendering of shares, the second term will be dominated by the first. The term $dV/d\alpha$ follows a pattern of first being positive and then negative.

The firm value first rises in the range $0 \leq \alpha \leq \alpha_1$, where $\alpha_1 = 1 - (1/2u)$ and then falls up to $\alpha = 0.5$. Beyond $\alpha = 0.5$, the firm value rises again as $y'(\alpha)$ is positive. This situation is depicted in Figure 2.2.

For moderate values of b , the general pattern followed by the firm value $V(\alpha)$ is shown in Figure 2.3. It first increases as α increases from zero to some value $\alpha_0 < \alpha_1$, then starts decreasing as α increases up to some value $\alpha_2 < 0.5$. Beyond α_2 , $V(\alpha)$ starts increasing again as α increases to 0.5. Beyond the point $\alpha = 0.5$, $V(\alpha)$ follows the pattern set by $y(\alpha)$ and depicted in Figure 2.3.

The exact turning points depend on the values of the parameters, including the parameters of the $y(\alpha)$ function. In Appendix 2.2, we present a numerical example, where the pattern of $V(\alpha)$ is exactly the same as in Figure 2.3 with $\alpha_0 = 6\%$ and $\alpha_2 = 27.5\%$. The parameter values have been chosen not only to reduce computation but also to generate a pattern very similar to the empirical results of Morck, Shleifer and Vishny (1988). Thus it is possible to explain the empirical observations by a model combining alignment hypothesis and possibility of takeover, without recourse to the entrenchment behavior.

When $y'(\alpha)$ is very large, the second term dominates the first, in magnitude. The second term is expected to be negative for small values of α and

slowly become positive as α increases. Consequently, the value of the firm first decreases and then increases in the range $0 \leq \alpha \leq 0.5$ and continues to increase as α increases beyond 0.5. However large $y'(\alpha)$ may be, it is not true that the value of the firm increases monotonically, as claimed by Stulz (1988) in his conclusion.

The parameter k is defined as $1 / (u - d)$. It is inversely related to the dispersion of the uniform distribution of $s(p)$. Since $s(p)$ itself is a probability, $k > 1$. We assume that the uniform distribution has enough variance so as not to make k very large.

It is evident that the parameter b plays a crucial role in determining the pattern of relationship between value of firm $V(\alpha)$ and managerial ownership α . This b is a measure of the extent of heterogeneity among outside shareholders in the matter of tendering of shares for any given premium. When opportunity cost of tendering is the same for all outside shareholders i.e. there is perfect homogeneity, then for any p , a randomly picked shareholder will either tender ($s(p)=1$) if p exceeds a given value or not tender ($s(p)=0$) if p is less than that value. Therefore the slope of the expected supply curve, $1/b$, tends to infinity. If the firm has heterogeneous outside shareholders, b will be a finite positive quantity.

Stulz (1988) argues that differences in tax liability among tendering shareholders can be the cause for heterogeneity about tendering. Heterogeneity among shareholders can also come about from asymmetry of information among outside shareholders. This asymmetry of information could be about assets in place and more so about intangible assets and future growth opportunities. While it is difficult to categorize firms according to the extent of heterogeneity about tax liability among a large number of outside shareholders, it may be possible to categorize firms according to asymmetry of information among the shareholders. Well-known firms in mature industries are likely to have shareholders with fairly homogeneous information, as such firms are extensively analyzed and information published. Relatively unknown firms in their growth stage are likely to have shareholders with differing levels of information.

The results of the model presented here show that when firms are categorized according to heterogeneity among outside shareholders, the relationship between managerial ownership and firm value is likely to be different for different categories. This suggests that if there is enough variation in managerial ownership levels in each category, the empirical analysis should be done for subsample categories rather than for a cross-section of all the firms as a whole. Tobin's Q may not be available for sufficient number of firms in the category of high heterogeneity among shareholders and so another measure of

performance may have to be used as a proxy. The measure of market value added (MVA) of Stern-Stewart may be a possible proxy.

2.4 Conclusion

In this chapter, we have analyzed a model incorporating the managerial alignment hypothesis and the possibility of a takeover bid, to derive theoretical results which correctly predict the empirically observed pattern of relationship between insider ownership and the value of the firm. As managerial ownership α increases, the firm value first increases, then falls and then continues to rise beyond $\alpha = 0.5$, which is exactly the pattern observed by various authors. We do not have to rely on the hypothesis of entrenchment behavior (which cannot satisfactorily explain other empirical observations) to explain the empirical relationship between firm value and insider ownership. However, we can continue to rely on the alignment hypothesis, which is based on a more sound theoretical footing. We obtain theoretical results as to how the pattern of relationship between firm value and managerial ownership changes for different ranges of parameter values. The empirical implication of this is that if firms are categorized according to heterogeneity of belief about the firm's true value among outside shareholders, then the relationship should be studied for each category separately rather than over the whole cross-section of firms. Even when the incentive effects

of alignment of interest between managers and outside shareholders are very strong, the firm value will in general exhibit a non-monotonic behavior.

Relationship between Insider Ownership and Firm Value
when outside shareholders are Homogeneous (b small)

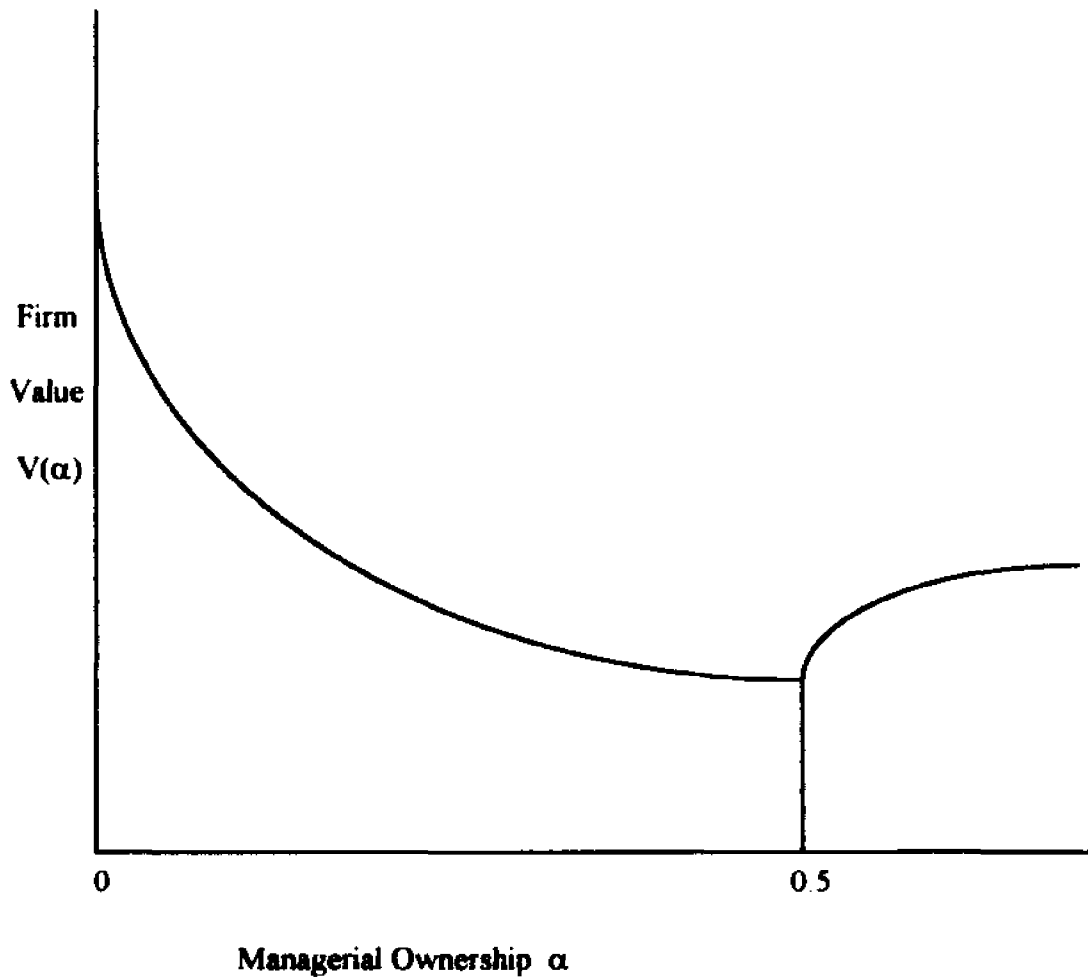


Figure 2.1

Relationship between Insider Ownership and Firm Value
when outside shareholders are highly Heterogeneous (b large)

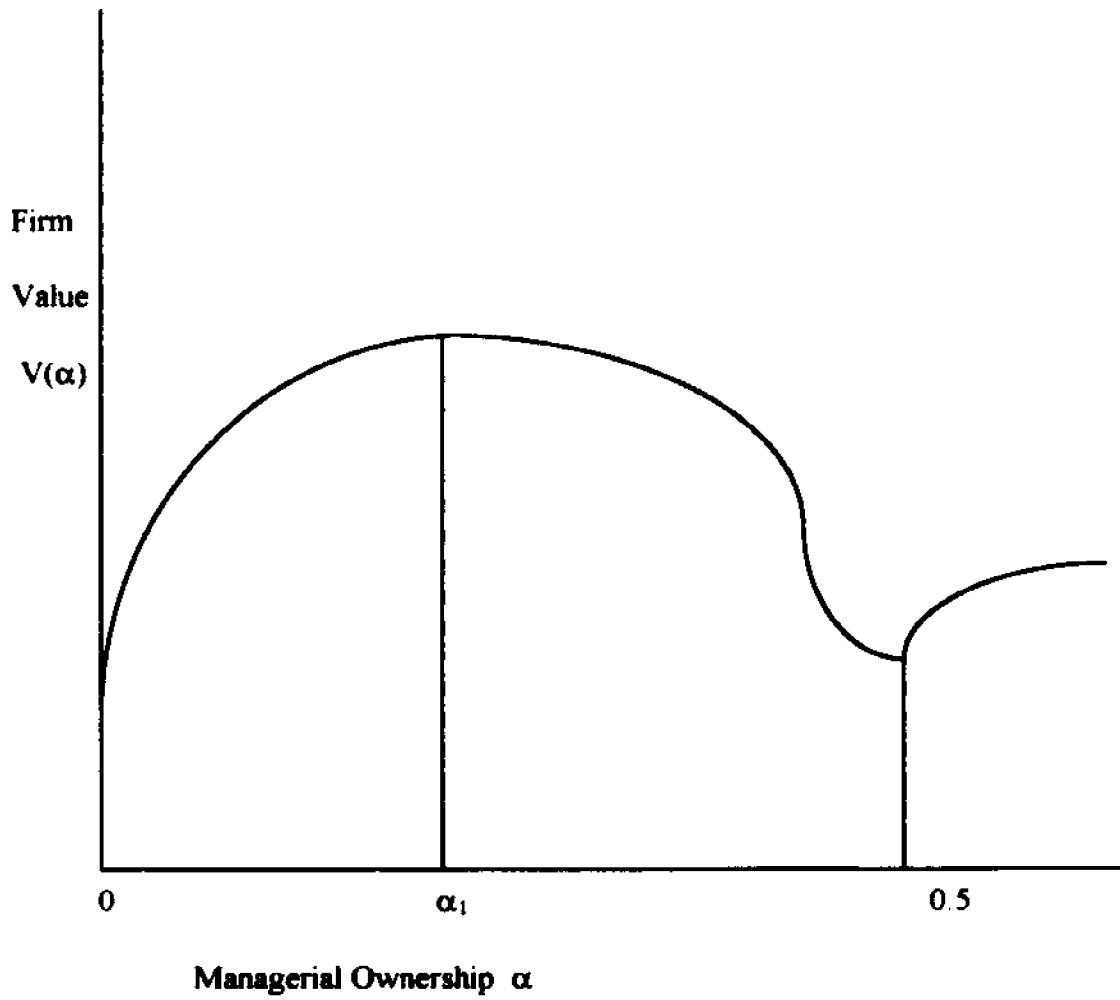


Figure 2.2

Relationship between Insider Ownership and Firm Value

when outside shareholders are moderately Heterogeneous (b moderate)

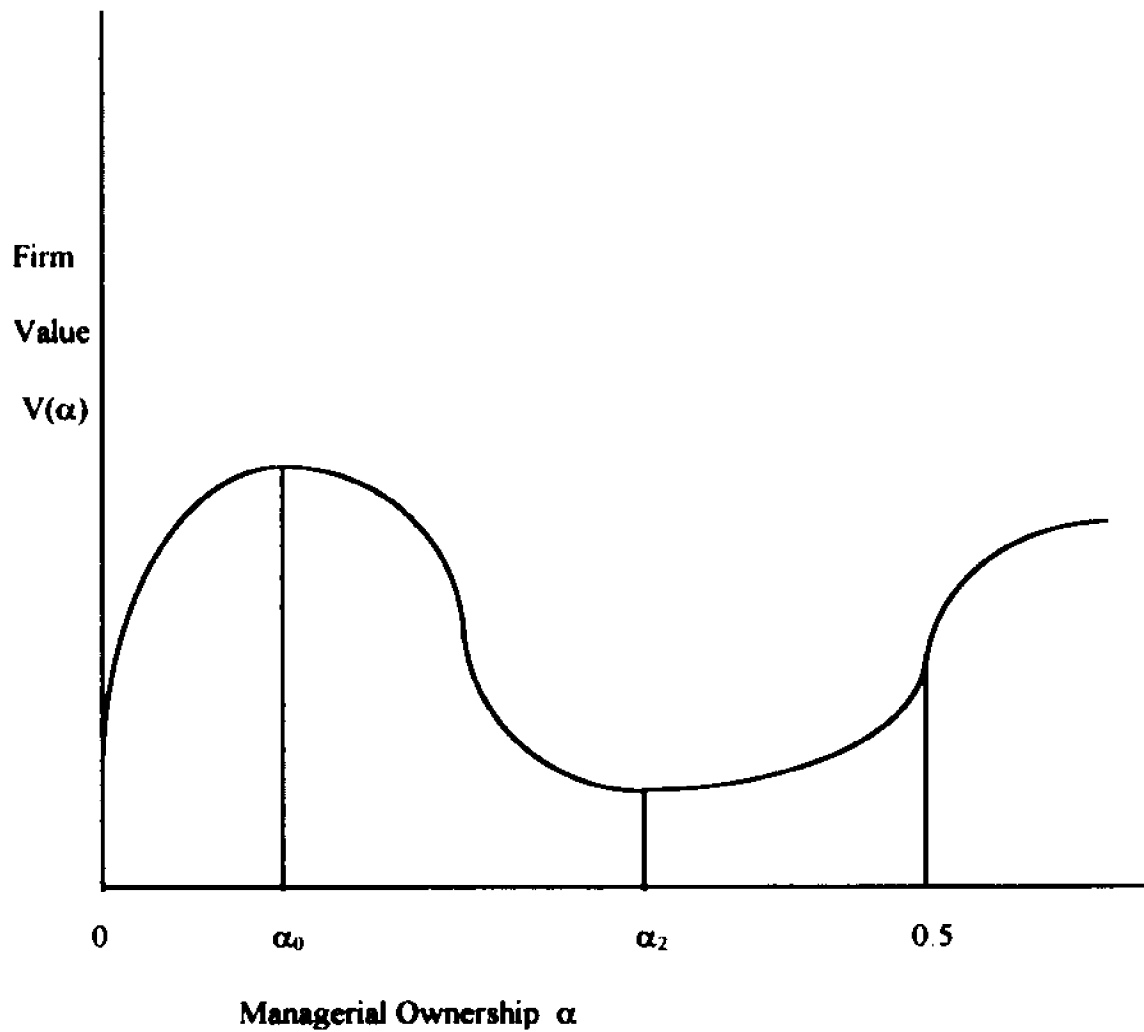


Figure 2.3

Appendix 2.1

$$N(p, \alpha) = [(u + p/b) - 0.5 / (1 - \alpha)] / [(u + p/b) - (d + p/b)]$$

$$= k \cdot [(u + p/b) - 0.5 / (1 - \alpha)] \quad \text{where } k = 1 / (u - d)$$

$$N_p = k/b > 0, \quad N_\alpha = -0.5 k (1 - \alpha)^{-2} < 0, \quad N_{pp} = N_{\alpha\alpha} = N_{p\alpha} = 0$$

Bidder maximizes $Z = (Ev - y - p) \bullet N$ by choosing p .

$$\text{First order condition: } Z_p = (Ev - y - p) \bullet N_p - N = 0$$

Second order condition: $Z_{pp} = -2 N_p < 0$, ensuring a maximum.

$$Z_\alpha = (Ev - y - p) \bullet N_\alpha - y_\alpha \bullet N < 0, \text{ as long as } y' > 0.$$

Thus as managerial ownership increases, the expected value of the bid to the bidder decreases.

By Envelop theorem, $p_\alpha = - (N - y \bullet N) / (-2 N_p)$

$$dN/d\alpha = N_\alpha + N_p \bullet p_\alpha = 0.5 \bullet N - 0.5 \bullet N_p \bullet y' < 0.$$

Thus as insider ownership α increases, probability of successful bid decreases.

By substituting the values of p_α , $N_\alpha + p \bullet N_p$ and N already obtained.

$$d(p \bullet N)/d\alpha = p \bullet N + p \bullet N_p \bullet p + p \bullet N$$

$$= 0.5 N \bullet (Ev - y - 2p) - 0.5 k \bullet b \bullet (Ev - y) \bullet y'$$

$$= (k \bullet b / 4) (1 - \alpha)^{-2} [u - 0.5 / (1 - \alpha)] - 0.5 k b (E v - y) y'$$

$$dV/d\alpha = (1 + R)^{-1} [y'(\alpha) + d(p \bullet N)/d\alpha]$$

By substituting the value of $d(p \bullet N)/d\alpha$ already obtained,

$$(1 + R) (dV/d\alpha) = (k \bullet b / 4) (1 - \alpha)^{-2} [u - 0.5 / (1 - \alpha)] \\ + y'(\alpha) [1 - 0.5 (k/b) \bullet (E v - y)]$$

Appendix 2.2

Parameter values : $b = 2.0$ $u = 0.55$ $d = 0.05$ $R = 0$

Then $(k/b) = 1$ and $(k \bullet b/4) = 1$

Substituting these values in the expression for $dV/d\alpha$ in Appendix 2.1,

$$\begin{aligned} dV/d\alpha &= (1-\alpha)^{-2} [0.55 - 0.5/(1-\alpha)] + y'(\alpha) \bullet [1 - 0.5(E(v) - y)] \\ &= T_1 + T_2 \end{aligned}$$

y (α) function : $y = (1-\alpha) \bullet L^{\gamma} + M \bullet (1-\alpha)$ with $L = 2$, $M = 1.9$

and $\gamma = 1.1$

Let $E(v) = 6.0$. Substituting the values and following a few iterations, it is straightforward to show that :

At $\alpha = 0$, $dV/d\alpha = + 0.0350$

At $\alpha = 0.0909$, $T_1 = 0$ and $T_2 = - 0.0205$ and so $dV/d\alpha = - 0.0205$

At $\alpha = 0.145$, $T_1 = 0$ and $T_2 = - 0.0476$ and so $dV/d\alpha = - 0.0476$

At $\alpha = 0.5$, $dV/d\alpha = + 2.8570$

and $dV/d\alpha = 0$ at $\alpha_0 = 0.060$ and $\alpha_2 = 0.275$

These values imply that V , as a function of α , has a local maximum at $\alpha_0 = 6\%$ and a local minimum at $\alpha_2 = 27.5\%$. The value of the firm $V(\alpha)$ increases as α increases from zero to 6% , then decreases as α increases from 6% to 27.5% and then starts increasing again as α increases from 27.5% to 50% . Beyond $\alpha = 50\%$, there is no possibility of takeover in this model and the firm

value follows the $y(\alpha)$ function, which is increasing. Thus we observe that the pattern is very similar to the empirical observations of Morck , Shleifer and Vishny.

Chapter 3

MANAGERIAL OWNERSHIP AND THE VALUE OF THE FIRM : THEORETICAL MODEL AND EMPIRICAL ANALYSIS

3.1. Introduction

In a corporation where the outside shareholders are widely dispersed and managers hold small portions of equity, the managers may not act in a manner which maximizes value. Jensen and Meckling (1976) formalize the conflict of interest between managers and outside shareholders and show that the allocation of shares between insiders and outsiders does influence firm value. They argue that larger managerial ownership aligns the interests of managers with those of outside shareholders, reducing agency costs and thus increasing firm value. On the other hand, the disciplinary effects of the managerial labor market (Fama(1980)) or the market for corporate control (Jensen and Ruback(1983)) can lead managers with low equity stakes towards value maximization. Morck, Shleifer and Vishny(1988) put forward the hypothesis of managerial entrenchment which suggests that the relation between insider ownership and firm value is non-monotonic. Stultz(1988) develops a theoretical model which predicts that as managerial ownership increases, the firm value first increases and then decreases to attain a minimum at 50% insider ownership. Morck et al (1988) provide

empirical evidence of a non-monotonic relation between firm performance/value and managerial ownership, where the firm value first increases then decreases and finally increases again as insider ownership increases. McConnell and Servaes (1990) also demonstrate a non-monotonic relation in which the firm value first increases and then decreases continuously. The point of inflection, i.e. the level of managerial ownership at which the firm value attains its maximum varies from regression to regression but averages around 50%.

In this chapter we consider a general theoretical model integrating the managerial alignment effect (agency cost due to conflict of interest between insiders and outsiders reduces as insider ownership increases) and the possibility of takeover. Not only do the outside shareholders debate whether to tender or not when a particular tender premium is offered, the insiders also decide whether or not to tender by balancing their value of control and wealth gains upon tendering. The value of control is not given exogenously but depends on the level of non-pecuniary benefits consumed by the managers, and consequently varies with the level of managerial ownership. Since managers also can tender, we are able to consider the case in which the firm has insider ownership of more than 50%. In a simple framework and under general parametric conditions, we derive a theoretical relationship between insider ownership and the value of the firm for the whole range of insider ownership. The firm value first increases up to a point at which insider ownership is less than 50%, and then decreases all the way up to

100% insider ownership. The point of inflection i.e the level of managerial ownership at which the firm value attains its maximum, depends on a few parameters of the model. In particular, heterogeneity of belief about the true value of the firm among outside shareholders is the most important parameter. The general pattern of the relationship between firm value and managerial ownership derived from the model is consistent with the empirical findings of McConnell and Servaes (1990).

In the empirical analysis we obtain a significant non-linear relationship between firm value and managerial ownership over a cross-section of 880 U.S. firms in 1992. The firm value increases as managerial ownership increases from zero to about 45% and then falls as managerial ownership increases beyond 45%. This is consistent with the predictions of the model analyzed here. For the subsample of the largest (according to 1991 capital) 350 firms, the firm value increases as insider ownership increases from zero to about 57% and then falls. For a subsample of the smallest 350 firms, the firm value increases as insider ownership increases from zero to about 39% and then falls. The direction of movement of the point of inflection as we sub-sample is also consistent with the predictions of the model.

This chapter proceeds as follows. In Section 2.2, we discuss the related theoretical and empirical work. Section 2.3 presents the model and Section 2.4

derives the relationship between firm value and insider ownership. Section 2.5 introduces a broader utility-based concept of value of control to managers. Section 2.6 describes the data and empirical results. Section 2.7 concludes the chapter.

3.2. Managerial ownership and firm value

When managers have none or very little ownership stake in a firm and the outside shareholders are numerous, there exists potential conflict of interest between the two (Berle and Means(1932)). Jensen and Meckling(1976) develop a formal model of agency cost due to conflict of interest between insiders and outside shareholders. Controlling managers maximize their utility, defined over wealth from their ownership share of the firm and non-pecuniary benefits (e.g. perquisite consumption). The managers' optimal decision deviates from value maximizing behavior due to the conflict of interest. Higher the ownership level of insiders, the significant wealth losses that managers would suffer if they did not seek to maximize firm value, leads to more and more alignment of interests of insiders and outside shareholders. This managerial alignment effect indicates a monotonic relation between firm value and managerial ownership. Leland and Pyle (1977) argue that managerial ownership conveys information to outside shareholders about managers' private valuation of the firm. Thus a high level of

share of ownership by management would be associated with higher valuation of the firm by the market.

In contrast with this monotonic and positive relationship between managers' share of ownership and firm value, Morck, Shleifer and Vishny (1988) put forward the hypothesis of managerial entrenchment. Dann and DeAngelo (1988) also conclude that managers' defensive reactions to hostile takeovers are best explained by their desires to entrench themselves in the corporation. As the management's ownership increases from zero, managerial interest becomes allied closer with outside shareholder interests; but when the managers' ownership is large enough that it gives managers sufficient control over the firm, managerial entrenchment begins to occur. Managers, secure in their controlling position, act in their own interest and not necessarily in the interest of the outside shareholders. The firm value falls as a consequence. As the managers' share of ownership becomes sufficiently large, the managers have too much at stake in the firm and would suffer substantial wealth loss if they acted in a manner other than value maximization. Thus the firm value starts increasing beyond a point.

On the other hand, Demsetz(1983) argues that the ownership structure of a firm emerges endogenously as an equilibrium organization of the firm. Accordingly, there should be no relationship between insider ownership and profitability or firm performance.

Morck, Shleifer and Vishny (1988) study the relation between Tobin's Q as a measure of firm performance and ownership stake of the board of directors, for a cross-section of firms. The authors show a significant relationship between insider ownership and Tobin's Q. The relationship is non-monotonic. As insider ownership increases from 0 to 5%, Tobin's Q rises; Q falls as ownership increases from 5% to 25% and then rises again as managerial ownership increases beyond 25%.

McConnell and Servaes (1990) study the empirical relationship between firm value and insider ownership over two cross-sections of 1173 firms in 1976 and 1093 firms in 1986 and also find a non-monotonic pattern. They regress Tobin's Q on a quadratic function of insider ownership and other explanatory variables. The firm value initially goes up and then continues to fall. The point of inflection, that is, the percentage insider ownership at which firm value attains its maximum, depends on the regression, but is generally a little less than 50%. Even for a sub-sample of large firms, McConnell & Servaes are unable to observe the piece-wise linear pattern observed by Morck, Shleifer & Vishny. The result that firm value continues to fall as equity ownership becomes more and more concentrated in the hands of the insiders is somewhat surprising. First, the interests of inside and outside equityholders are getting more and more aligned, causing agency cost of outside equity to fall and yet firm value decreases.

Second, the entrenchment effect, if at all it exists, should be overwhelmed by the wealth effects for managers as they own a very large fraction of the equity.

Harris and Raviv (1988) and Stulz (1988) have developed theoretical models linking managerial ownership, amongst other financial characteristics of the firm, with takeover bids. The possibility of takeover bids has an effect on managers' performance and hence on the firm value. Israel (1992) develops a model for the optimal ownership structure, as well as optimal capital structure, resulting from anticipated future takeover contests. Thus the market for corporate control has a direct impact on the relationship between managerial ownership and firm value.

Stulz (1988) examines how managerial ownership affects firm value by influencing its attractiveness as a takeover target. In Stulz model, the higher the fraction of votes held by the management, the higher the premium a rational bidder must offer to take over the firm, but lower the probability that a hostile bid will succeed. As a consequence of these two effects, firm value initially rises as managerial control of voting rights increases and then falls. Stulz predicts that, after the peak, the firm value decreases continuously as managerial control of voting rights increases up to 50%, where it attains a minimum and remains so.

In our model, the takeover bid and heterogeneity about tendering among outside shareholders are similar to Stulz(1988). However, we incorporate the

agency cost due to conflict of interest between insiders and outsiders established by Jensen and Meckling(1976). Further, not only do the outside shareholders decide whether to tender or not when a particular tender premium is offered, but also the insiders decide whether or not to tender by balancing their value of control and wealth gains upon tendering. The value of control is not given exogenously but depends on the level of non-pecuniary benefits consumed by the managers and consequently varies with the level of managerial ownership.

The relationship between ownership level of institutional investors and the value of the firm is somewhat ambiguous Pound(1988) proposes three hypotheses relating to the behavior of institutional investors. According to the 'efficient-monitoring' hypothesis, institutional investors have greater expertise in monitoring insiders than small individual investors and hence there is a reduction in agency cost, leading to a higher firm value. According to the 'conflict-of-interest' hypothesis, institutional investors are coerced into voting with management because of other profitable business relationships with the firm. And according to the 'strategic-alignment' hypothesis, institutional investors and managers find it mutually advantageous to cooperate. In both these scenarios, there is a negative relationship between institutional ownership and firm value. On the other hand, Shleifer and Vishny (1986) develop a model in which higher level of ownership by institutional as well as block investors leads to more investment in information about the firm and thus more effective monitoring via the potential

the potential takeover threat posed by them. As a result, institutional ownership is predicted to have a positive effect on firm value, irrespective of insider ownership level.

3.3. The Model

Let us consider an all equity firm with fraction α owned by management and the remaining fraction $(1-\alpha)$ owned by a large number of individuals as outside shareholders. Suppose some firm (the bidder) acquires information about this firm (the target), describing the expected value (by virtue of synergy) it can achieve by gaining control of the target.⁶ Given this information the bidder decides whether or not to make a bid. It is assumed that if the bidder's first attempt to acquire control of the target is not successful, then the potential synergy disappears.⁷ We represent the point in time when the bidder decides to acquire information as $t=0$ and the time when the bidder makes the bid as $t=1$.

⁶The Synergy that can be captured by merger not only arises from the inefficiency of status quo managers who are prone to excessive perk consumption and do not maximize value but also from technological integration and tax shields etc. Thus the synergy could be much higher than the reduction in value due to existing agency costs.

⁷This assumption is made in order to focus on the main objective of this paper. It allows us to abstract from issues of the free rider problem and the economic game theoretic formulations that arise from the possibility of future bids.

The takeover bid is a simple two-tier bid: the bidder offers to buy exactly half the shares at a total price of $0.5y + p$ and the other half at $0.5y$, where y is the value of the firm at $t=1$ and p is the total premium offered by the bidder for half the outstanding shares. This amounts to a dilution of rights of the non-tendering shareholders (Grossman and Hart(1980)). The control of the target is guaranteed by possession of a simple majority (50 percent) of the shares.⁸ We assume that there is no conflict of interest between managers and owners of the bidding firm.

The value of the firm (at $t=1$) in the absence of a takeover bid is given by y , which is known to all. However, y depends on the share of managerial ownership α . Consistent with the managerial alignment hypothesis, we assume $y(\alpha)$ to be an increasing function of α , with $y'(\alpha) > 0$ and $y''(\alpha) < 0$. Let M be the maximum value that the status-quo managers can attain if they have value maximizing behavior. Then $G(\alpha) = M - y(\alpha)$ is the Agency cost of outside equity due to managers deviating from value maximizing behavior. Following Jensen & Meckling (1976), this has a one-to-one correspondence with the level of consumption of non-pecuniary benefits, $F(\alpha)$. Managers value control because it enables them to consume non-pecuniary benefits $F(\alpha)$. Therefore, we can also interpret $G(\alpha)$ as a measure of the value of control to the incumbent managers.

⁸ Gaining control by proxy, examined by Harris and Raviv (1988), is ignored here.

As managerial ownership α increases, $F(\alpha)$ decreases and the manager also pays for a greater fraction of the non-pecuniary benefits consumed. The value of control goes down with increase in managerial ownership

Since the outside shareholders are dispersed, they cannot collude and force the bidder to raise the premium. Instead, given the nature of the bid, they compete amongst one another for receiving the premium offered.⁹ An individual shareholder has no incentive not to tender if his/her share of the premium exceeds his/her perception of the true value of the share. Shareholders, however, differ in their beliefs about the true value of the firm.¹⁰ Shareholders' beliefs are assumed to be uniformly distributed between $y(\alpha)$ and $y(\alpha) + b$, where $b > 0$ is assumed to be independent of α and known to all. We also assume that there is at least one outside shareholder who values the firm more than the insiders do when $\alpha=0.5$.¹¹ Let $s(p)$ be the proportion of outside shareholders that will tender, once a bid with premium p is made. Then $s(p) = p / b$ for $p < b$ and $s(p) = 1$ for $p \geq b$. The supply curve of shares tendered is, thus, an upward sloping linear function

⁹ This competition is considered in some details in Grossman and Hart (1980) and DeAngelo and Rice (1983).

¹⁰ Stulz (1988) gives an example where differing opportunity cost of tendering can arise because of differences in tax liability. An alternate reason for heterogeneity about tendering can come from asymmetry of information among outside shareholders.

¹¹ This reasonable assumption is necessary to ensure continuity (not differentiability) of the optimal premium function as managerial ownership changes.

of premium p with slope $1/b$. The fraction of total shares tendered by outsiders is $(1-\alpha)s(p)$.

Let $p^*(\alpha)$ be the premium needed to induce the insiders to tender. The insiders balance their value of control from not tendering and wealth gains from tendering, when a premium is offered. Since the bidder has to offer the bid with premium p^* without discrimination between inside and outside shareholders, ex-ante, wealth gain to insiders is αp^* and loss from losing control is $G(\alpha)$. Therefore,

$$p^*(\alpha) = G(\alpha)/\alpha = [M - y(\alpha)]/\alpha \quad (3.1)$$

Since $y'(\alpha) > 0$, the numerator decreases as α increases while the denominator increases. Thus $p^*(\alpha)$ is a decreasing function of α and tends to infinity as α tends to zero, while $p^*(1)$ is zero.

Given a value of α less than 0.5, when the bidder offers a premium p less than $G(\alpha)/\alpha$, a fraction $s(p)$ of outsiders tender and insiders do not. The proportion of all shares tendered is $(1-\alpha)s(p)$. In order for the bid to succeed, the tender premium p offered must be such that $(1-\alpha)s(p) \geq 0.5$. As $s(p) = p/b$, the bid will succeed if $p > 0.5b/(1-\alpha)$ and fail if $p < 0.5b/(1-\alpha)$. Note that these are relevant when we are in the region $p < G(\alpha)/\alpha$. The minimum premium required for the bid to be successful is given by

$$p_0(\alpha) = 0.5b / (1-\alpha) \quad (3.2)$$

Note that $p'_0(\alpha) = 0.5b \cdot (1-\alpha)^{-2} > 0$ i.e. $p_0(\alpha)$ is increasing in α . Also, $p_0(0) = 0.5b < \infty$ and $p_0(\alpha)$ tends to infinity as α approaches unity.

Since we have shown that $p^*(\alpha)$ is a decreasing function of α and $p_0(\alpha)$ is an increasing function of α and $p_0(0) < p^*(0)$ while $p_0(1) > p^*(1)$, there exists an α , say α^* , at which $p_0(\alpha)$ equals $p^*(\alpha)$. α^* is thus defined by

$$0.5b / (1-\alpha^*) = G(\alpha^*) / \alpha^* = [M - y(\alpha^*)] / \alpha^* \quad (3.3)$$

As there is at least one outside shareholder who values the firm more than the value to the insiders when $\alpha = 0.5$, it is not possible to obtain 50% of shares from outsiders alone (i.e. get all outsiders to tender) by offering a premium of $p^*(0.5)$. This ensures that $p_0(0.5)$ must be above $p^*(0.5)$, which implies that $\alpha^* < 0.5$. Figure 3.1 depicts the tender premium functions $p_0(\alpha)$ and $p^*(\alpha)$ and the point of intersection α^* .

At insider ownership less than or equal to α^* , the premium $p_0(\alpha)$ needed to obtain half the outstanding shares from outsiders alone is less than the reservation premium $p^*(\alpha)$ of the insiders. It does not pay to induce the insiders to tender. For $0 \leq \alpha \leq \alpha^*$, the optimal premium for the bidder is $p_0(\alpha)$.

Beyond α^* there is no need to offer premium $p_0(\alpha)$ based only on outside shareholders because insiders are also willing to tender at this price. Given that insiders tender, the bidder would need $(0.5-\alpha)$ proportion of shares from outsiders. This can be ensured by offering a premium p such that $(1-\alpha)s(p) = (0.5-\alpha)$ or $p \geq p_1(\alpha)$, where $p_1(\alpha) = b \bullet (0.5-\alpha) / (1-\alpha)$. This can be interpreted as the price required to be paid to outside shareholders in order to ensure success, given that insiders also tender. Taking the first derivative, we get that $p'_1(\alpha) = -b / (1-\alpha) - 0.5b / (1-\alpha)^2 < 0$, so that $p_1(\alpha)$ is a monotonically decreasing function of α . We also notice that $p_1(\alpha) < p_0(\alpha)$, which implies that at $\alpha = \alpha^*$, $p_1(\alpha^*) < p_0(\alpha^*) = p^*(\alpha^*)$. At $\alpha = 0.5$, $p_1(0.5) = 0$ while $p^*(0.5) > 0$. Thus over the whole range α^* to 0.5, $p_1(\alpha)$ is less than $p^*(\alpha)$, the premium required to induce the insiders to tender. This means that if the bidder offers a premium of $p^*(\alpha)$ he not only gets the insiders to tender but also gets enough outsiders to ensure success. If he offers less than that, only some outsiders tender which is not sufficient to get 50% shares, as with only outsiders a much higher (than even $p^*(\alpha)$) premium $p_0(\alpha)$ is required to get 50% shares. In the range of insider ownership between α^* and 0.5, the optimal premium is, therefore, $p^*(\alpha)$.

When the insider ownership is more than 0.5, a bidder cannot succeed without the insiders tendering. An offer of $p^*(\alpha)$ is sufficient to induce the

insiders to tender which automatically gets the bidder more than 50% shares. The bidder, therefore, does not care about how many outsiders would tender even though the premium offered is equally available to insiders and outsiders alike. The optimal premium it will offer is exactly $p^*(\alpha)$.

The bidder's optimal tender premium schedule, $p_{opt}(\alpha)$ is, therefore, given by

$$p_{opt}(\alpha) = \begin{cases} p_0(\alpha^*) & \text{for } \alpha \leq \alpha^* \\ p^*(\alpha) & \text{for } \alpha > \alpha^* \end{cases}$$

where α^* is such that $p_0(\alpha^*) = p^*(\alpha^*)$ and $\alpha^* < 0.5$.

3.4. Value of the Firm

The value of the firm at $t = 0$ is defined as the present value of the cash flows, discounted at a given rate R , which accrue to shareholders. This will be dependent on the managerial ownership α . Let it be represented as $V(\alpha)$. We ignore taxes in this analysis, so that $V(\alpha)$ corresponds to the value of the firm from the perspective of an investor who pays no taxes. We also assume, for simplicity, that the value of the firm at $t=1$ in the absence of a takeover, viz. $y(\alpha)$ is already known at $t = 0$. The shareholders as a whole retain the value $y(\alpha)$ if the bid does not succeed. If the bid succeeds half get $0.5y(\alpha) + p$ and the remaining

get $0.5y(\alpha)$ so that the shareholders as a whole get $y(\alpha) + p$. The value of the firm is then given by

$$\begin{aligned} V(\alpha) &= (1+R)^{-1} [(y(\alpha) + p) \bullet N + y(\alpha) \bullet (1-N)] \\ &= (1+R)^{-1} [y(\alpha) + p \bullet N] \end{aligned} \quad (3.5)$$

In the range of insider ownership $0 \leq \alpha \leq \alpha^*$, the optimal premium is $p_0(\alpha)$ which is just the premium to ensure that $N = 1$. Therefore in this range, by plugging in the value of $p_0(\alpha)$ and taking derivative with respect to α , we get

$$(1+R) V'(\alpha) = y'(\alpha) + 0.5b \bullet (1-\alpha)^{-2} > 0 \quad (3.6)$$

In this range of $0 \leq \alpha \leq \alpha^*$, as insider ownership increases, the effects on firm value of reduction in agency costs and increase in tender premium are reinforcing each other. Thus we get the following proposition:

Proposition 3.1: As fraction of managerial ownership α increases from zero upto a point α^* (less than 0.5), the Value of the firm increases.

For all α greater than α^* , the optimal premium is given by the function $p^*(\alpha) = G(\alpha)/\alpha = (M - y(\alpha))/\alpha$. At this premium, $N = 1$ and the value of the firm is $V(\alpha) = (1+R)^{-1} [y(\alpha) + (M - y(\alpha))/\alpha]$. Taking derivative with respect to α , we get

$$(1+R) dV(\alpha)/d\alpha = - (M-y(\alpha))/\alpha^2 - (1-\alpha)y'(\alpha)/\alpha < 0 \quad (3.7)$$

In this region of $\alpha > \alpha^*$, as insider ownership increases, the effects of decreasing agency costs and decreasing premium on firm value are acting in opposite directions. The net effect, however, is to reduce the value of the firm. Thus we get the following proposition:

Proposition 3.2: As the fraction of managerial ownership increases from α^* to 1, the Value of the firm decreases.

Using propositions 3.1 and 3.2, we show how the Value of the firm changes with change in managerial ownership in Figure 3.2. The value first goes up as α increases from zero upto a point α^* , and then it falls steadily as α increases upto 1. In the latter part, the value falls even though in the model agency costs are falling as α increases. This is similar to the pattern observed by McConnell & Servaes (1990) in both their samples.

The Value of the firm does not reach a minimum when insider ownership is 0.5, instead it continues to fall with higher concentration of ownership in the hands of the insiders. The firm value at $\alpha = 0$ is $(1+R)^{-1} [y(0) + 0.5b]$ and at $\alpha = 0.5$ it is equal to $(1+R)^{-1} [y(0.5) + 2(M - y(0.5))]$. Whether $V(0.5)$ is higher than $V(0)$ depends upon the parameter values. For α^* close to 50%, however,

$V(0.5)$ will be close to $(1+R)^{-1} [y(0.5) + b]$, which is greater than $V(0)$. This is similar to what McConnell & Servaes (1990) observe in their empirical results but is in contrast with Stulz(1988), where the value of the firm is at a minimum at $\alpha = 0.5$.

The point of inflection in the relationship between firm value and insider ownership is given by the point α^* , defined by (3.2). The fraction of insider ownership α^* at which this takes place clearly depends upon the parametric values. Using the Implicit function theorem over the implicit function $H(\alpha^*, b) = 0$ defined by (3.2), we show in Appendix 3.1 that $d\alpha^*/db < 0$.

The parameter b measures the inverse of the slope of the supply curve of shares tendered by outside shareholders for various tender premia. Lower value of b implies more homogeneity of belief among the outside shareholders and $b = 0$ is the case of perfect homogeneity. Larger the value of b , the more heterogeneous are the outside shareholders about their beliefs. It follows that greater the heterogeneity among outside shareholders, smaller is α^* , i.e. the point of inflection occurs further to the left from 0.5.

Higher Research & Development expenditures are generally associated with intangible growth opportunities for the firm, of which outside shareholders are likely to have scarce information and so will have differing beliefs about the

true value of these intangibles. This implies more heterogeneity among the outside shareholders. According to this model, for high R&D (in proportion to sales or capital) firms, while firm value will first increase and then decrease as insider ownership increases, the point of inflection will be at low level of insider ownership. The model, therefore, provides some basis for observing R&D expenditures as a significant regressor in the empirical studies of firm value and insider ownership.

Well-known firms in mature industries are likely to have shareholders with fairly homogeneous information, as such firms are extensively analyzed and information published. Relatively unknown firms in their growth stage are likely to have shareholders with differing levels of information. Thus in a cross-section of firms, a sub-sample of the larger firms is likely to exhibit a relationship between firm value and insider ownership with a point of inflection higher than a similar relationship in a sub-sample of relatively small firms.

3.5 Value of Control

If the takeover bid succeeds, the managers lose their non-pecuniary benefits derived from controlling the firm, whether they tender or not. At managerial ownership level α , let $F(\alpha)$ represent the managers' non-pecuniary

benefits. Since there is a one to one correspondence between $F(\alpha)$ and the agency cost $M - y(\alpha)$, we have upto now taken the latter as the value of non-pecuniary benefits. This is what the managers are giving up when they lose control. In order to give up $F(\alpha)$, the insiders will have to be compensated by an additional wealth $w(\alpha)$ such that the insiders' utility remains the same, that is,

$$U [F(\alpha), \alpha y(\alpha)] = U [0, \alpha y(\alpha) + w(\alpha)]$$

where $U [\bullet , \bullet]$ is the managers' utility function defined over non-pecuniary benefits and wealth. The managers value their non-pecuniary benefits at a wealth level of $w(\alpha)$.

In order to induce the managers to tender, the tender premium p must satisfy $\alpha p \geq w(\alpha)$ or, $p \geq w(\alpha)/\alpha$. The premium that is just enough to induce the insiders to tender is then given by $p^*(\alpha) = w(\alpha)/\alpha$. Since managers' consumption of non-pecuniary benefits $F(\alpha)$ decreases with increase in α , $F'(\alpha) < 0$. As $w(\alpha)$ is the wealth at which the managers value $F(\alpha)$, the two must be positively correlated. Therefore, $w'(\alpha) < 0$. This ensures that, as before, $p^*(\alpha)$ is a decreasing function of α and $p^*(0)$ tends to infinity. In Appendix 3.2, we show more formally that $w'(\alpha) < 0$ for general utility functions with relative risk aversion greater than unity. We also show that $y(\alpha) + p^*(\alpha) = y(\alpha) + w(\alpha)/\alpha$

decreases with α . Thus the propositions 3.1 and 3.2 about the value of the firm remain true with the new utility based definition of value of control.

3.6 Empirical Results

3.6.1 Data

In the empirical analysis, a proxy for Tobin's Q is regressed on a quadratic function of the percentage of insider ownership or control of shares, and other regressors. The data for insider ownership of equity has been obtained from Value Line Investment Survey (1992). Value Line defines corporate insiders to include officers and members of the board of directors. The data for market value of firms in 1992 and operating capital have been obtained from Stern-Stewart Performance 1000, and the ratio of market value to operating capital has been used as a proxy for Tobin's Q. The sample of firms in 1992 consists of 880 non-financial firms with insider ownership spread over the whole range, with 182 firms having insider ownership above 50%. The data on industry category is also available in the Stern-Stewart performance 1000 data set.

3.6.2 Regression Results

The whole sample consists of 880 firms. The ratio of market value in 1992 to operating capital is the dependent variable (used as a proxy for Tobin's Q),

which is regressed on insider ownership (α) and the square of the insider ownership (α^2). Table 3.1 gives the results of the regression for the whole sample. To control for industry category effects, dummy variables have been used for different industry categories. The coefficients on these dummy variables have not been quoted in Table 3.1 (as well as in Table 3.2). The coefficient on insider ownership α is positive and highly significant and the coefficient on the square of insider ownership, α^2 , is negative and highly significant. This implies that the firm value increases as insider ownership increases upto about 45% and then falls. In the second regression in Table 3.1, operating capital has been included as a regressor to control for the possibility that market value to capital ratio and insider ownership may be related through firm size. The capital variable has a negative significant effect and its inclusion in the second regression does not materially alter the pattern of relationship between insider ownership and firm value.

Table 3.2 reports similar regressions on sub-samples of the largest 350 firms and the smallest 350 firms. Although the level of significance of the coefficient on α^2 is no longer highly significant, the pattern of relationship between firm value and insider ownership is essentially the same. It is interesting to note that the point of inflection is at 39.3% insider ownership for the smallest 350 firms and is at 57.2% insider ownership for the largest 350 firms.

In all the regressions, the general pattern of how firm value changes with change in insider ownership is consistent with the prediction of the model. The results are similar to the empirical observations of McConnell & Servaes (1990). Moreover the sub-sample of 350 large firms can be expected to have less heterogeneity among outside shareholders as they are likely to be well analyzed publicly. The sub-sample of smallest 350 firms are likely to have higher heterogeneity among outside shareholders. The model predicts that the point of inflection decreases with higher heterogeneity among outside shareholders. The empirical result that the point of inflection (57.2%) for the first sub-sample is higher than that (39.3%) for the second sub-sample is consistent with the prediction of the model. The point of inflection is given by negative of the ratio of coefficient on α and twice the coefficient on α^2 , a non-linear function. The data, therefore, bear out the model's predictions not only in terms of sign and magnitude of the regression parameters but also in terms of a non-linear function of the two parameters.

3.7. Conclusion

In this paper a theoretical model is developed integrating the concept of decreasing agency cost associated with higher managerial ownership (managerial alignment effect) and the possibility of a takeover bid. Not only do the outside

shareholders tender if they find it profitable, but the insiders also optimally choose whether to tender or not by balancing their wealth gains from tendering to the value of their control. In the model, the managers do not have any entrenchment behavior. The value of control to managers depends on the level of non-pecuniary benefits consumed and consequently on insider ownership. Since managers as well as outside shareholders can tender, the possibility of takeover when insider ownership is more than 50% is also analyzed. We derive a non-monotonic relationship between firm value and managerial ownership. The firm value goes up as insider ownership increases upto a point (where insider ownership is less than 50%) and then decreases. The firm value keeps falling beyond the point of inflection in spite of the fact that there is less and less agency cost as insider ownership increases. The pattern derived in the model is consistent with the empirical pattern observed by McConnell & Servaes(1990). We also show that when the point of inflection is close to 0.5, the firm value at 50% insider ownership is significantly higher than the firm value at insider ownership of close to zero. This prediction is contrary to Stulz(1988) and consistent with McConell & Servaes(1990). The exact point of inflection depends on the values of the parameters of the model. In particular, the greater the heterogeneity of belief (about the firm's true value) amongst outside shareholders, the further to the left is the turning point.

The empirical analysis investigates a sample of 880 firms in 1992, using Stern-Stewart Performance 1000 data set to construct a proxy for Tobin's Q. The sample of firms studied here has wide variation in managerial ownership and also consists of several relatively new firms. The pattern of relationship between firm value and managerial ownership is very similar to the results of McConnell and Servaes(1990). For the entire cross-section of firms, the firm value goes up as managerial ownership increases upto about 45% and then falls all the way over the remaining range. For the largest 350 firms in the sample, the firm value increases as managerial ownership increases upto about 57% and for the smallest 350 firms in the sample, the point of inflection is at about 39% insider ownership. Since the first sub-sample is likely to consist of firms which are extensively analyzed, they have very little heterogeneity among outside shareholders, compared to the second sub-sample. The empirical result is, therefore, in accordance with the prediction of the model that higher heterogeneity amongst outside shareholders decreases the point of inflection.

Optimal Tender Premium Schedule

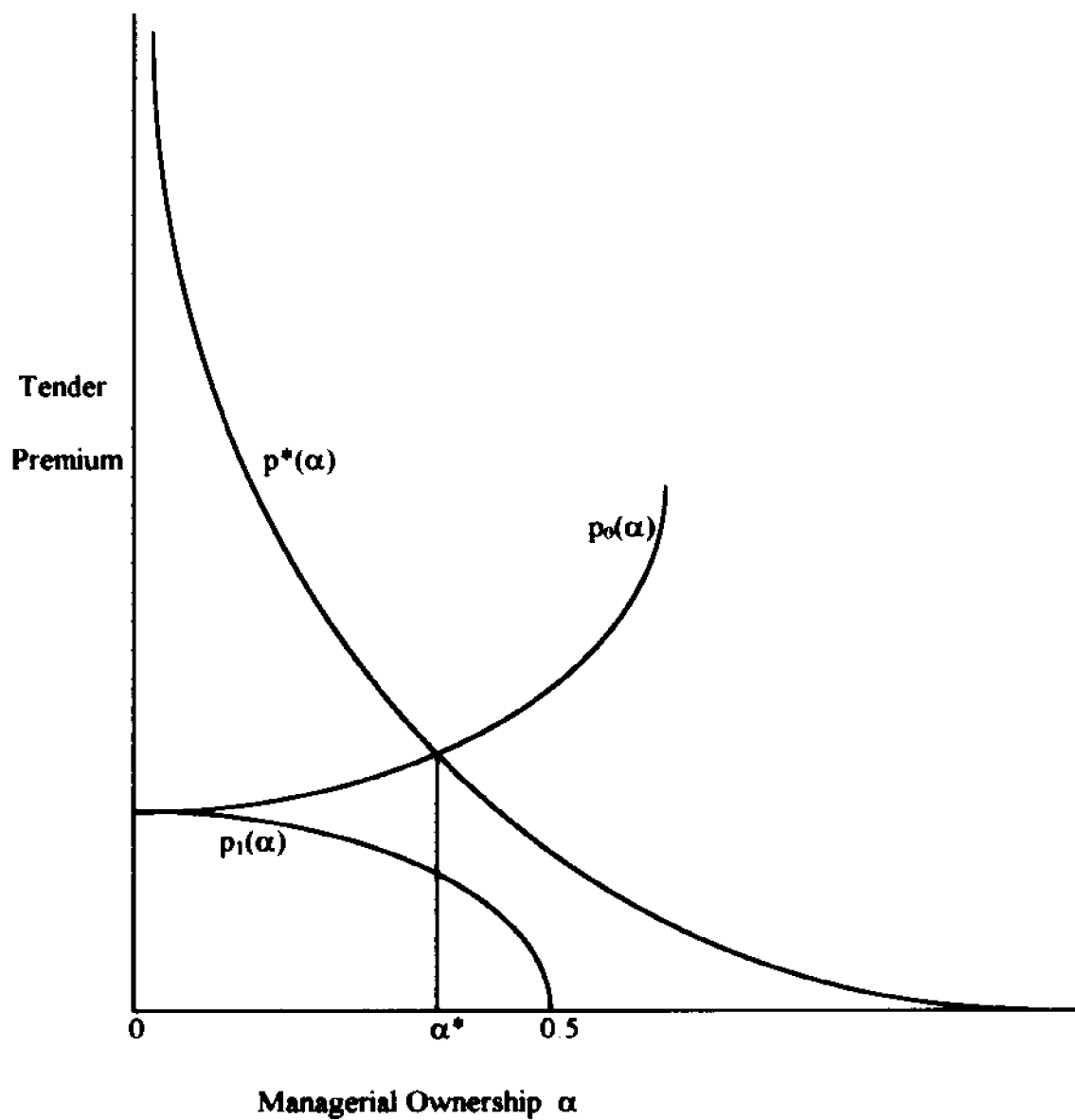


Figure 3.1

Insider Ownership and the Value of the Firm

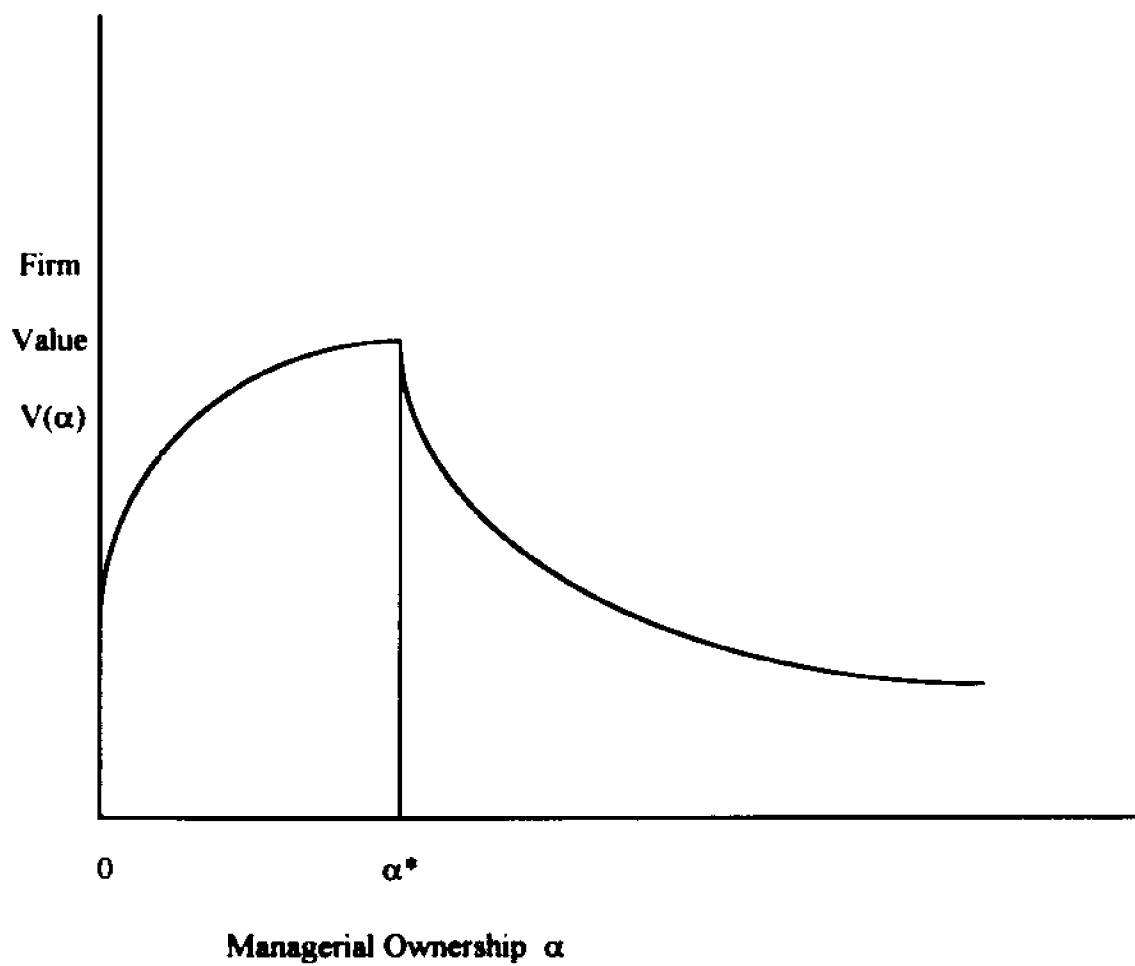


Figure 3.2

Table 3.1**Regression of Market Value/Operating Capital on Insider Ownership**

(p-values in parentheses)

Sample : 880 U.S. firms in 1992

	Regression 1 -----	Regression 2 -----
Intercept	1.61425 (0.00)	1.84135 (0.00)
α	0.09111 (0.00)	0.08363 (0.00)
α^2	-0.000101 (0.00)	-0.00094 (0.00)
Capital (1991 year-end)	---	-0.000046 (0.05)
Industry category Dummies Used	Yes	Yes
Adj R²	0.0781	0.0829
Inflection point	45.06%	44.49%

α = Percentage insider ownership of equity.

Table 3.2**Regression of Market Value/Operating Capital on Insider Ownership****(p-values in parentheses)****Column I -- Largest 350 Firms in the sample.****Column II -- Smallest 350 Firms in the sample.**

	Column I -----	Column II -----
Intercept	1.32444 (0.00)	2.72963 (0.00)
α	0.02632 (0.01)	0.08322 (0.05)
α^2	- 0.00023 (0.05)	- 0.00106 (0.05)
Industry category Dummies Used	Yes	Yes
R²	0.1377	0.0803
Inflection point	57.22%	39.30%

α = Percentage insider ownership of equity.

Appendix 3.1

The implicit function defined by equation (3.3) is given by $H(\alpha^*, b) = 0.5b/(1-\alpha^*) - (M-y(\alpha^*))/\alpha^* = 0$. By the Implicit Function Theorem, $d\alpha^*/db = -(\delta H/\delta b)/(\delta H/\delta \alpha^*)$. The numerator $\delta H/\delta b = 0.5/(1-\alpha^*) > 0$. The denominator $\delta H/\delta \alpha^* = 0.5b/(1-\alpha^*)^2 + y'(\alpha^*)/\alpha^* + (M-y(\alpha^*)) / (\alpha^*)^2 > 0$. Therefore, $d\alpha^*/db$ is negative.

Appendix 3.2

$$U(F(\alpha), \alpha \bullet y(\alpha)) = U(0, \alpha \bullet y(\alpha) + w(\alpha)) = U(0, z),$$

$$\text{where } z = \alpha \bullet y(\alpha) + w(\alpha)$$

Therefore, suppressing the argument (α),

$$U_1(F, \alpha y) F' d\alpha + U_2(F, y) (\alpha y' + y) d\alpha = U_2(0, z) \bullet z' d\alpha$$

Using Taylor expansion around (0, αy),

$$\begin{aligned} & [U_1(0, \alpha y) + F U_{11}(0, \alpha y)] F' + [U_2(0, \alpha y) + F U_{21}(0, y)] (\alpha y' + y) \\ & = [U_2(0, \alpha y) + w U_{22}(0, \alpha y)] \bullet z' \end{aligned}$$

or, suppressing the argument (0, αy),

$$\begin{aligned} & U_1 \bullet [1 + F \bullet U_{11}/U_1] F' + \{U_2 + F \bullet U_{21}\} (\alpha y' + y) \\ & = U_2 [1 + z \bullet U_{22}/U_2] \bullet z' + \alpha y \bullet U_{22} \bullet z' \end{aligned} \quad (i)$$

Let R_j be the relative risk aversion defined by

$$R_j = -x_j U_{jj}(x_1, x_2)/U_j(x_1, x_2) \quad \text{for } j = 1, 2.$$

Assuming $R_j \geq 1$, for any $X_j > x_j$,

$$r_j = -X_j U_{jj}(x_1, x_2)/U_j(x_1, x_2) > R_j \geq 1$$

Using this in (i) and the facts that $F > 0$ and $z > \alpha y$, we see that the terms in square brackets in (i) are both negative. As $F' < 0$, the first term in the left hand side is positive and assuming $U_{21} \geq 0$ the second term in the left hand side is also

positive. Since U_{22} is negative, (i) can be satisfied only if $z' < 0$. Now, $z'(\alpha) = y'(\alpha) + y(\alpha) + w'(\alpha)$ and the first two terms in $z'(\alpha)$ are both positive. Hence $w'(\alpha)$ must be negative. Also $z'(\alpha) < 0$ implies that $y(\alpha) + w(\alpha)$ is decreasing in α . Therefore, $y(\alpha) + w(\alpha)/\alpha$ is decreasing in α .

Chapter 4

INSTITUTIONAL OWNERSHIP AND THE VALUE OF THE FIRM

4.1 Introduction

In recent decades, institutional investors have progressively accumulated more and more equity of U S. corporations and now own significant fraction of the outstanding shares of many firms, including several large publicly held ones. These institutional investors (or any outside blockholder in general) can exert pressure to force the firm towards value maximization, given any level of insider ownership. The potential takeover threat that a large blockholder can exert works as an effective device for monitoring the incumbent managers. Shliefer & Vishny (1986) present a model in which takeovers can be successful only when the bidder has acquired a large minority ownership position in the firm. It does not pay atomistic outside shareholders to invest in costly monitoring. However, holders of large block of shares can benefit from monitoring because they are able to capture large wealth gains that result from a takeover. Thus, Shleifer & Vishny predict that the presence of a large block shareholder has a positive effect on the value of the firm. The large blockholder could be an institutional investor. Consistent with this monitoring argument, Mikkelson & Ruback (1985) and Barclay & Holderness (1990) find significant positive excess returns around the

announcement dates when outsiders acquire large equity positions. On the other hand, Holderness & Sheenan (1988) look at two sample of firms, one in which a single shareholder owns 50% or more shares and another in which no single shareholder owns more than 20% shares. They find no significant difference between the two samples in terms of performance measures.

The relationship between institutional ownership and firm value is somewhat ambiguous in the literature. Pound (1988) proposes three hypotheses as to the behavior of institutional investors. According to the 'efficient-monitoring' hypothesis, institutional investors have greater expertise and can monitor management at a lower cost than can small atomistic investors. Thus this hypothesis predicts a positive relationship between level of institutional ownership and firm value. According to the 'conflict-of-interest' hypothesis, institutional investors are coerced into voting with the insiders because of other profitable business relationship with the firm. Finally, according to the 'strategic-alignment' hypothesis, institutional investors and managers find it mutually advantageous to cooperate. In both the latter scenarios, there is a negative relationship between institutional ownership and firm value.

Existing empirical evidence concerning the relationship between institutional holdings and firm value is primarily confined to an analysis of the institution's role in corporate control issues. Jarrell and Poulsen (1987) find that

firms that adopt the most harmful anti-takeover amendments have lower institutional holdings on average. Birckley, Lease and Smith (1988,1994) report that institutional investors vote more actively on anti-takeover amendments than do other shareholders and that institutional owners more actively oppose proposals that appear harmful to shareholders. Pound (1988), on the other hand, finds that the probability of a management victory in a proxy contest increases with the level of institutional holding of equity.

In this chapter, we explicitly model the 'efficient-monitoring' behavior on one hand, and the behavior of going along with the management inherent in the 'conflict-of-interest' and 'strategic-alignment' hypotheses, on the other. The market for corporate control and managerial alignment effect are modeled in the same way as in Chapter 3. In this model the level of insider ownership plays a crucial role in the relationship between institutional ownership and firm value.

The theoretical analysis shows that under 'efficient-monitoring', higher institutional ownership increases firm value when insider ownership is low but the relationship is negative when insider ownership is high. The theoretical model also implies that when institutional investors go along with the managers, higher institutional ownership increases firm value when insider ownership is low but has no effect on firm value when insider ownership is high.

Most publicly held firms have low levels of managerial ownership. Thus the model predicts that in any cross-section of firms, the observed relationship between institutional ownership and firm value will be positive, irrespective of the behavioral assumption on the part of institutional investors. This prediction is in contrast with Pound (1988) and consistent with the empirical results of McConnell & Servaes (1990). However, the theoretical results presented here show that an empirically observed positive relationship between institutional ownership and firm value cannot be taken as a confirmation of efficient monitoring.

In the empirical analysis, we find a positive, significant relationship between institutional ownership and firm value for the firms contained in Stern-Stewart Performance 1000. In a sub-sample of firms with insider ownership of less than 45%, the relationship is also positive and significant. However, for a sub-sample of firms with insider ownership greater than or equal to 45%, the relationship is negative but insignificant. This result shows that the level of insider ownership is an important determinant of how institutional ownership affects the value of the firm. It is consistent with our theoretical model which predicts that both the behavioral assumption about institutional investors and the level of insider ownership together determine how institutional ownership affects firm value.

4.2 Theoretical Model

We consider the same model as in Chapter 3 and incorporate the presence of institutional shareholders. Of the outside shares, now assume a fraction I is owned by institutional investor(s) and the remaining fraction $(1-\alpha-I)$ is owned by a large number of individuals, where α is the fraction of shares owned by the insiders. We can, therefore, start directly from the results of the model in Sections 3.3 and 3.4, since 'I' can be treated as a suppressed parameter in Chapter 3. Introducing I as a parameter explicitly, the value $V(\alpha, I)$ of the firm is given by

$$(1+R)V(\alpha, I) = y(\alpha, I) + p_0(\alpha, I) \quad \text{for } 0 \leq \alpha \leq \alpha^*(I) \quad (4.1)$$

$$(1+R)V(\alpha, I) = y(\alpha, I) + p^*(\alpha, I) \quad \text{for } \alpha^*(I) < \alpha < 1 \quad (4.2)$$

where $p_0(\alpha, I)$ is the optimal premium targeting only outside shareholders and $p^*(\alpha, I)$ is the reservation premium for the insiders.

Under Efficient-Monitoring hypothesis, institutional shareholding enables better monitoring of the insiders thus reducing agency costs. Therefore G_I is less than zero and y_I is positive. Since $p^*(\alpha, I) = G(\alpha, I)/\alpha$ the reservation premium for insiders decreases with I . When the bidder makes a bid, the institutional shareholders do not go along with the insiders. The bidder has the fraction of

shares $(1-\alpha)$ to target and so, $p_0(\alpha, I) = 0.5b / (1-\alpha)$ as before in section 3.3.

Thus under the efficient monitoring hypothesis,¹²

$$(1+R) \bullet V(\alpha, I) = y(\alpha, I) + 0.5b / (1-\alpha) \quad \text{for } 0 \leq \alpha \leq \alpha^*(I) \quad (4.1a)$$

$$(1+R) \bullet V(\alpha, I) = y(\alpha, I) + [M - y(\alpha, I)] / \alpha \quad \text{for } \alpha^*(I) < \alpha < 1 \quad (4.2a)$$

where $\alpha^*(I)$ is defined by

$$0.5b / (1-\alpha^*(I)) = [M - y(\alpha^*(I), I)] / \alpha^*(I) \quad (4.3a)$$

From (4.1a) and (4.2a), taking partial derivative with respect to I ,

$$(1+R) \bullet V_I(\alpha, I) = y_I(\alpha, I) > 0 \quad \text{for } 0 \leq \alpha \leq \alpha^*(I) \quad (4.4a)$$

$$(1+R) \bullet V_I(\alpha, I) = -y_I(\alpha, I) \bullet (1-\alpha) / \alpha < 0 \quad \text{for } \alpha^*(I) < \alpha < 1 \quad (4.5a)$$

Equations (4.4a) and (4.5a) lead to the following proposition:

Proposition 4.1: Under ‘efficient-monitoring’ behavior by institutional investors

- (i) when insider ownership is low, increase in level of institutional ownership increases firm value; and, (ii) when insider ownership is high, increase in institutional ownership decreases firm value.

Thus efficient monitoring by institutional investors does not always increase firm value. Whether it does or not depends on the level of insider

¹² All equations pertaining to the case of ‘efficient-monitoring’ will be denoted by an “a” after the number while all equations pertaining to the case of ‘strategic-alignment’ will be denoted by a “b” after the number.

ownership. The result in (i) above is consistent with existing literature (Shleifer & Vishny(1986), Pound(1988)). But the result in (ii) above is surprising. Heuristically, when managers own a large fraction of the firm, increased monitoring causes them to value their control less. As a result, the managers tender their shares at a premium lower than what it would have otherwise been.¹³ This causes the firm value to fall with increase in institutional ownership (and consequent increase in monitoring) The situation is somewhat analogous to the provision of 'golden parachute' to managers.

Under Strategic-Alignment hypothesis, there is no monitoring by the institutional investors.¹⁴ Therefore, $y_I = G_I = 0$. Instead, institutional investors go along with the managers and so the bidder can target outside shareholders owning a fraction $(1-\alpha-I)$, in the case when insiders (and institutional shareholders along with them) do not tender. Therefore, $p_m(\alpha, I) = 0.5b / (1-\alpha-I)$. Thus under strategic alignment,

$$(1+R) \bullet V(\alpha, I) = y(\alpha, I) + 0.5b / (1-\alpha-I) \quad \text{for } 0 \leq \alpha \leq \alpha^*(I) \quad (4.1b)$$

¹³ Notice that in this situation the firm can be taken over only if the managers tender. In the situation where managers own a small fraction of the firm, it is not their reservation premium but the belief of the outside shareholders that determine the optimal takeover premium.

¹⁴ In our model, there is no parameter that makes a distinction between 'strategic-alignment' and 'conflict-of-interest' hypotheses. Hence all results for the 'strategic-alignment' behavior holds true for the 'conflict-of-interest' behavior enunciated by Pound (1988).

$$(1+R) \bullet V(\alpha, I) = y(\alpha, I) + [M - y(\alpha, I)] / \alpha \quad \text{for } \alpha^*(I) < \alpha < 1 \quad (4.2b)$$

where $\alpha^*(I)$ is defined by

$$0.5b / (1 - \alpha^*(I) - I) = [M - y(\alpha^*(I), I)] / \alpha^*(I) \quad (4.3b)$$

From (4.1b) and (4.2b), taking partial derivative with respect to I , and using the fact that $y_I(\alpha, I) = 0$,

$$(1+R) \bullet V_I(\alpha, I) = 0.5b / (1 - \alpha - I)^2 > 0 \quad \text{for } 0 \leq \alpha \leq \alpha^*(I) \quad (4.4b)$$

$$(1+R) \bullet V_I(\alpha, I) = 0 \quad \text{for } \alpha^*(I) < \alpha < 1 \quad (4.5b)$$

Equations (4.4b) and (4.5b) lead to the following proposition:

Proposition 4.2: Under the 'strategic-alignment' behavior by institutional investors, (i) when insider ownership is low, increase in level of institutional ownership increases firm value, and (ii) when insider ownership is high, increase in institutional ownership has no effect on firm value.

Thus alignment of interest between institutional shareholders and the incumbent management does not necessarily lead to the conclusion that firm value falls with increase in institutional holdings under strategic alignment. Proposition 4.2 is in contrast with Pound's (1988) argument that strategic alignment implies a negative relationship between firm value and institutional ownership. In fact, the

relationship is positive when insider ownership is low. In this situation, a potential bidder can acquire the firm by buying shares tendered by outside shareholders alone, perhaps at a low tender premium. The institutional owners, by aligning with the managers (or even the expectation of their being aligned with the managers) raise the optimal tender premium that the bidder would offer. This gets reflected in the share value. The higher the level of institutional ownership, the more difficult it is for the bidder to obtain majority and the higher is the tender premium. This results in a positive relationship between institutional holdings and firm value, under strategic alignment. Even in the case when insider ownership is high, increase in institutional ownership has no adverse effect on firm value.

4.3 Empirical Results

4.3.1 Data

In the empirical analysis, a proxy for Tobin's Q, namely the ratio of market value to operating capital, is regressed on level of institutional ownership and other regressors (which includes a quadratic function of the percentage of insider ownership). The data for institutional ownership as well as insider ownership of equity have been obtained from Value Line Investment Survey (1992). The data for market value of firms in 1992 and operating capital have been obtained from Stern-Stewart Performance 1000 and have been used to

generate a proxy for Tobin's Q. The sample of firms in 1992 consists of 880 non-financial firms. The data on industry category is also available in the Stern-Stewart performance 1000 data set

4.3.2 Regression Results

The ratio of market value in 1992 to operating capital has been used as the dependent variable, and is regressed on institutional ownership (I) as well as on insider ownership (α) and the square of the insider ownership (α^2). Table 4.1 gives the results of the regression for the whole sample of 880 firms. To control for industry category effects, dummy variables have been used for different industry categories, the coefficients on which have not been quoted. The coefficients on insider ownership α and square of insider ownership α^2 are similar to the regressions in Table 3.1; i.e. the the firm value increases as insider ownership increases upto a point and then falls. The coefficient on institutional ownership I is positive and highly significant, i.e. as institutional holding of equity increases, firm value also increases. This result is consistent with the empirical observations of McConnell & Servaes (1990).¹⁵ They argue huerestically that this lends support to efficient monitoring by institutional

¹⁵ Also, the inclusion of institutional ownership I as a variable in the regression raises the point of inflection from 45.06% (Table 3.1 Regression 1) to 55.48% (Table 4.1 Regression 1). This is very similar to the observation of McConnell & Servaes in both their cross-sectional regressions.

equityholders. The theoretical results derived in Section 3.2 indicate that when insider ownership is low, firm value increases with institutional ownership under both efficient monitoring and strategic alignment hypotheses. Even though our sample has 182 firms with insider ownership of more than 50%, the distribution of insider ownership level is still considerably skewed to the left. Hence in the whole sample, the empirically observed positive relationship between institutional ownership and firm value is in accordance with the prediction of our theoretical model. But the observed positive relationship does not imply efficient monitoring. Also it reconciles Pound's (1988) observation that institutional investors do go along with the incumbent management in proxy contests and the observed positive relationship between firm value and institutional holding.

In the second regression in Table 4.1, operating capital has been included as a regressor to control for the possibility that market value to capital ratio and institutional ownership are related through firm size. The capital variable has a negative significant effect, its inclusion does not materially alter the pattern of relationship between institutional ownership and firm value.

Table 4.2 reports similar regressions using two sub-samples, one consisting of firms with insider ownership of less than 45% and the other consisting of firms with insider ownership of 45% or more.¹⁶ The pattern of

¹⁶ The cut-off point of 45% insider ownership is prompted by the results in Chapter 3, where the point of inflection for the whole sample was about 45%.

relationship between firm value and insider ownership is essentially the same. But the relationship between firm value and institutional holding is different for the two sub-samples. For firms with low insider ownership the coefficient on I is positive and highly significant. This is consistent with the theoretical results in Section 4.2, that for firms with low insider ownership, increase in level of institutional holdings increases firm value irrespective of whether the institutional investors are efficiently monitoring the incumbent managers or not.

For the sub-sample of firms with high insider ownership, the coefficient on institutional ownership variable I is negative but not significant. Since the coefficient is statistically insignificant, we cannot use the sign of the coefficient to draw inference, based on the theoretical results in Propositions 4.1 and 4.2, about the behavioral characteristics of the institutional investors.

4.4 Conclusion

In this chapter, we have considered the relationship between the level of ownership of institutional investors and the value of the firm. The model allows us to distinguish between the 'efficient-monitoring' and 'strategic-alignment' hypotheses and derive the effects of increase in institutional ownership on firm value under each of these behavioral theories. Under efficient-monitoring, higher institutional ownership increases firm value when insider ownership is low but the

relationship is negative when insider ownership is high. The latter is in contrast with the commonly accepted notion that if institutional investors effectively monitor the managers, the firm value should increase with institutional ownership. Under strategic alignment, when institutional investors go along with the managers, higher institutional ownership increases firm value when insider ownership is low but has no effect on firm value when insider ownership is high. The theoretical results reconcile the observed positive relationship between institutional ownership and firm value and the alignment between institutional investors and incumbent management in proxy contests. The theoretical results also indicate that an empirically observed positive relationship between institutional ownership and firm value cannot be taken as confirmation of efficient monitoring.

We test the relationship between institutional ownership and firm value empirically on a cross-section of non-financial firms in 1992, finding a significantly positive relation. In a sub-sample of firms with insider ownership of less than 45%, the relationship is also positive and significant. However, for a sub-sample of firms with insider ownership greater than or equal to 45%, the relationship is negative but insignificant. The empirical results, apart from being consistent with our theoretical model, show that the level of insider ownership is an important determinant of how institutional ownership affects the value of the firm.

Table 4.1**Regression of Market Value/Operating Capital on Institutional Ownership**

(p-values in parentheses)

Sample : 880 U.S. firms in 1992

	Regression 1 -----	Regression 2 -----
Intercept	1.38624 (0.00)	1.49336 (0.00)
α	0.07656 (0.00)	0.07235 (0.00)
α^2	-0.00069 (0.01)	-0.00064 (0.01)
I	0.05825 (0.00)	0.040376 (0.00)
Capital (1991 year-end)	---	-0.000063 (0.05)
Industry category Dummies Used	Yes	Yes
Adj R ²	0.1186	0.1227

 α = Percentage insider ownership of equity. I = Percentage institutional ownership of equity

Table 4.2**Regression of Market Value/Operating Capital on Institutional Ownership****(p-values in parentheses)****Column I -- Firms in the sample with $\alpha < 45\%$ (Sample size 683)****Column II -- Firms in the sample $\alpha \geq 45\%$ (Sample size 197)**

	Column I -----	Column II -----
Intercept	1.28913 (0.00)	2.36758 (0.00)
α	0.06904 (0.01)	0.07519 (0.05)
α^2	- 0.00061 (0.05)	- 0.00076 (0.05)
l	0.07615 (0.01)	- 0.02954 (0.17)
Industry category Dummies Used	Yes	Yes
R ²	0.1285	0.0988

 α = Percentage insider ownership of equity.

l = Percentage institutional ownership of equity.

Chapter 5

INSIDER OWNERSHIP, CORPORATE CONTROL AND INSIDER TRADING

5.1. Introduction

Insider trading is like a two-edged sword. On the one hand, insiders with superior information about the prospect of their firm can earn excess profit from insider trading. On the other hand, insider trading affects ownership structure, which in turn affects their ability to maintain corporate control. Although there are many studies on insider trading, most have focussed on market efficiency or related issues and few, if any, from the perspective of corporate control.¹⁷

The value of corporate control to insiders decreases as insider ownership α increases while the tender premium at which outside shareholders tender their shares increases with α . Furthermore, the optimal tender premium increases with α up to a certain $\alpha \leq \alpha^*$ and then decreases with α after that. At a low α , insiders have a strong incentive to protect the benefit of corporate control which

¹⁷ Many empirical studies on insider trading have focussed on testing market efficiency, e.g. Jaffe (1974), Finnerty (1976), Seyhun (1986,1988) and Rozeff & Zaman (1988). Theoretical models of insider trading have examined either informationally efficient stock prices, e.g., Fishman & Hagerty (1992) and John & Narayanan (1994), or signalling aspect of insider trading, e.g., Bagnoli & Khanna (1992) and John & Lang (1991).

they may lose without a proper compensation if the takeover succeeds. Hence, insiders with low ownership do not always sell shares upon receipt of unfavorable information while they always buy upon receipt of favorable information. On the other hand, at a high α , insiders are not concerned about losing control as the tender premium is just enough to compensate for the loss of the benefit of control for insiders. Hence, insiders with high ownership trade symmetrically, i.e., they sell shares with unfavorable information and buy with favorable information.

In this chapter, we analyze optimal insider trading for various levels of insider ownership when there exist potential contests of corporate control. We find that insiders' trading activity differs for different levels of insider ownership. When insiders do not own or control a large fraction of shares, they do not always sell shares upon the realization of unfavorable private information while they always buy upon the realization of unfavorable private information. This is because protecting the benefit of corporate control often outweighs the trading profit from sales of overvalued shares. On the other hand, when insiders own or control a large fraction of shares, they always sell (buy) upon the realization of unfavorable (favorable) private information. This is because for a takeover bid to succeed, a bidder must make a tender offer that is acceptable to insiders. Knowing their strong position to protect the benefit of control, insiders trading keeping in mind the trading profits only.

Asymmetry in insider trading between purchases and sales for firms with low insider ownership is consistent with reported empirical observations in the literature, noting that insiders of most publicly held firms own small fractions of shares. Recently, Seyhun(1988) reports that the volume of purchases by insiders exceed that of sales. Since insiders with low insider ownership sell only when they perceive the stock is substantially overvalued, the magnitude of the market's reaction to sales (in terms of the magnitude of abnormal return) for firms with low insider ownership will be significantly greater than the magnitude of its reaction to purchases. Insiders, however, trade symmetrically when their ownership is high. Thus the above differences in volume and market's reaction between purchases and sales will not exist for firms with high insider ownership.

Sales of stocks by insiders are not all information driven. Insiders may sell due to liquidity needs or for the purpose of their portfolio diversification. Since outsiders cannot distinguish between information trades and liquidity trades, a sales transaction by insiders is a noisy signal. Insiders of large firms rarely receive private information good enough for them to sell their shares for profit. Thus information trades, as a proportion of observed sales by insiders, will be lower for large firms than for small firms. Hence, the larger the firm, the noisier is the signal and less pronounced is the market's reaction. This leads us to the prediction that the market's reaction to sales by insiders is significantly more negative for small firms than for large firms.

5.2. The Value of Control and Tender Offers

In this section, we focus first on the value of corporate control and then the possible takeover bid. The formulation of corporate control contest is similar to Stulz(1988). In our model, the benefits of control may accrue to insiders (corporate managers and directors) mainly from perquisite consumption as in Jensen and Meckling (1976)^{18,19} Let α be the fraction of an all-equity firm the firm owned by insiders. $F(\alpha)$ and $y(\alpha)$ represent the optimal perquisite consumption and the corresponding firm value respectively, which maximize the insiders' utility $U(F(\alpha), \alpha y(\alpha))$ subject to the wealth constraint $M = F(\alpha)+y(\alpha)$. U_1 and U_2 are positive. Without loss of generality, let $F(1) = 0$ and $y(1) = M$ for $\alpha = 1$, i.e., when insiders own 100 percent of the firm, there will be no perquisite consumption. In order to induce insiders to give up their perquisite consumption $F(\alpha)$, they have to be compensated by an increase in wealth, at least by $w(\alpha)$, such that $U(F(\alpha), \alpha y(\alpha)) = U(0, \alpha y(\alpha)+w(\alpha))$. Measured in terms of wealth, it is $w(\alpha)$ that the insiders have to give up upon losing control, i.e., $w(\alpha)$ is the value of control to insiders. As α increases, insiders reduce the optimal perk

¹⁸ Definition of insiders usually include beneficial owners of more than 10% of any class of equity in addition to officers and directors. Our narrow definition, however, does not alter the empirical hypotheses drawn from our main conclusions

¹⁹ The benefits of control may accrue to the managers of the firm from other factors as well as perquisite consumption, e.g. the ability to dilute minority rights and the diversion of wealth from one firm to another.

consumption i.e. $F'(\alpha) < 0$. This is because the portion $\alpha F(\alpha)$ that insiders pay for their perquisite consumption increases with α and insiders' stake of the firm value also increases. Since insiders value $F(\alpha)$ at $w(\alpha)$, the two must be positively related. Hence, $w'(\alpha) < 0$. That is, as insider ownership increases, the value of control decreases.

Control of this firm requires possession of a simple majority (fifty percent) of the shares. Suppose some firm (bidder) acquires information about this firm (target) and learns the synergy that would accrue to the bidder from control of the target²⁰. Given the level of synergy, the bidder decides whether to make a bid. Following Stulz(1988), we consider a simple two-tier bid: the bidder offers to buy exactly half the shares at $0.5y + p$ and the other half at $0.5y$, where y is the value of the firm at the time of the bid and p is the total premium for half the shares.

By tendering their shares, insiders give up the value of control, $w(\alpha)$, for the proportional tender premium, αp . This is because the tender offer is made without discrimination between insiders and outside shareholders. Let $p^*(\alpha)$ be insiders' reservation tender premium for a given α . Then,

$$p^*(\alpha) = w(\alpha) / \alpha \quad (5.1)$$

²⁰ The synergy may come from technological integration or tax shields as well as savings from excessive perquisite consumption by the incumbent managers.

Since $w'(\alpha) < 0$, $p^*(\alpha)$ decreases with α

In order to motivate an upward-sloping supply curve of shares, we assume that outside shareholders differ in their beliefs about the true value of the firm. Let y_0 be the true value of the firm assessed by outside shareholders. The current outside shareholders believe that $y_0 > y(\alpha)$. We further assume that outside shareholders' beliefs are distributed uniformly such that $y_0 \in [y(\alpha), y(\alpha) + b]$. The variable b is independent of α and known to all parties. We further assume that $b \geq w(0.5)/0.5$, i.e., there is at least one outside shareholder who believes the unrealized portion of the true value greater than or equal to the value of control to insiders when $\alpha = 0.5$. Let $s(p)$ be the fraction of outside shareholders who believe the tender premium p is high enough to compensate for the unrealized portion of the true value, i.e., $p > y_0 - y(\alpha)$. Hence, $s(p) = p/b$ for $p < b$, and $s(p) = 1$ for $p \geq b$.

When $\alpha < 0.5$, the bid cannot succeed without some outside shareholders tendering. Consider the case in which $p < p^*(\alpha)$ for $\alpha < 0.5$. In order for the bid to be successful, the tender premium offered must be such that $(1-\alpha)s(p) > 0.5$, i.e., outside shareholders who believe that $p > y_0 - y(\alpha)$ must constitute a majority of total shareholders. We are interested in a minimum required premium that

ensures the bid to be successful for a given α . Such a premium is denoted by $p_0(\alpha)$. Hence,

$$p_0(\alpha) = 0.5b / (1-\alpha) \quad (5.2)$$

Note that $p_0(\alpha)$ increases as α increases. This is because in order to maintain the majority ownership, the premium must be raised to induce higher proportion of outside shareholders to tender, as fewer outside shareholders are available.

Lemma 1 The bidder's optimal tender premium, denoted by p_{opt} , will be

$$p_{opt}(\alpha) = \begin{cases} p_0(\alpha^*) & \text{for } \alpha \leq \alpha^* \\ p^*(\alpha) & \text{for } \alpha > \alpha^* \end{cases}$$

where α^* is such that $p_0(\alpha^*) = p^*(\alpha^*)$ and $\alpha^* < 0.5$.

Proof We first show the existence of α^* . When $\alpha = 0$, $p_0(0) = 0.5b$ and $p^*(0)$ approaches infinity. Thus, $p_0(0) < p^*(0)$. Since $p^*(\alpha)$ is decreasing with α but $p_0(\alpha)$ is increasing with α , at a certain α^* , $p_0(\alpha^*) = p^*(\alpha^*)$. Recall that when $\alpha = 0.5$, there is at least one outside shareholder who believes the unrealized portion of the true value greater than or equal to the value of control to insiders, i.e., $b > w(0.5)$. Hence, $p^*(0.5) < p_0(0.5)$ which implies $\alpha^* < 0.5$.

Next, we show $p_0(\alpha) < p^*(\alpha)$ for $0 \leq \alpha < \alpha^*$ and $p^*(\alpha) < p_0(\alpha)$ for $\alpha^* \leq \alpha \leq 1$. When the insider ownership is as low as $\alpha < \alpha^*$, the bid is made to only

outside shares to be tendered as shown above. When the insider ownership is as high as $\alpha \geq \alpha^*$, the bid is made toward both insiders and outside shareholders. Let us first consider the case when insiders own the majority of the shares. For $\alpha > 0.5$, the bidder cannot gain the majority without insiders tendering, and thus the optimal premium is $p^*(\alpha)$. We are still left to prove that $p^*(\alpha)$ is the optimal premium for $\alpha^* \leq \alpha \leq 0.5$.

For $\alpha^* \leq \alpha \leq 0.5$, we know that $p^*(\alpha) \leq p_0(\alpha)$ and $p_0(\alpha)$ is decreasing with α . To ensure that the bid is successful, the bidder would need only $(0.5 - \alpha)$ proportion of outside shares to be tendered. If the bidder can discriminate between outside shareholders and insiders, he would make an offer to outside shareholders with a minimum tender premium p_m such that $(1 - \alpha)s(p_m) = 0.5 - \alpha$. Hence $p_m = (0.5 - \alpha) \cdot b / (1 - \alpha)$. Note that $p_m'(\alpha) = 0.5b / (1 - \alpha)^2 < 0$, i.e., p_m decreases with α . Also note that $p_m(\alpha^*) < p_0(\alpha^*) = p^*(\alpha^*)$ since $(0.5 - \alpha) < 0.5$. Further note that $p_m(0.5) = 0$ but $p^*(0.5) = w(0.5)/0.5 > 0$. Thus, for $\alpha^* \leq \alpha \leq 0.5$, $p_m(\alpha) < p^*(\alpha)$. This implies that with the premium $p^*(\alpha)$, the bidder not only gets the insiders to tender but also gets enough outside shareholders to willingly tender. If the premium is lower than $p^*(\alpha)$, then the number of outside shares to be tendered is not enough to be a majority. This completes the proof that $p^*(\alpha)$ is the optimal premium for $\alpha^* \leq \alpha \leq 0.5$.

The optimal premium is $p_0(\alpha)$ for $\alpha \leq \alpha^*$ and $p^*(\alpha)$ for $\alpha > \alpha^*$ as shown in Figure 5.1. As insider ownership increases from zero to α^* , the optimal premium goes up. Beyond α^* , the optimal premium goes down.

Because of the nature of the two-tier tender offer, all shareholders (insiders and outside shareholders) will tender at the optimal premium. This is because all parties recognize that the bid will succeed when offered at the optimal premium and fail when offered below the optimal premium. If a takeover succeeds, insiders stand to lose the value of control $w(\alpha)$ for the proportional tender premium $\alpha \cdot p(\alpha)$. The net loss to insiders is denoted by $g(\alpha)$ such that

$$\begin{aligned} g(\alpha) &= w(\alpha) - \alpha \cdot p_0(\alpha) & \text{for } 0 \leq \alpha < \alpha^* \\ &= 0 & \text{for } \alpha^* < \alpha \leq 1 \end{aligned} \quad (5.3)$$

Since $w'(\alpha) < 0$ and $p_0'(\alpha) > 0$, $g'(\alpha) < 0$ for $0 \leq \alpha < \alpha^*$ and $g'(\alpha) = 0$ for $\alpha^* < \alpha \leq 1$.

5.3. Insider Trading

Given the possible loss of control in the next period, we now consider insiders' optimal trading when insiders receive private information about the true firm value. Although insiders earn excess profits by trading based on superior

information, insider trading changes insiders' ownership, which in turn affects their position vis-a-vis a potential takeover subsequent to the trading. For notational simplicity, we assume that the discount rate is zero ²¹

We consider separately two exclusive cases of information about the firm value. First, suppose that M increases exogenously to a new M_1 , which results in a shift of the budget constraint upwards. Only insiders observe M_1 which will be revealed to outside shareholders the next period. Assuming that both perquisite consumption and wealth are normal goods for insiders, the optimal perquisite consumption and the corresponding firm value increase to $F_1(\alpha)$ and $y_1(\alpha)$ respectively such that $M_1 = y_1(\alpha) + F_1(\alpha)$. Let $y_1(\alpha) = y(\alpha) + x$, for $x > 0$. The current market value of the firm, $y(\alpha)$, is lower than the true value $y_1(\alpha)$ by an amount x . As the optimal perquisite consumption increases to $F_1(\alpha)$, so does the value of control to $w_1(\alpha)$. The reservation premium shifts upward to $p_1^*(\alpha) = w_1(\alpha) / \alpha$. In the event of the successful takeover, insiders stand to lose $g_1(\alpha)$ which is greater than $g(\alpha)$ in the region $0 \leq \alpha < \alpha^*$. Note also that the point of inflection increases to α_1^* , where the reservation premia for insiders and outsiders are equal. Upon receiving information about $x > 0$ and $w_1(\alpha)$, insiders buy an additional fraction, say β , of their shares. Insiders gain an excess trading profit of $x \cdot \beta$. However, it also increases their ownership to $\alpha + \beta$, which affects the

²¹ Relaxation of this assumption does not alter our results. It is introduced only to simplify notations.

potential net loss to $g_1(\alpha+\beta)$. The amount insiders can trade is limited by regulation and their own wealth. Let $\bar{\beta}$ be the maximum fraction of shares insiders can buy. Formally, insiders' program is

$$\text{Max}_{\beta < \bar{\beta}} G(\beta) = x\beta - g_1(\alpha+\beta) \quad (5.4)$$

Proposition 5.1 When insiders receive information that the firm is undervalued by x , it is always optimal for them to buy to the maximum extent possible

Proof: When the stock is undervalued by $x > 0$ and the value of control increases to $w_1(\alpha)$. Since $g_1'(\bullet) < 0$ for $\alpha+\beta \leq \alpha_1^*$ and $g_1'(\bullet) = 0$ for $\alpha+\beta > \alpha_1^*$, $G'(\beta) = x - g_1'(\alpha+\beta) > 0$ for any $x > 0$. Hence, the optimal β is the corner solution $\beta = \bar{\beta}$.

Consider first the case when $0 \leq \alpha < \alpha^*$. Insiders' purchase by β reduces the potential net loss from losing control from $g_1(\alpha)$ to $g_1(\alpha+\beta)$ as $g_1'(\cdot) < 0$. Thus, through the purchase, the insiders not only earn an excess trading profit of $x\beta$ but also reduce their potential net loss from losing control in the event of the successful takeover. This can be seen from Figure 5.2 as the difference between the insiders' reservation premium and the outside shareholders' reservation premium. It is, therefore, optimal for insiders to buy to the maximum extent to

which their wealth and regulation permit. Next we consider the case when $\alpha > \alpha^*$. In this range, $g_1'(\cdot) = 0$ i.e., the purchase has no effect on the potential net loss from losing control. On the other hand, the excess trading profit, $x \cdot \beta$, increases with β . Hence, insiders buy to the maximum extent possible.²²

Now we consider the opposite case in which M decreases exogenously to a new M_2 . The new optimal perquisite consumption $F_2(\alpha)$ and the corresponding firm value $y_2(\alpha)$ decrease accordingly. Let $y_2(\alpha) = y(\alpha) - x$ for $x > 0$. Since $F_2(\alpha) < F(\alpha)$, $w_2(\alpha) < w(\alpha)$. Thus, the reservation premium $p^*(\alpha)$ now shifts downwards to $p_2(\alpha)$ as shown in Figure 5.3. Consider first the case when $0 \leq \alpha < \alpha_2^*$ where α_2^* is the new inflection point. Before any trading takes place, insiders stand to lose $g_2(\alpha)$ which is less than $g(\alpha)$ in the region $0 \leq \alpha < \alpha_2^*$. By selling, insiders can earn an excess trading profit as the firm is overvalued. Selling a fraction of shares β decreases insider ownership to $\alpha - \beta$ so that the potential net loss from losing control increases from $g_2(\alpha)$ to $g_2(\alpha - \beta)$. This can be seen from Figure 5.3 as an increase in the distance between the insiders' reservation premium $p_2(\bullet)$ and the outside shareholders' reservation premium $p_0(\bullet)$. Thus, when the stock is overvalued, selling a higher fraction β of shares by insiders has opposing effects: it increases the excess profit from insider trading and also increases the

²² Recently, Lee, Mikkelsen & Partch (1992) report that insiders increase their purchases and decrease their sales before stock repurchase by tender offer.

potential net loss from losing control²³ How much insiders can sell is also limited by regulation and their own wealth and thus we maintain the assumption that $\beta \leq \bar{\beta}$. Insiders are prohibited from selling short by Securities and Exchange Commission. We will, however, show shortly that insiders in this model will never sell short. Then, insiders' program is

$$\text{Max}_{\beta \leq \bar{\beta}} G(\beta) = x \cdot \beta - g_2(\alpha - \beta) \quad (5.5)$$

Without any constraint, the derivative of Equation (5.5) with respect to β is

$$G'(\beta) = x + g_2'(\alpha - \beta) \quad (5.6)$$

Note that $G'(\beta)$ can be positive, negative or zero since $g_2'(\alpha - \beta) < 0$ for $\alpha - \beta < \alpha_2^*$ and $x > 0$

In the range $\alpha \leq \alpha_2^*$, $x^*(\alpha)$ is defined such that $G'(0) = x^*(\alpha) + g_2'(\alpha) = 0$. This can be interpreted as follows: if insiders happen to receive information that the current firm value is overvalued exactly by $x^*(\alpha)$, they would optimally

²³ In signalling models such as John & Lang (1991) and Bagnoli & Khanna (1992), insiders can earn profits from insider trading by not revealing their private information fully through financial signalling like dividend. However, not signalling truthfully can be costly if insiders have a large stake in the firm. In our model also, there is a trade-off between insider trading profit and insiders' control of the firm. Although insider trading is driven by private information, it is not a signal by insiders in our model.

choose $\beta = 0$. Substituting (5.2) into (5.3) and differentiating the resulting expression with respect to α , we have

$$g_2'(\alpha) - w_2'(\alpha) = 0.5b/(1 - \alpha)^2 \quad (5.7)$$

Sufficient condition for Equation (5.5) to be a maximum program is $G''(\beta) = -g_2''(\alpha - \beta) < 0$, which implies $g_2''(\alpha) < 0$. Recall that $x^*(\alpha) = -g_2'(\alpha)$ in the range $\alpha \leq \alpha_2^*$. Note that $-g_2'(0)$ approaches infinity as does $-w_2'(0)$, while $-g_2'(\alpha_2^*)$ is some finite positive number. Hence, $x^*(\alpha)$ decreases with α in the range $\alpha \leq \alpha_2^*$, as shown in Figure 5.4.

Let β_2 be an unconstrained interior solution of (5.5) such that $G'(\beta_2) = x + g_2'(\alpha - \beta_2) = 0$ for some x and α . Upon realizing the stock being overvalued, insiders' decision to sell actually depends on the ownership α as well the extent of overvaluation x . Prempting the nature of our results, let us divide the x and α plane into four regions as follows:

Region 1: $0 \leq x \leq x^*(\alpha)$ and $\alpha \leq \alpha_2^*$

Region 2: $x > x^*(\alpha)$ and $\alpha \leq \alpha_2^*$

Region 3: $x > x^*(\alpha_2^*)$ and $\alpha > \alpha_2^*$

Region 4: $0 \leq x \leq x^*(\alpha_2^*)$ and $\alpha > \alpha_2^*$

Proposition 5.2: Suppose insider information indicates that the firm is overvalued by $x > 0$; then

- (i) In Region 1: insiders do not sell
- (ii) In Region 2: insiders sell by a fraction $\beta = \min [\beta_2, \bar{\beta}]$
- (iii) In Region 3: insiders sell by a fraction $\beta = \min [\beta_2, \bar{\beta}]$
- (iv) In Region 4: insiders sell by a fraction $\beta = \min [(\alpha - \hat{\alpha}^*), \bar{\beta}]$

Proof:

Region 1 where $0 \leq x \leq x^*(\alpha)$ and $\alpha \leq \alpha_2^*$: For $x \leq x^*(\alpha)$, $G'(0) = x + g_2'(\alpha) < 0$.

Since $g_2''(\cdot) > 0$, $x + g_2'(\alpha) \geq x + g_2'(\alpha - \beta)$ for any $\beta \geq 0$, which implies that the optimal $\beta = 0$. The intuition here is that although insiders recognize that the stock is overvalued (by less than or equal to $x^*(\alpha)$), the trading profit is not large enough to compensate them for the potential net loss of control.

Region 2 where $x > x^*(\alpha)$ and $\alpha \leq \alpha_2^*$: For $x > x^*(\alpha)$, $G'(0) = x + g_2'(\alpha) > 0$.

Since $g_2'(\alpha - \beta)$ decreases with β , at some β , say β_{22} , $G'(\beta_{22}) = x + g_2'(\alpha - \beta_{22}) = 0$.

In fact, β_{22} is the unconstrained optimal in this region. Note that $\alpha - \beta_{22}$ must be positive and cannot be equal to zero since $g_2'(0)$ approaches negative infinity.

Thus, insiders here do not sell short. $\bar{\beta}$ is the only restriction imposed on insiders' sales. Hence, insiders sell by the minimum of $\bar{\beta}$ and β_2 .

Region 3 where $x > x^*(\alpha_2^*)$ and $\alpha > \alpha_2^*$: $G'(\beta) = x > 0$ as long as $\alpha - \beta \geq \alpha_2^*$. However, $\alpha - \alpha_2^*$ cannot be the unconstrained optimal β , since the trading profit from additional sales still exceeds the potential net loss of control. β_{21} , the unconstrained optimal β in this region, satisfies $G'(\beta_{21}) = x + g_2'(\alpha - \beta_{21}) = 0$. As insiders' sales is restricted by $\bar{\beta}$, the optimal sales is the minimum of β_{21} and $\bar{\beta}$.

Region 4 where $0 \leq x \leq x^*(\alpha_2^*)$ and $\alpha > \alpha_2^*$: As shown above, $G'(\beta) = x > 0$ as long as $\alpha - \beta \geq \alpha_2^*$. $\alpha - \alpha_2^*$ turns out to be the unconstrained optimal β , since the trading profit from additional sales is not large enough to compensate for the potential net loss of control in the range of $\alpha - \beta < \alpha_2^*$. Insiders sell by the minimum of $\alpha - \alpha_2^*$ and $\bar{\beta}$.

Figure 5.4 shows how insiders optimally sell in the plane of x and α . When insiders receive information that the stock is overvalued by less than or equal to $x^*(\alpha)$ and α is in the range where they would not be sufficiently compensated for the loss of control (Region 1), the trading profit by selling is not large enough to compensate for the potential net loss of control. However, if the stock is overvalued by more than $x^*(\alpha)$ and $\alpha \leq \alpha_2^*$ (Region 2), insiders decide to sell and earn the trading profit in spite of the fact that this increases the potential net loss of control. In this case, β_2 is the unconstrained interior solution such that $x = x^*(\alpha - \beta_2) = -g_2'(\alpha - \beta_2)$.

When insiders' ownership is large (i.e. in the range $\alpha > \alpha_2^*$), the bidder must compensate them fully for the loss of control for the bid to succeed. In this situation, at first sight it seems that insiders would sell as much as $(\alpha - \alpha_2^*)$ to maximize the trading profit. However, this is so when the stock is moderately overvalued by $x < x^*(\alpha_2^*)$, i.e. in Region 4. In this region, the trading profit from additional sales is not large enough to compensate for the potential net loss of control. On the other hand, when the stock is greatly overvalued by $x > x^*(\alpha_2^*)$, i.e. in Region 3, the trading profit from additional sales still outweighs the potential net loss of control. β_2 is the unconstrained interior solution such that $x = x^*(\alpha - \beta_2) = -g_2'(\alpha - \beta_2)$. Note that $\beta_2 > (\alpha - \alpha_2^*)$. In all four regions, insiders in this model never sell short.

Propositions 5.1 and 5.2 imply that insiders trade asymmetrically upon realizing mispricing of their firm's stock when the ownership is in the range $\alpha \leq \alpha^*$. That is, information about underpricing of the stock prompts insiders to buy while while information about overpricing does not always prompt them to sell. Because of the asymmetry between buy and sell in the range $\alpha \leq \alpha^*$ and because insider ownership of most publicly held firms fall into this range, we should observe significantly higher volume of purchases than of sales by insiders. This has been reported by Seyhun(1988). Insiders with low ownership ($\alpha \leq \alpha^*$) sell only when the firm is considerably overvalued (by more than $x^*(\alpha)$), while they

always buy when the firm is undervalued. Thus the market's reaction to insider trading should be stronger for sales than for purchases. Hence the model provides us, so far, with the following three hypotheses about information driven insider trading.

- (H1) For firms with low insider ownership ($\alpha \leq \alpha^*$), the volume of purchase transactions by insiders is more than that of sales transactions
- (H2) For firms with low insider ownership ($\alpha \leq \alpha^*$), the market's reaction (in terms of abnormal returns) to the report of sale by insiders is significantly greater, in magnitude, than its reaction to the report of purchases.
- (H3) For firms with high insider ownership ($\alpha > \alpha^*$), there is no significant difference between volume of sales and volume of purchases by insiders. Furthermore, the market's reaction to sales and purchases by insiders are not significantly different from each other in magnitude.

So far we have considered information trades only, i.e., insiders trade based on private information that is not available to outside investors. Sales transactions by insiders are not always based on inside information. For example, they may sell because of liquidity needs, or they may need to sell some of their

holdings to reduce firm-specific risk of their portfolio as their compensation package often includes stock options. We refer to this kind of trade as liquidity trade in contrast with information trade. A liquidity trade does not reveal any new information about the firm's true value. However, outside investors do not always know whether a sale by insiders is information trade or liquidity trade. Hence, observed sales transaction by insiders is a noisy signal to outside investors.

Informational asymmetries are in general more pronounced with small firms than with large firms. Insiders of large firms would rarely be in a position to have superior information and trade based on that information. Insiders of small firms, on the other hand, may often have private information that the firm is highly overvalued. It is optimal for insiders to sell only if the extent of overvaluation is large. Thus there will be fewer information driven sales by insiders of large firms than by those by insiders of small firms. The liquidity trades, as a proportion of observed sales by insiders, will be higher for large firms than for small firms. Therefore, the sales transaction by insiders of large firms is a noisier signal of information than that by insiders of small firms. The larger the noise, the less pronounced is the market's reaction to the observed sales transaction by insiders. The introduction of noise to the sales by insiders leads us to the following additional empirical hypothesis:

(H4) Market's reaction to sales by insiders is significantly more negative for small firms than for large firms.

**Optimal Tender Premium Schedule
before receipt of Inside information**

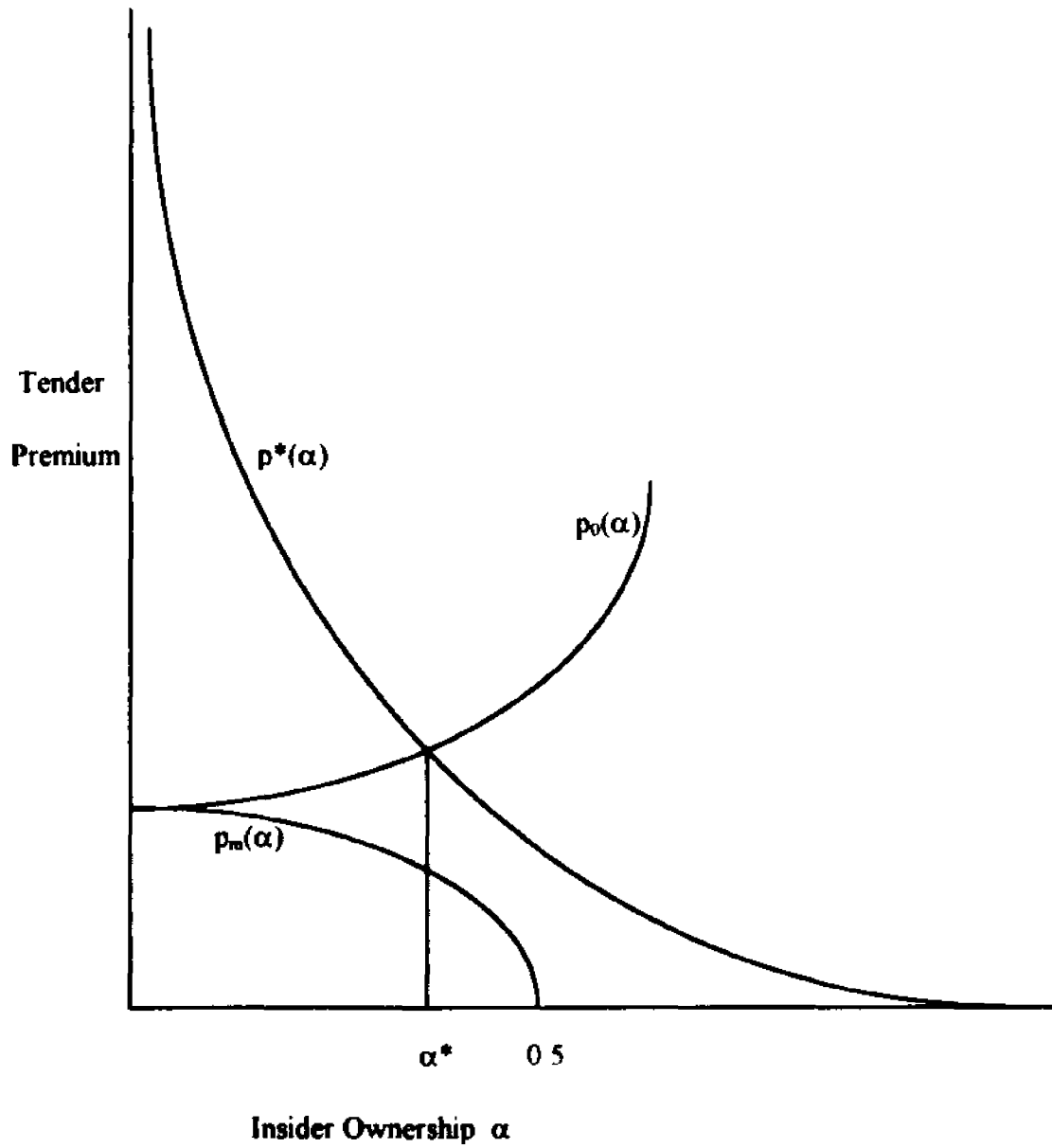


Figure 5.1

Optimal Tender Premium Schedule
when Insiders learn that the Firm is Undervalued

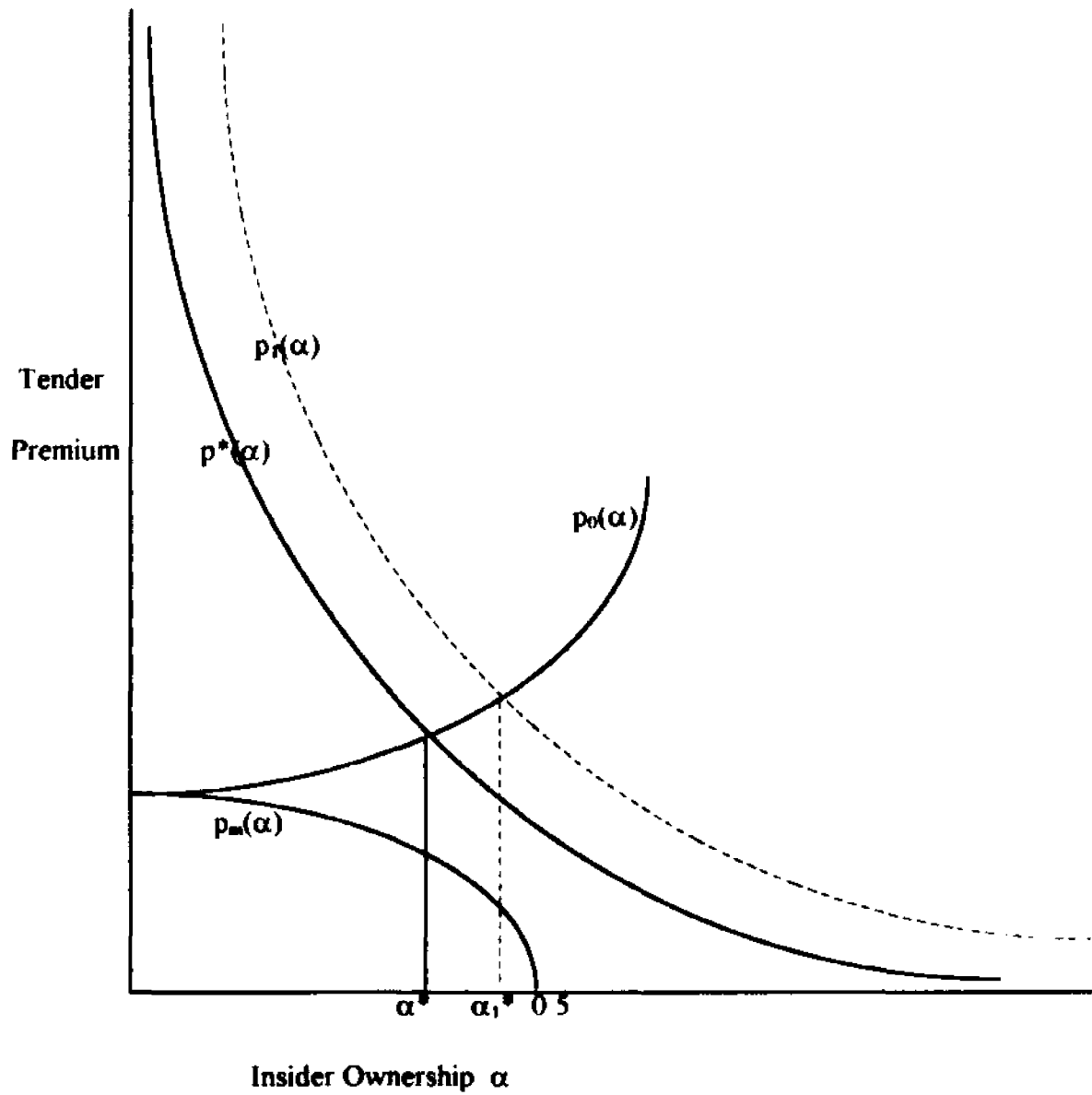


Figure 5.2

Optimal Tender Premium Schedule
when Insiders learn that the Firm is Overvalued

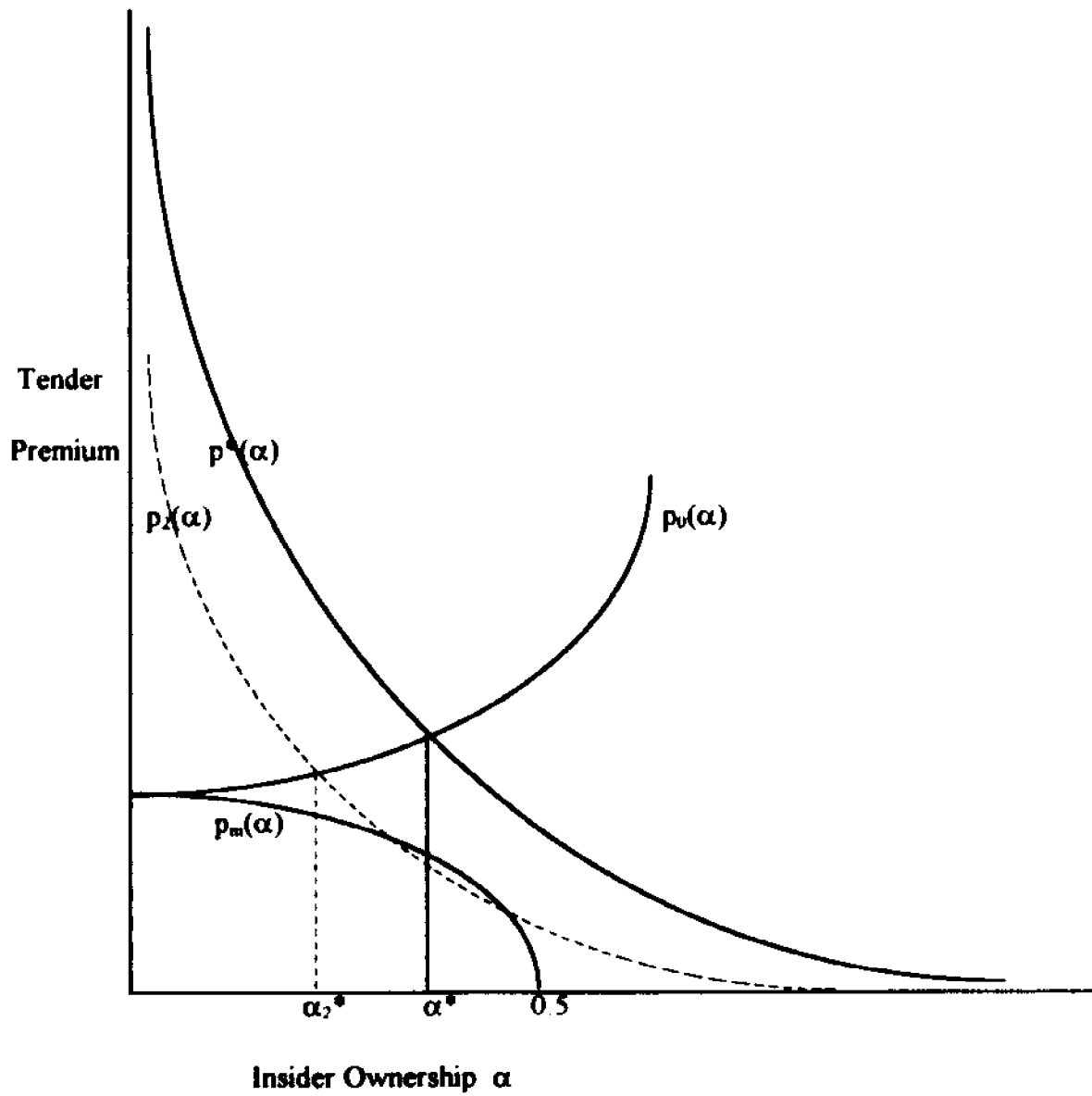


Figure 5.3

Optimal Insider Trading

when Insiders learn that the Firm is Overvalued

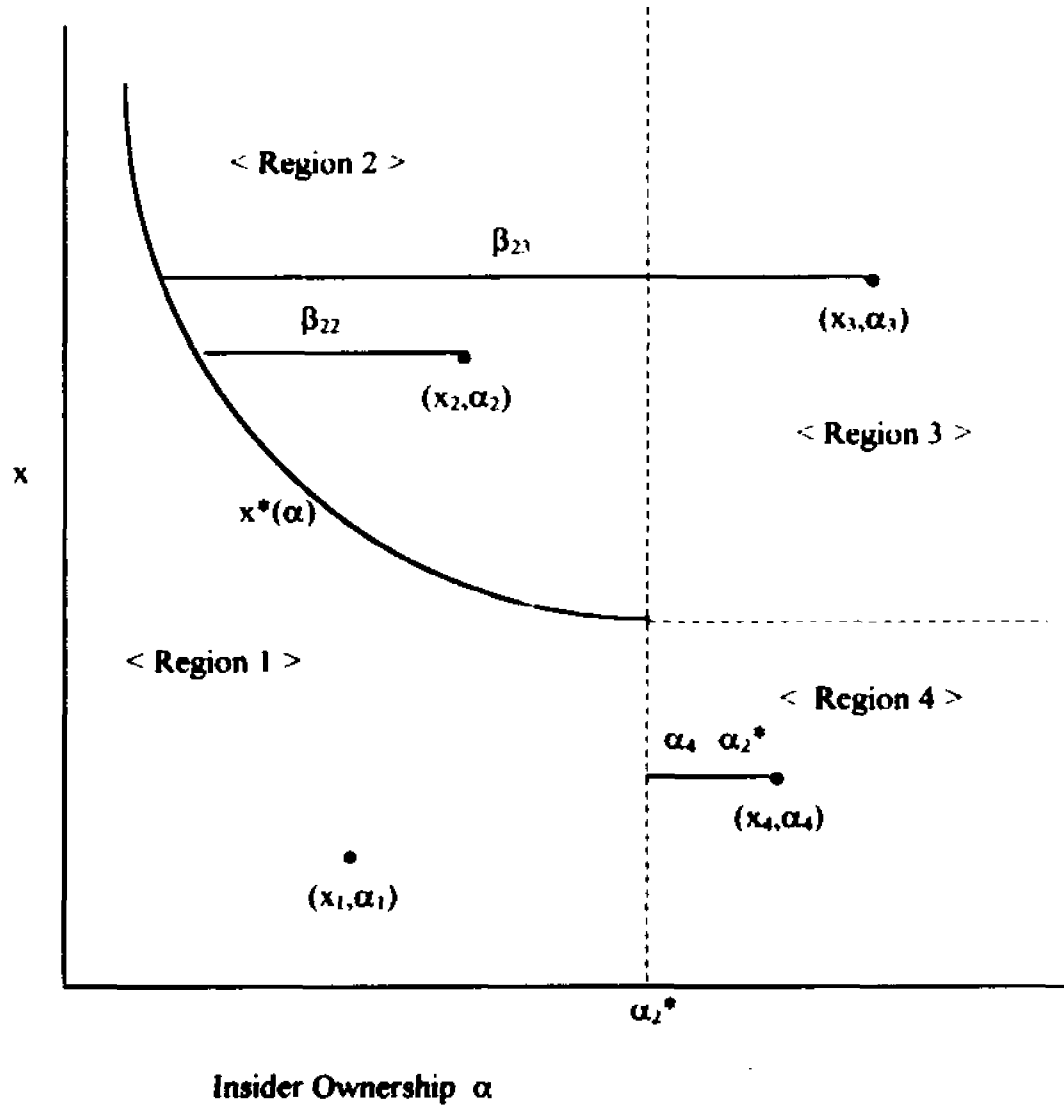


Figure 5.4

Chapter 6

CONCLUSION

The four essays of the dissertation develop theoretical models (and test some of the predictions empirically), in which the market for corporate control and the level of insider ownership play pivotal roles. The theoretical model considered in the first essay is an extension of Stulz (1988) model. The key extension is that in the absence of a takeover threat, the firm value is not a constant but an increasing function of the level of managerial ownership. The higher the stake of the managers in the firm, the more aligned are their interests with those of the shareholders at large. This managerial alignment effect (Jensen & Meckling, 1976) reduces agency costs and raises firm value. Our model shows that the relationship between managerial ownership and firm value follows different patterns for different ranges of parameter values. For moderate parameter values, we derive a pattern similar to the one empirically observed by Morck, Shleifer & Vishny (1988). Our model is able to predict the empirical results of Morck, Shleifer & Vishny without taking recourse to the managerial entrenchment behavior hypothesised by them. We can rely on the managerial alignment hypothesis, which is based on much more theoretically sound agency cost arguments.

There is a common core of the models developed in the previous three essays. We build on a common set of characteristics of the market for corporate control and the distribution of beliefs among outside shareholders about the true value of the firm's shares. The empirical tests on the predictions of the models developed in the second and the third essays were performed on a cross-section of non-financial firms contained in the Stern-Stewart Performance 1000 dataset

In the second essay, a theoretical model was developed incorporating the possibility of takeover and the managerial alignment effect (as insider ownership increases, agency cost due to conflict of interest between insiders and outside shareholders reduces) Not only do the outside shareholders decide whether to tender or not when a particular tender premium is offered, but insiders also decide whether or not to tender by balancing their value of control and wealth gains upon tendering. The value of control is not an exogenously given quantity (as in Israel(1992)) but depends on the level of non-pecuniary benefits consumed by the managers and consequently varies with the level of insider ownership. Since managers may also tender, we are able to consider the case in which the firm has insider ownership of more than 50%. The outside shareholders are dispersed and their beliefs about the true share value has a uniform probability distribution.

We derived the theoretical relationship between insider ownership and the value of the firm for the whole range of insider ownership, which is non-linear.

As insider ownership increases from zero to some value, the firm value steadily increases and thereafter, as insider ownership increases to 100%, the firm value falls. The general pattern derived from the model is consistent with the empirical observations of McConnell and Servaes (1990). The point of inflection i.e. the level of managerial ownership at which the firm value attains its peak, depends on the parameters of the model. In particular, one of the important parameters of the model is the extent of heterogeneity of belief about the true value of the firm among outside shareholders. Possible extensions of the model to explain other empirical results in corporate finance are: first, allowing for an explicit probability distribution of the synergy and second, allowing for the possibility of more than one takeover bid, in the future.

In the empirical analysis, a significant non-linear relationship is observed between firm value and insider ownership for a cross-section of 880 U.S. non-financial firms observed in 1992. The firm value increases as insider ownership increases from zero to about 45% and then falls as insider ownership increases beyond 45%. This is consistent with the predictions of the model. For a sub-sample of the large, well-analyzed firms, the firm value increases as insider ownership increases from zero to about 57% and then falls. For a sub-sample of the small, less analyzed firms, the firm value increases as insider ownership increases from zero to about 40% and then decreases. As we move from large

firms to small firms, the point of inflection decreases (moves to the left) significantly. This observation is consistent with the predictions of the model.

The third essay deals with the relationship between ownership level of institutional investors and the value of the firm. The role of institutional investors are characterized by three behavioral hypotheses in the literature (Pound, 1988). Under the 'efficient monitoring' hypothesis, institutional investors have greater expertise to monitor the managers than small investors and so there is reduction in agency cost of monitoring, leading to higher firm value. Under the 'conflict-of-interest' or 'strategic alignment' hypotheses, institutional investors and managers act in unison because of other profitable business relationships with the firm and there is a negative relationship between level of institutional ownership and the value of the firm. In the model developed, we consider the effect of higher institutional ownership on firm value under each behavioral hypothesis.

The analysis shows that under efficient monitoring, higher institutional ownership increases firm value when insider ownership is low but the relationship is negative when insider ownership is high. The latter is in contrast with the commonly accepted notion that if institutional investors effectively monitor the managers, the firm value would increase with institutional ownership.

The theoretical model also implies that when institutional investors go along with the managers, higher institutional ownership increases firm value when

insider ownership is low but has no effect on firm value when insider ownership is high. The implications are interesting because even though the institutional investors are not monitoring the managers but are aligning with them, there is no adverse effect on firm value. Instead the firm value increases in one range of insider ownership.

Most publicly held firms have low levels of managerial ownership. Thus the model predicts that in any cross-section of firms, the observed relationship between institutional ownership and firm value will be positive, irrespective of the behavioral assumption on the part of institutional investors. This prediction is in contrast with Pound (1988) and consistent with the empirical results of McConnell & Servaes (1990). However, the theoretical results presented here show that an empirically observed positive relationship between institutional ownership and firm value cannot be taken as a confirmation of efficient monitoring.

The empirical analysis in the third essay shows a positive, significant relationship between institutional ownership and firm value for a set of firms contained in Stern-Stewart Performance 1000 database. In a sub-sample of firms with insider ownership of less than 45%, the relationship is positive and significant. However, for a sub-sample of firms with insider ownership greater than or equal to 45%, the relationship is negative but insignificant. This result

shows that the level of insider ownership is an important determinant of how institutional ownership affects the value of the firm. This is consistent with our theoretical model which predicts that the relationship between institutional ownership and firm value depends not only on the behavioral assumption about institutional investors but also on the level of insider ownership. A possible extension of this work is to study the actual behavior of institutional shareholders of individual corporations with differing levels of managerial ownership and test, more explicitly, the predictions of the theoretical model.

In the fourth essay, we develop a model to analyze optimal insider trading for various levels of insider ownership when there exist potential contests for corporate control. Insiders with superior information about the prospects of the firm can earn excess profits from insider trading. At the same time, insider trading affects the ownership level of the insiders which, in turn, affects the managers' ability to maintain corporate control.

The theoretical model implies that insiders' optimal trading activity depends on the level of insider ownership. When their ownership is low, insiders do not always sell shares upon receipt of unfavorable information, but they always buy upon receipt of favorable information. However, when insiders own a large block of shares, they always sell (buy) upon receipt of unfavorable (favorable) information.

The analysis of the model yields four empirical hypotheses. First (H1): For firms with low insider ownership, the volume of purchase transactions by insiders is more than that of sales transactions. This asymmetry in insider trading between purchases and sales is consistent with reported empirical observations in the literature (Seyhun, 1988), considering that insiders of most publicly held firms own small fraction of the shares. Second, we also show the existence of a threshold such that insiders sell only when they perceive the stock to be substantially overvalued (i.e. above the threshold). This leads to the empirical hypothesis (H2): For firms with low insider ownership, the market's reaction (in terms of abnormal returns) to sales by insiders is significantly greater, in magnitude, than its reaction to purchases by insiders. Third, as a complement to the second hypothesis, we derive the empirical hypothesis (H3): For firms with large insider ownership, there is no significant difference between the volumes of sales and purchases by insiders. Fourth, stock sales by insiders are not all information driven. Insiders may sell due to liquidity needs or purposes of portfolio diversification. Incorporating this liquidity trade, which makes a sales transaction by insiders a noisy signal, we derive the empirical hypothesis (H4): Market's reaction to sales by insiders is significantly more negative for small firms than for large firms. Future work in this area consists of testing these hypotheses on insider trading data over a sufficiently wide time window.

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