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ESTIMATING MANAGERS' UTILITY-MAXIMIZING DEMAND FOR AGENCY GOODS

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Abstract

An empirical model of managers' demand for agency goods is derived and estimated using the Almost Ideal Demand System of Deaton and Muellbauer (*AER* 1980). As in Jensen and Meckling (*JFE* 1976), we derive managers' demand for agency goods by maximizing a managerial utility function where managers allocate the potential value of their firm's assets to the consumption of agency goods and the production of market value (which, given their ownership stake, determines their wealth). The utility function is defined over wealth and the value of agency goods and is conditioned on managers' holdings of stock options, the proportion of the firm owned by outside block-holders, and the firm's capital structure. We obtain the maximum potential value of firms' assets by fitting a stochastic frontier (upper envelope) to the market value of assets given the investment in those assets. The difference between the potential market value of a firm's investment in its assets and their actual market value (corrected for statistical noise) is used to gauge managers' consumption of agency goods.

The demand function for agency goods (lost market value) is estimated using U. S. data on publicly traded bank-holding companies. Using the adding-up condition, the demand for asset value is derived from it and restated as the utility-maximizing Q ratio. We apply Slutsky's equation to decompose the effect of a variation in the proportion of the firm owned by managers into a substitution and a wealth effect, which parallel the alignment-of-interest effect and the entrenchment effect. By estimating financial performance in a choice-theoretic framework, the alignment and entrenchment effects of ownership can be identified econometrically. We find evidence that the strength of both effects increases with insider ownership, but ownership by outside block-holders mitigates the entrenchment effect.

Key Words: agency goods, efficiency, ownership structure, capital structure

JEL Codes: G32, G21, D21

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Introduction

When insiders do not own all of the firm they manage, the firm's outside owners subsidize the insiders' consumption of non-pecuniary benefits; hence, they consume more of these benefits than they would when they own the entire firm and pay the entire cost of these benefits. Jensen and Meckling (1976) define the *agency cost* of these misaligned incentives as the difference between the higher value of the firm when a manager owns all of the firm's equity and the lower value when the manager owns less of the equity. This *lost market value* represents the manager's consumption of agency goods, which could include consuming perquisites, building empires, discriminating prejudicially, shirking, using too much or too little risk to enhance control, and, in general, making incompetent or mediocre investment and production decisions.

In the theoretical model developed by Jensen and Meckling (1976), managers allocate the potential value of their firms' assets to the production of market value and to their consumption of agency goods. The proportion of the firm owned by managers represents their opportunity cost of consuming agency goods, and it determines their stake in the firms' potential value (their potential wealth) and in the market value they achieve (their achieved wealth). Given this "price" of agency goods and their potential wealth, managers' preferences for achieved wealth and for agency goods determine their utility-maximizing production of asset value and consumption of agency goods.

Empirical studies often document a statistically significant association between a firm's insider ownership and the market value its managers achieve.¹ They typically hypothesize that the *price effect* — a change in managerial ownership — involves two contrasting incentives. On the one hand, the *alignment-of-interests hypothesis* asserts that more ownership increases managers' opportunity cost of consuming agency goods and, thus, better aligns the interests of managers and outside owners. On the other hand, the *entrenchment hypothesis* maintains that more ownership gives insiders greater command over their firm's assets and, hence, greater ability to consume agency goods. When performance is positively associated with ownership, it is usually concluded that the alignment-of-interest effect dominates the entrenchment effect and *vice versa*. While these studies lack the formal theoretical framework necessary to identify these effects structurally, they have nevertheless informally constructed the comparative-static properties of the utility-maximizing production of asset value and consumption of agency goods. We use this insight to develop utility-maximizing performance equations whose logical structure permits the econometric estimation of alignment and entrenchment effects.

¹See, for example, Morck, Shleifer, and Vishny (1988), McConnell and Servaes (1990), Barclay, Holderness, and Pontiff (1993), and Holderness, Kroszner, and Sheehan (1999).

Using the Almost Ideal (AI) Demand System of Deaton and Muellbauer (1980a) to model managerial preferences, we derive and estimate managers' utility-maximizing demand for agency goods and their utility-maximizing production of market value (measured by a proxy for Tobin's Q ratio). We consider how a change in managerial ownership — the price of agency goods — affects the consumption of agency goods and the production of market value. In particular, we compute Slutsky's decomposition of the composite price effect into a substitution (alignment) effect, which represents the effect on market value of a better alignment of interests between insiders and outside owners, and a wealth (or entrenchment) effect, which captures the effect on market value of a greater command over the firm's assets. The logic of utility maximization implies that an increase in insider ownership (the price of agency goods) reduces the demand for agency goods through the alignment (substitution) effect and, if the consumption of agency goods is "normal," increases it through the entrenchment (wealth) effect. The composite effect depends on the relative magnitudes of the alignment and entrenchment effects.

The empirical implementation of the Jensen-Meckling (1976) model requires two important measures: the *potential value* of a firm's investment in assets and a measure of the *value of agency goods* consumed by the firm's managers. Agency costs arise from the diffusion of ownership and, in the Jensen-Meckling model, are measured against the value of private benefits the single owner-manager would consume.² However, the empirical implementation of our model relies on firms' achieved market value, which is practically obtained only from publicly traded firms. This reliance on publicly traded firms eliminates the zero-agency-cost benchmark of firms whose equity is entirely owned by a single manager since all publicly traded firms necessarily have owners who are outsiders. In the absence of single-owner-manager firms, we propose to gauge agency costs against *the value of those firms where agency costs are the lowest*. We measure a firm's lost market value — its agency costs — by the difference between the highest market value observed in the sample for the firm's investment in its assets and the market value its managers achieve for this investment. A proxy for the highest potential value of a firm's investment in its assets can be obtained by fitting a stochastic upper envelope to the market values of the firms' investment in those assets.³ The

²Ang, Cole, and Lin (2000) measure agency costs with data on privately held firms where some firms are entirely owned and managed by a single individual. By definition, these firms constitute the zero-agency-cost benchmark of Jensen and Meckling (1976). They compare various accounting ratios that gauge the cost and revenue efficiency of the benchmark firms to those of firms with alternative ownership and management structures. They find evidence of agency costs — higher operating costs and lower revenues — for firms where managers own less than 100 percent of their firm.

³See Greene (1997), Kumbhakar and Lovell (2000), and Bauer (1990) for a description of the stochastic frontier estimation technique, which was proposed by Jondrow, Lovell, Materov, and Schmidt (1982). Profit and cost functions are frequently estimated as stochastic frontiers. The market-value frontier was proposed by Hughes, Lang, Moon, and

stochastic frontier eliminates the influence of luck and answers the question, what is the highest potential value or, equivalently, the “best-practice” value of any given investment in assets. Because the stochastic envelope is fitted over the entire sample of firms, the best-practice value of any particular firm’s assets is independent of the firm’s own investment decisions. We use this best-practice value as a proxy for the *potential value* of a firm’s assets. And, the difference between a firm’s potential value and its (noise-adjusted) market value — its lost market value — gauges the value of its managers’ consumption of agency goods.

We apply the model to data on U. S. bank holding companies in 1994. The AI Demand System employs a flexible function form and fits the data well. All observations conform to the predictions of utility theory. In particular, for all 169 observations, the estimated alignment effect indicates that an increase in insider ownership is associated with an increase in the utility-maximizing Q ratio (or, equivalently, a reduction in the demand for agency goods). As expected, the alignment effect increases in strength with the proportion of the firm insiders own. And, for all 169 observations, the entrenchment (wealth) effect indicates that financial performance and insider ownership are negatively related. Again, the strength of this effect increases with the proportion of the firm insiders own. The entrenchment effect dominates the alignment effect for 144 holding companies while the alignment effect dominates the entrenchment effect for the remaining 25 banks. In the case of these 25 banks where the composite effect indicates that financial performance and insider ownership are positively related, the stake held by outside block-holders significantly exceeds that of banks where the composite effect is negative. Moreover, the relationship between the utility-maximizing Q ratio and the stake of outside block-holders is significantly positive when *insiders* own between 5 and 25 percent of their firm and significantly positive at the 0.16 level above 25 percent. Apparently, block-holders exert their most effective discipline on insiders when insiders own enough of their firm to exert some control themselves, but not too much control.

While using the utility maximization framework to estimate alignment and entrenchment effects is novel, the results we have summarized above and detail below suggest familiar hypotheses and intuitively reasonable relationships — relationships that elude other techniques of investigating agency conflicts which are not derived from the assumption of optimizing behavior. Because we derive the performance equation from a model of constrained utility maximization, it enjoys all the properties of a well-behaved demand function. In particular, the effect of a variation in insider ownership — the price of agency good

Pagano (1997) and has been employed by Hughes, Lang, Mester, and Moon (1999), Hughes, Lang, Mester, and Moon (2000), Hughes, Mester, and Moon (2001), and Hughes, Lang, Mester, Moon, and Pagano (2003).

consumption — on the utility-maximizing Q ratio and on the utility-maximizing consumption of agency goods can be decomposed into an alignment-of-interests effect and an entrenchment effect which can in turn be computed from the estimated performance equation. In contrast, other studies typically estimate *ad hoc* specifications of the performance equation. Various measures of firm performance are usually regressed on ownership structure and control variables. Some studies gauge firm performance by market value metrics, such as a proxy for Tobin's Q ratio, or by accounting ratios, such as the return on assets.⁴ Others use the stochastic frontier technique to obtain a measure of lost production or of lost market value, which they regress on ownership structure and controls.⁵ Some studies estimate a maximum profit function or a minimum cost function as a stochastic frontier to obtain a measure of lost profit or of excessive cost, which is then used in the estimation of the *ad hoc* performance equation.⁶ Although these two performance metrics are obtained from an optimizing function (fitted as a frontier), neither the profit function nor the cost function can explain how performance is related to the ownership incentives since they assume there are no agency conflicts: managers efficiently maximize profit. Hence, their logical structure is useless in *explaining* the role of managerial incentives: it serves only to generate a measure of performance for use in the estimation of the *ad hoc* performance equation.⁷ In contrast, the utility-maximizing performance equations can *explain* how performance is related to managerial incentives because they allow managers to trade performance for the consumption of agency goods. In addition, the logical structure of the performance equation permits the decomposition of the price effect and predicts the sign of the alignment effect.⁸

⁴For example, Morck, Shleifer, and Vishny (1988), McConnell and Servaes (1990), Barclay, Holderness, and Pontiff (1993), and Holderness, Kroszner, and Sheehan (1999) employ a proxy for Tobin's Q ratio in their performance regressions.

⁵Bottasso and Sembenelli (2002) fit a stochastic production function to obtain a measure of lost production while Palia and Lichtenberg (1999) use total factor productivity. Hughes, Lang, Mester, Moon, and Pagano (2003) measure performance using Tobin's Q ratio and also a measure of lost market value obtained by fitting a stochastic frontier to the market value of assets.

⁶DeYoung, Spong, and Sullivan (2001) measure performance by the magnitude of a firm's systematic failure to achieve its highest potential profit, which is obtained by estimating a stochastic profit frontier.

⁷The objective of managerial utility maximization has been used to derive profit and cost functions that account for production decisions that trade profit for other managerial objectives, which could include maximizing market value but could also include sacrificing value for agency good consumption. For the theory and application of these functions, see Hughes, Lang, Mester, and Moon (1996, 2000) and Hughes, Mester, and Moon (2001).

⁸Several studies have sought to disentangle entrenchment and alignment effects by considering firms whose ownership structure includes classes of stock that have voting rights but no cash-flow rights (for example, Claessens, Djankov, Fan, and Lang (2003) and LaPorta, Lopez-de-Silanes, and Shleifer (1999)). Such classes of stock are unusual in the United States. Adams and Santos (2003) focus on a notable exception: the common stock of U. S. banks that the

Section I that follows formalizes the managerial utility maximization framework and derives the Slutsky decomposition of the performance effect of a variation in managerial ownership. Section II adapts the Almost Ideal Demand System to model managerial preferences and to derive the utility-maximizing managerial demand for agency goods and firm value (expressed as a Q ratio). Section III explains the stochastic estimation technique used to obtain a firm's highest potential value and its lost market value. Section IV details the estimation and the data. Section V investigates how ownership structure, the size of investment opportunities, and capital structure influence managers' demand for agency goods and production of market value.

I. Deriving the Demand for Agency Goods from a Managerial Utility Function

In the Jensen-Meckling (1976) framework, the managerial utility function is defined over managers' wealth and the value of agency goods consumed. The value of agency goods consumed, V_B , is given by the difference between the potential value, V_P , of the firm's assets and their actual market value, V_A ; hence, $V_P - V_A = V_B$. If managers own the proportion, α_E , of their firm, their gross wealth, W , is given by their claim on the market value of their firm's assets, $\alpha_E V_A$, so that $W = \alpha_E V_A$.⁹ Utility will be defined over *gross* wealth, W , and, to account for *net* wealth, utility is conditioned on two arguments that capture the firm's debt: the book-value of the firm's assets, A , and the book-value ratio of equity capital to total assets, k . The utility function is also conditioned on a vector, θ , of environmental variables that influence the market value of the firm's debt and equity. For a given amount of assets, a higher capital ratio implies that less debt is used to finance production, which can be expected to influence managers' preferences in several ways. First, less debt and more equity funding, given managers' ownership stake, increases their net wealth. Second, less debt means that there is less pressure on managers who must produce enough revenue to cover the debt payments to avoid financial distress.¹⁰ Finally, less debt reduces the under-investment problem associated with debt.¹¹ Managers' propensity to consume agency goods is also influenced by the degree of monitoring they face from

banks' managers control through their trust departments. Unfortunately, in the case of the United States, the paucity of such classes of stock limit the applicability of this technique. Disentangling the alignment and entrenchment effects when voting rights entail cash-flow rights requires a model built on a *logical* structure that links incentives to performance and that exploits the role of managerial ownership as a "price" — an opportunity cost of consuming agency goods.

⁹Wealth from sources other than the firm's assets is ignored in this formalization.

¹⁰See Jensen (1986).

¹¹See Myers (1977).

stakeholders. While atomistic outside owners have little incentive to monitor, outside owners of large blocks of equity have a much greater incentive to discipline insiders.¹² Thus, the proportion of the equity owned by outside block-holders, α_B , is used as a control variable. Since the value of stock options granted to managers is not included in this definition of wealth, the *quantity* of stock options granted, stated as a proportion, α_O , of outstanding shares, is included in the utility function as a conditioning argument. Letting $\mathbf{z} = (\alpha_B, \alpha_O, k, A, \theta)$, the utility function is given by $U = (W, V_B; \mathbf{z})$.

The opportunity set from which managers choose W and V_B is defined by their claim on the maximum potential value of their firm's assets, $\alpha_E V_P$. Letting $X = \alpha_E V_P$, the "budget" constraint managers face is given by $X - W - \alpha_E V_B = 0$. Assuming a well-behaved utility function and an interior optimum, the utility-maximizing production of wealth, W^* (or value, V_A^*) and consumption agency goods, V_B^* , is given by the solution to the problem,

$$\max_{V_A, V_B} U(W, V_B; \mathbf{z}) \quad (1a)$$

$$\text{s.t. } X - W - \alpha_E V_B = 0. \quad (1b)$$

The first order conditions require that $(\partial U / \partial V_B) / (\partial U / \partial W) = \alpha_E$, so that the marginal rate of substitution of wealth for private benefits equals the opportunity cost of consuming a dollar of agency goods — the *proportion* of the firm owned by managers. The utility-maximizing demand functions for value and agency goods are denoted

$$V_A^* = V_A(\alpha_E, X, \mathbf{z}) \quad (2a)$$

and

$$V_B^* = V_B(\alpha_E, X, \mathbf{z}). \quad (2b)$$

The demand for wealth follows trivially from the demand for firm value:

$$W^* = \alpha_E V_A(\alpha_E, X, \mathbf{z}). \quad (2c)$$

The utility-maximizing equilibrium is illustrated in Figure 1. The trade-off between the value of the firm's assets and the value of managers' consumption of agency goods is given by the line $V_P V_B$ whose slope

¹²The evidence on the influence of block-holders is inconclusive. See, for example, McConnell and Servaes (1990) and Barclay, Holderness, and Pontiff (1993).

is -1. Managers' trade-off between their wealth and their consumption of agency goods is defined by the line $\alpha_E^0 V_P V_B$ whose slope is $-\alpha_E^0$. The utility-maximizing combination of wealth and agency goods, W_0 and V_B^0 , is designated by point A, and the resulting value of the firm's assets is given by V_A^0 .

The effect of a variation in managers' ownership on their consumption of agency goods is also illustrated in Figure 1. The improved trade-off between wealth and agency goods on the line $\alpha_E^1 V_P V_B$, whose slope is $-\alpha_E^1$, represents an increase in the proportion of the firm owned by managers. At point B, the new equilibrium, the demand for agency goods increases from V_B^0 to V_B^1 . On the other hand, the value of the firm's assets falls from V_A^0 to V_A^1 . In contrast, if the new equilibrium had occurred at point D instead of B, the demand for agency goods would have decreased and the value of the firm's assets would have increased. The effect of a variation in manager's ownership on their consumption of agency goods is given formally by the derivative of (2b),

$$\partial V_B^*/\partial \alpha_E = \partial V_B(\alpha_E, X, \mathbf{z})/\partial \alpha_E + [\partial V_B(\alpha_E, X, \mathbf{z})/\partial X]V_P. \quad (3)$$

The first term, $\partial V_B(\alpha_E, X, \mathbf{z})/\partial \alpha_E$, measures the change in demand for agency goods for a given opportunity set, $X (= \alpha_E V_P)$. This effect is analogous to the "total effect" of a price change *for a given level of income* in the standard formulation of a utility-maximizing demand function. In this case, though, the price change increases "income" — the size of the opportunity set — and, thus, induces an additional component of the "total effect." An increase in managers' ownership claim on the firm is not only an increase in the opportunity cost of consuming agency goods, it is also an increase in managers' ownership stake in their firm's potential value, from which they consume agency goods and produce value. The second term, $[\partial V_B(\alpha_E, X, \mathbf{z})/\partial X]V_P$, captures the effect on demand of the change in the size of the opportunity set, $X = \alpha_E V_P$. This two-component price effect is analogous to the effect on labor supply of a change in the wage rate.¹³

The first term of the total effect, $\partial V_B(\alpha_E, X, \mathbf{z})/\partial \alpha_E$, can be decomposed further into the standard substitution and "income" (or wealth) effects by the use of Slutsky's equation. The substitution effect captures the effect on the demand for agency goods of a price change after compensating for the wealth effect of the price change. Hence, it focuses on the change in *opportunity cost* of consuming agency goods and gauges the effect of a *better alignment of interests* between managers and outside owners on managers' demand. In Figure 1, the substitution effect is defined by the compensated equilibrium, point C, on the original indifference curve. After compensating so that utility remains constant when the price of agency

¹³For a discussion of the Slutsky decomposition of labor supply, see Deaton and Muellbauer (1980b, 86-93).

goods increases, the (compensated) demand for agency goods falls from V_B^0 to V_B^C . This decomposition can be conveniently derived using the expenditure function,

$$E(U, \alpha_E, \mathbf{z}) = \min_{V_A, V_B} \{W + \alpha_E V_B \text{ s.t. } U(W, V_B; \mathbf{z}) = U^0\}, \quad (4)$$

which gives the minimum expenditure, $E(U, \alpha_E, \mathbf{z})$, on wealth and agency goods required to achieve the level of utility, U^0 . Let U^* denote the maximum value of the utility index in problem (1a) for a given potential value of the firm, X^0 , in the constraint (1b). Setting $U^0 = U^*$ in (4), the minimum expenditure, $W + \alpha_E V_B$, on wealth and agency goods that achieves this level of utility is given by $E(U, \alpha_E, \mathbf{z}) = X^0$.¹⁴ Thus, the utility-maximizing demands are equal to the expenditure-minimizing demands. The expenditure minimizing demands are denoted by

$$V_A^U(\alpha_E, U, \mathbf{z}) \quad (4a)$$

and

$$V_B^U(\alpha_E, U, \mathbf{z}). \quad (4b)$$

As in the standard consumer theory, Shephard's lemma can be applied to the expenditure function to obtain the expenditure-minimizing demand for agency goods without having to solve an optimization problem:¹⁵

$$\partial E / \partial \alpha_E = V_B^U(\alpha_E, U, \mathbf{z}); \quad (5)$$

¹⁴The expenditure function equals the amount of potential wealth, X , that achieves the required utility at the price, α_E , and the values of the conditioning variables, \mathbf{z} . Hence, the potential value of the firm's assets is varied to compensate for changes in the price of agency goods. In the labor supply model, this expenditure metric would equal the value of "full income" due to the number of hours available for work and leisure. Rather than vary the number of hours available to compensate for a wage change, the labor supply model introduces "nonwage income" so that the number of hours available for leisure and work are fixed. In the case of modeling managerial investment decisions, compensating for changes in the price of agency goods in terms of the potential value of the managers' investments is intuitively and practically more interesting than compensating in terms of their sources of wealth not associated with their firm's cash flow.

¹⁵The Lagrangean function evaluated at the optimum, $\mathcal{L}^* = \alpha_E V_A^* + \alpha_E V_B^* + \lambda^*[U(\alpha_E V_A^*, V_B^*; \mathbf{z}) - U^0]$, gives the expenditure function. The expenditure-minimizing demand for agency goods follows from the derivative, $\partial \mathcal{L}^* / \partial \alpha_E = \partial E / \partial \alpha_E = V_A^* + V_B^* + \lambda^*[\partial U / \partial W][V_A^*] = V_B^*$ since the first-order condition, $\lambda^*[\partial U / \partial W] = -1$, holds at the optimum.

and, since the expenditure function is a concave function of α_E ,¹⁶ the expenditure-minimizing demand for agency goods is inversely related to their “price:”

$$\partial^2 E / \partial \alpha_E^2 = \partial V_B^U(\alpha_E, U, \mathbf{z}) / \partial \alpha_E < 0, \quad (6)$$

which implies that the substitution effect (alignment-of-interests effect) on the demand for agency goods of an increase in their price is negative. As noted previously, this effect is illustrated in Figure 1 by the equilibria at points A and C.

There is a basic identity between a good’s expenditure-minimizing demand and its utility-maximizing demand for agency goods. The expenditure-minimizing demand for agency goods, (4b), holds the value of the utility index constant, and the utility-maximizing demand, (2b), holds the managers’ claim on the potential value of their firm (“expenditure”) constant. These two functions can be made identically equal by substituting the expenditure function (4) for the managers’ claim on the firm’s potential value, X , in the utility-maximizing demand function (2b):

$$V_B(\alpha_E, E(U, \alpha_E, \mathbf{z}), \mathbf{z}) \equiv V_B^U(\alpha_E, U, \mathbf{z}). \quad (7)$$

Differentiating this expression with respect to the “price” of agency goods, α_E , gives the Slutsky decomposition of the derivative, $\partial V_B(\alpha_E, X, \mathbf{z}) / \partial \alpha_E$, into a substitution effect, which holds utility constant, and a wealth effect, which holds the price constant:

$$\partial V_B(\alpha_E, X, \mathbf{z}) / \partial \alpha_E + (\partial V_B(\alpha_E, X, \mathbf{z}) / \partial X)(\partial E / \partial \alpha_E) = \partial V_B^U(\alpha_E, U, \mathbf{z}) / \partial \alpha_E, \quad (8)$$

which can be simplified by using Shephard’s lemma (5), $\partial E / \partial \alpha_E = V_B^U(\alpha_E, U, \mathbf{z}) = V_B^*$,

$$\partial V_B(\alpha_E, X, \mathbf{z}) / \partial \alpha_E = \partial V_B^U(\alpha_E, U, \mathbf{z}) / \partial \alpha_E - (\partial V_B(\alpha_E, X, \mathbf{z}) / \partial X) V_B^*. \quad (9)$$

The term, $\partial V_B(\alpha_E, X, \mathbf{z}) / \partial \alpha_E$, holds managers’ claim the their firm’s potential value constant and gives the

¹⁶To prove concavity, let $U = U^0$, and consider two values, $\alpha_E = \alpha_E^0, \alpha_E^1$. The minimum expenditure of achieving U^0 at these values is given by $E(U^0, \alpha_E^0, \mathbf{z}) = \alpha_E^0 V_A^0 + \alpha_E^0 V_B^0$ and $E(U^0, \alpha_E^1, \mathbf{z}) = \alpha_E^1 V_A^1 + \alpha_E^1 V_B^1$. Let $\alpha_E^t = t\alpha_E^0 + (1-t)\alpha_E^1$ where $0 < t < 1$. The minimum expenditure when α_E^t is given by $E(U^0, \alpha_E^t, \mathbf{z}) = \alpha_E^t V_A^t + \alpha_E^t V_B^t = (t\alpha_E^0 + (1-t)\alpha_E^1)V_A^t + (t\alpha_E^0 + (1-t)\alpha_E^1)V_B^t = t\alpha_E^0(V_A^t + V_B^t) + (1-t)\alpha_E^1(V_A^t + V_B^t)$. Since $E(U^0, \alpha_E^0, \mathbf{z}) < \alpha_E^0(V_A^t + V_B^t)$ and $E(U^0, \alpha_E^1, \mathbf{z}) < \alpha_E^1(V_A^t + V_B^t)$, $E(U^0, \alpha_E^t, \mathbf{z}) > tE(U^0, \alpha_E^0, \mathbf{z}) + (1-t)E(U^0, \alpha_E^1, \mathbf{z})$. Hence, minimum expenditure is a concave function of α_E .

effect of a price change on the demand for agency goods. This effect is decomposed into a substitution effect, $\partial V_B^U(\alpha_E, U, \mathbf{z})/\partial\alpha_E$, and a wealth effect, $-(\partial V_B(\alpha_E, X, \mathbf{z})/\partial X)V_B^*$. A change in α_E generates two types of wealth effects. As noted above in (3), an increase in α_E increases managers' claim on their firm's potential value, $X (= \alpha_E V_P)$. But, when this claim is held constant, as it is in the derivative, $\partial V_B(\alpha_E, X, \mathbf{z})/\partial\alpha_E$, an increase in α_E reduces managers' purchasing power. Thus, the wealth effect in this Slutsky decomposition captures the effect of this particular change in purchasing power on the demand for agency goods. From (6), the substitution effect is negative: an increase in α_E tends to reduce the demand for agency goods. When agency goods are normal goods, $\partial V_B(\alpha_E, X, \mathbf{z})/\partial X > 0$, the wealth effect in (9) reinforces the substitution effect.

The decomposition in (9) can be substituted into (3), the decomposition of the total effect:

$$\partial V_B^*/\partial\alpha_E = \partial V_B^U(\alpha_E, U, \mathbf{z})/\partial\alpha_E - [\partial V_B(\alpha_E, X, \mathbf{z})/\partial X]V_B^* + [\partial V_B(\alpha_E, X, \mathbf{z})/\partial X]V_P. \quad (10)$$

The decomposition consists, then, of a negative substitution effect and two types of wealth effects which differ in sign. These two wealth effects can be simplified:

$$\begin{aligned} \partial V_B^*/\partial\alpha_E &= \partial V_B^U(\alpha_E, U, \mathbf{z})/\partial\alpha_E + [\partial V_B(\alpha_E, X, \mathbf{z})/\partial X][V_P - V_B^*] \\ &= \partial V_B^U(\alpha_E, U, \mathbf{z})/\partial\alpha_E + [\partial V_B(\alpha_E, X, \mathbf{z})/\partial X]V_A^*. \end{aligned} \quad (11)$$

Thus, the total effect consists of a negative substitution effect and a *composite* wealth effect that is positive when agency goods are normal. *The substitution effect corresponds to the alignment-of-interests effect while the composite wealth effect corresponds to the entrenchment effect.* Figure 1 illustrates the composite wealth effect by the two equilibria at points C and B. Thus, the effect on the demand for agency goods of a better opportunity set, holding the price of agency goods constant, is given by the increase in demand for agency goods from V_B^C to V_B^1 .

A similar decomposition can be obtained for the utility-maximizing demand for firm value:

$$\partial V_A^*/\partial\alpha_E = \partial V_A^U(\alpha_E, U, \mathbf{z})/\partial\alpha_E + [\partial V_A(\alpha_E, X, \mathbf{z})/\partial X]V_A^*. \quad (12)$$

Since $V_P = V_B + V_A$, the total effect of a change in the price of agency goods on the demand for value must be the negative of the total effect on the demand for agency goods: $\partial V_A^*/\partial\alpha_E = -\partial V_B^*/\partial\alpha_E$ when $dV_P = 0$.

Thus, when the demand for agency goods is positively related to α_E , the demand for value must be negatively related.

II. Adapting the Almost Ideal Demand System to Obtain Managers' Demand for Agency Goods

The estimation of consumer demand functions recovers consumers' preferences for goods and services from budget data. Similarly, the estimation of the demand functions for wealth and agency goods recovers managers' preferences for value and private benefits. We adapt the expenditure function of the Almost Ideal (AI) Demand System (Deaton and Muellbauer, 1980a) to represent managerial preferences for wealth and agency goods and use it to derive the utility-maximizing demand functions (2a) and (2b) for firm value and for agency goods. First, Shephard's lemma is applied to the adapted AI expenditure function to obtain the expenditure-minimizing demands. Second, the expenditure function is inverted to derive the AI indirect utility function, and then the indirect utility function is substituted into the expenditure-minimizing demands to transform them into the utility-maximizing demands that will be estimated.

The AI expenditure function adapted to represent managerial preferences for wealth and agency goods is given by

$$\ln E(U, \alpha_E, \mathbf{z}) = \ln P + U\beta_0\alpha_E^{\beta_E}K^{\beta_K}A^{\beta_A}. \quad (13)$$

where $\ln P = \alpha_0 + \sum_i \alpha_i \ln s_i + (1/2)\sum_i \sum_j \alpha_{ij} \ln s_i \ln s_j$, letting $\mathbf{s} = (\alpha_E, \mathbf{z})$. Inverting the expenditure function and recalling that $E(U, \alpha_E, \mathbf{z}) = X$ yields the indirect utility function,

$$U(\alpha_E, X, \mathbf{z}) = [\ln X - \ln P]/\beta_0\alpha_E^{\beta_E}K^{\beta_K}A^{\beta_A}. \quad (14)$$

The expenditure-minimizing demand for agency goods, expressed as a share of total expenditure X , is obtained by applying Shephard's lemma to the expenditure function and substituting the indirect utility function for the utility argument:¹⁷

¹⁷From equation (5), $(\partial E/\partial \alpha_E)(\alpha_E/X) = \partial \ln E/\partial \ln \alpha_E = \alpha_E V_B^*/X$. Applying Shephard's lemma to (13) results in $\partial \ln E/\partial \ln \alpha_E = \partial \ln P/\partial \ln \alpha_E + \beta_E U\beta_0\alpha_E^{\beta_E}K^{\beta_K}A^{\beta_A}$. The utility-maximizing demand for agency goods is obtained by substituting the indirect utility function (14) for U in the expenditure-minimizing demand: $\partial \ln E/\partial \ln \alpha_E = \partial \ln P/\partial \ln \alpha_E + [\beta_E\beta_0\alpha_E^{\beta_E}K^{\beta_K}A^{\beta_A}][\ln X - \ln P]/\beta_0\alpha_E^{\beta_E}K^{\beta_K}A^{\beta_A} = \partial \ln P/\partial \ln \alpha_E + \beta_E [\ln X - \ln P]$.

$$\alpha_E V_B^*/X = \partial \ln P / \partial \ln \alpha_E + \beta_E [\ln X - \ln P]. \quad (15)$$

Since $X = W + \alpha_E V_B$, the utility-maximizing share equation for wealth is given by

$$\alpha_E V_A^*/X = 1 - \alpha_E V_B^*/X. \quad (16)$$

Because the share equations (15) and (16) sum to one, one of the equations must be dropped in the estimation. Hence, only the share equation for agency goods (15) is estimated.

The share equations for agency goods and value can be simplified:

$$\alpha_E V_B^*/X = V_B^*/V_P, \quad (17)$$

which is the ratio of lost market value to potential value, the proportion of potential value which is not achieved by the incumbent managers. Hence, the agency good's share in potential value is an *inefficiency* ratio. On the other hand, the share of achieved value in potential value is an *efficiency* ratio:

$$\alpha_E V_A^*/X = V_A^*/V_P. \quad (18)$$

Of course, the two ratios sum to one.

Tobin's Q ratio is commonly used to gauge firms' financial performance. The utility-maximizing share of market value in potential market value can easily be transformed into the utility-maximizing Q ratio — the ratio of the utility-maximizing market value of assets to a proxy for the replacement-cost investment in assets:

$$(V_A^*/V_P)(V_P/A) = V_A^*/A = Q^* \quad (19)$$

where A , the book-value of assets (net of goodwill). The *utility-maximizing Q ratio* equation shares all the logical properties of the utility-maximizing share equations for agency goods and achieved value. Hence, the effect on the Q ratio of a variation in managerial ownership can be decomposed into a substitution (alignment-of-interest) effect and a wealth (entrenchment) effects. The empirical results that follow are derived both in terms of the utility-maximizing share of agency goods in potential value, which is an *inefficiency ratio*, and in terms of the utility-maximizing Q ratio, which is an *efficiency ratio*.

III. Estimating Potential Market Value from a Stochastic Upper Envelope

The highest potential market value of a firm's investment in assets can be determined by fitting a stochastic upper envelope to firms' market values as a function of a proxy for their replacement-cost investment in the assets, the book value of the assets net of goodwill. This frontier answers the question, what is the highest potential value of any given investment in assets — or, more precisely, what is the highest observed value or the “best-practice” value of the investment? The difference between the frontier value of a firm's investment and the (noise-corrected) achieved value of its investment is the firm's *lost market value*. The stochastic frontier technique eliminates the influence of luck from achieved market value.

Letting MVA_i denote the market value of the i -th firm's assets and BVA_i , their book value less goodwill,¹⁸ the stochastic frontier of market values is defined by

$$MVA_i = \alpha + \beta (BVA_i) + \gamma (BVA_i)^2 + \epsilon_i, \quad (20)$$

which is estimated by maximum likelihood techniques. The composite error term, $\epsilon_i = v_i - \mu_i$, distinguishes statistical noise, $v_i \sim \text{iid } N(0, \sigma_v^2)$, from the systematic shortfall, $\mu_i (\geq 0) \sim \text{iid } N(0, \sigma_\mu^2)$ — i.e., the shortfall from the firm's highest potential (frontier) market value. The quadratic specification allows the frontier to be nonlinear. The frontier value, $FMVA_i$, is defined by the deterministic kernel of the stochastic frontier,

$$FMVA_i = \alpha + \beta (BVA_i) + \gamma (BVA_i)^2. \quad (21)$$

The stochastic frontier, $SFMVA_i$, consists of the deterministic kernel and the two-sided error term: $SFMVA_i = FMVA_i + v_i$.

The firm's market-value shortfall, μ_i , is given by the difference between its stochastic frontier market value and the observed market value, or, equivalently, between its value on the deterministic kernel of the frontier and its noise-adjusted market value:

$$\mu_i = SFMVA_i - MVA_i = FMVA_i - (MVA_i - v_i), \quad (22)$$

¹⁸Since goodwill accounts for assets in terms of market value, it must be subtracted from book value to obtain a proxy for replacement cost. See Demsetz, Saidenberg, and Strahan (1996). The market value of assets is proxied by the market value of equity plus the book value of liabilities.

where $(MVA_i - v_i)$ is the noise-adjusted, observed market value of assets. The shortfall, μ_i , cannot be directly measured: hence, it is estimated as the expectation of μ_i conditional on ϵ_i :

$$E(\mu_i | \epsilon_i) = FMVA_i - (MVA_i - E(v_i | \epsilon_i)). \quad (23)$$

This procedure is described in detail in Bauer (1990), Greene (1997), Kumbhakar and Lovell (2000), and Jondrow, Lovell, Materov, and Schmidt (1982).

In the empirical specification of the AI share equations, the potential value, V_{Pi} , of a firm's assets is given by the deterministic kernel, $FMVA_i$, of the stochastic frontier. The achieved value, V_{Ai} , is proxied by the noise-adjusted market value, $(MVA_i - E(v_i | \epsilon_i))$. The consumption of agency goods, V_{Bi} , is given by $E(\mu_i | \epsilon_i)$ in equation (23), the difference between the potential value of the firm and the noise-adjusted market value.

IV. The Estimation and the Data

By adding an error term, u , to the right-hand side of (15), we arrive at the following regression equation which gives the demand for agency goods expressed as a share of the assets' potential value:

$$\alpha_E V_B^* / X = \partial \ln P / \partial \ln \alpha_E + \beta_E [\ln X - \ln P] + u. \quad (24)$$

The error term, u , in the share equation represents managers' optimization error in the maximization of their utility.

The data consist of 169 publicly traded, highest-level, U. S. bank holding companies in 1994. A highest-level holding company is not owned by another holding company. Holding companies that commenced operations after June 1986 are excluded as *de novo* banks. Other excluded holding companies include those in unit banking states and those operating as nonbank banks or special purpose banks. The data were obtained from the Federal Reserve Y-9C Consolidated Financial Statements, the Compustat data base, proxy statements, and Compact Disclosure.

Returning to the AI expenditure function (13) and indirect utility function (14) together with the expression, $\ln P = \alpha_0 + \sum_i \alpha_i \ln s_i + (1/2) \sum_i \sum_j \alpha_{ij} \ln s_i \ln s_j$ where $\mathbf{s} = (\alpha_E, \mathbf{z})$ and $\mathbf{z} = (\alpha_B, \alpha_O, k, A, \theta)$, we consider the following ten variables that comprise \mathbf{s} :

ownership structure variables¹⁹

α_E = *Insider ownership* = the percentage of outstanding shares held by officers and directors;

α_O = *Options granted* = the percentage of outstanding shares represented by stock options granted to senior managers;

α_B = *Outside block-holder ownership* = the percentage of outstanding shares held by outside block-holders (holders of 5 percent or more of outstanding shares);

other control variables

k = *capital-to-asset ratio* = ratio of the book-value of equity to the book-value of assets at the end of 1994;

A = *Asset size* = book value of total assets (less goodwill) at the end of the 1994;

θ_1 = *asset quality* = sum of nonperforming loans and gross charge-offs;

θ_2 = *macro growth rate* = weighted average GDP growth rate over 1985-1994 in the states in which the bank operated in 1994, where its deposit shares in the states are the weights;

θ_3 = *macro unemployment rate* = weighted average unemployment rate over 1985-1994 in the states in which the bank operated in 1994, where its deposit shares in the states are the weights;

θ_4 = *index of macroeconomic diversification* = $1/[\mathbf{h}'\mathbf{V}\mathbf{h}]^{1/2}$ where \mathbf{V} is a matrix of variances and covariances in state unemployment rates over 1985-94 and \mathbf{h} is a vector of a BHC's deposit shares in each state;

θ_5 = *Herfindahl index of market power* = bank's weighted share of deposits in the markets in which the bank operates;

and, in addition to the variables that comprise \mathbf{s} , the

share variables derived from the stochastic frontier estimation²⁰

V_p = *Size of investment opportunity set* = the highest potential value of the bank's assets in the

¹⁹The data on insider ownership and options granted to insiders reflect compensation received through 1994, which in turn reflect performance through 1993. Thus, the incentives inherent in these data on ownership predate and potentially influence financial performance in 1994. The data for these ownership variables were obtained from proxy statements and Compact Disclosure.

²⁰As noted in Section III, the market value of assets is proxied by the market value of equity plus the book value of liabilities. Market values used to compute potential value, noise-adjusted achieved value, and agency good consumption are measured at year-end 1994.

markets in which it operates, which is measured using stochastic frontier techniques (described below and defined in equation (21));

$V_A = \text{noise-adjusted market value of assets} = MVA_i - v_i$; and

$V_B = \text{consumption of agency goods} = E(\mu_i | \epsilon_i)$.

The data are summarized in Table 1.

Because some banks do not grant options to managers and others have no ownership by outside block-holders, we amend the logarithmic specification of the $\ln P$ expression in (24) in the following ways. First, we define a function *zeroln* which returns zero for zero-valued observations and $\ln(\text{value})$ for positive valued observations. Second, we define two dummy variables, d_B and d_O , which return one when α_B and α_O equal zero, and, to save degrees of freedom, we interact them in $\ln P$ only with the constant, $\alpha_{0B}d_B$ and $\alpha_{0O}d_O$, and with the proportion of managerial ownership, $\alpha_{EB}d_B(\ln\alpha_E)$ and $\alpha_{EO}d_O(\ln\alpha_E)$. Hence, the expression $\ln P$ becomes the following:

$$\begin{aligned} \ln P = & \alpha_0 + \alpha_{0B}d_B + \alpha_{0O}d_O + \alpha_{EB}d_B(\ln\alpha_E) + \alpha_{EO}d_O(\ln\alpha_E) \\ & + \sum_i \alpha_i(\text{zeroln } s_i) + (1/2)\sum_i \sum_j \alpha_{ij}(\text{zeroln } s_i)(\text{zeroln } s_j) \end{aligned} \quad (25)$$

where $s = (\alpha_E, z)$ and $z = (\alpha_B, \alpha_O, k, A, \theta)$.

Imposing symmetry on the coefficients of $\ln P$, we can identify seventy-one parameters: α_0 , ten α_i 's, fifty-five α_{ij} 's, α_{0B} , α_{0O} , α_{EB} , α_{EO} , and β_E . We cannot identify β_0 , β_K , and β_A . The expression $\partial \ln P / \partial \ln \alpha_E$ appearing on the right-hand side of the regression equation (24) is linear in the set of identifiable parameters while $\beta_E[\ln X - \ln P]$ is nonlinear in the set of identifiable parameters unless Stone's linear approximation is applied to $\ln P$. Since the bias resulting from the Stone approximation is well noted by Pashardes (1993), Buse (1994), and Moschini (1995), we do not apply it. Hence, we treat (24) as a nonlinear regression equation and use nonlinear least squares (NLS) estimation to obtain parameter estimates and their asymptotic standard errors.

V. Empirical Evidence on Agency Conflicts and Entrenchment

Evidence of agency conflicts is often sought in the statistical relationship between financial performance and ownership structure. Our specification of the performance equation (24) differs from the standard specification in that it represents utility-maximizing managerial decisions — the managers' allocation of the potential value of their firm's assets between their consumption of agency goods and the production of market value. Thus, the performance equation can be interpreted as the managers' demand

for agency goods or, in terms of achieved value, their demand for asset value. The estimated performance equation (24) is expressed as the share of agency goods in the potential value of the firm's assets, $\alpha_E V_B^*/X$, which is equal to an inefficiency ratio, V_B^*/V_P , lost market value as a proportion of potential value. Equivalently, using the identity, $V_A^*/V_P + V_B^*/V_P = 1$, the inefficiency ratio can be transformed into an efficiency ratio, V_A^*/V_P , (noised-adjusted) achieved value as a proportion of potential value. And, to express this ratio in more familiar terms, we use the transformation in (19) to calculate the utility-maximizing Tobin's Q ratio, $V_A^*/A = Q^*$.

We look for evidence of agency conflicts in the fitted values of the derivatives $\partial Q^*/\partial \ln \mathbf{t}$ and $\partial(V_B^*/V_P)/\partial \ln \mathbf{t}$, where $\mathbf{t} = (\alpha_E, \alpha_B, \alpha_O, X, k, A)$. These derivatives are semi-elasticities: they give the change in the efficiency ratio, Q^* , and the inefficiency ratio, V_B^*/V_P , that are associated with a proportional change in a component of \mathbf{t} . Since the estimated performance equation, (24), is flexible in \mathbf{t} , the value of these derivatives differs across observations. Thus, we report the mean value of the derivatives for the full sample and for sub-samples that capture important differences among banks, such as the level of insider ownership and the level of outside block-holder ownership. The semi-elasticities of Q^* are reported in Table 2 and those of V_B^*/V_P , in Table 3. Since these two performance measures are related by the budget identity, $V_A^*/V_P + V_B^*/V_P = 1$, in the constrained utility maximization problem, they necessarily agree. Hence, we focus on the more familiar Q results reported in Table 2.

Before turning to the findings of the regression analysis, we consider the summary statistics in Table 1 for the sample divided into the inefficient half and the efficient half where the division is effected by the median value of the inefficiency ratio, V_B^*/V_P . Inefficient banks are distinguished from efficient banks by a higher proportion of insider ownership, a lower proportion of outside block-holder ownership, a higher capital-to-assets ratio, more valuable investment opportunities (a higher ratio of potential value to book value), and a smaller amount of total assets. While these differences suggest familiar hypotheses linking performance to ownership structure, the role of asset size (and other relevant factors) in driving the results cannot be ignored. Hence, we turn to the multi-variate analysis of the performance effects of these factors.

A. Performance Effects of a Variation in Insider Ownership

In Table 2, the relationship between the utility-maximizing Q^* and a proportional variation in insider ownership is reported in three different ways. In the second column, the composite (uncompensated) price effect of a variation in insider ownership is reported as a semi-elasticity. From Slutsky's equation (11), the composite price effect is decomposed into a substitution (compensated) semi-elasticity and a composite wealth semi-elasticity, which are reported in the third and fourth columns respectively. The means of these

three components that constitute the Slutsky relationship are then computed for various sub-samples.

Measured by the estimated composite price effect, the utility-maximizing Q^* ratio and the proportion of the firm owned by insiders are negatively related for 144 banks and positively related for 25 banks. All 169 observations yield a positive-valued substitution semi-elasticity and a negative-valued composite wealth semi-elasticity. The substitution semi-elasticity holds utility constant and answers the question, what is the effect on performance of an increase in insider ownership after eliminating (compensating for) the wealth effect of the variation? As such, it reflects the effect on performance of a better alignment of interests between inside and outside owners that results from the increased level of insider ownership. Its positive value for all 169 observations conforms to the prediction of utility theory: a higher price of agency goods results in a substitution of achieved market value (wealth) for agency goods. An increase in insider ownership also increases managers' control over the potential value of their firms' assets. The composite wealth semi-elasticity holds ownership (price of agency goods) constant and answers the question, what is the effect on performance of an increase in the potential value of the assets managers control? The negative-valued composite wealth effect for all 169 observations indicates that when the potential value under managers' control increases, their consumption of agency goods increases proportionately more than their production of value so that the relative share of achieved market value (Q ratio) falls. For 144 banks whose composite price effect is negative, the entrenchment (wealth) effect dominates the alignment (substitution) effect; while, for the remaining 25 banks with a positive composite price effect, the alignment effect dominates the entrenchment effect. The second and third columns of Table 4 report how these two groups of banks differ. Interestingly, the mean level of insider ownership does not differ, but the mean level of outside block-holder ownership equals 11.5 percent at banks where alignment dominates while it equals 1.9 percent where entrenchment dominates. In addition, banks in the group where entrenchment dominates are larger and have higher capital-to-assets ratios. To explore the robustness of these comparisons and the plausibility of these semi-elasticities, we evaluate the means of the semi-elasticities for various partitions of the sample, such as by the level of insider ownership, the level of outside block-holder ownership, and the level of assets. Table 2 lists these partitions in the first column and reports the mean semi-elasticities in the remaining columns.

The first partition reported in Table 2 divides the sample by the level of insider ownership. Measured by the composite price effect, the utility-maximizing Q^* ratio and insider ownership are negatively related for all three groupings by the level of insider ownership and statistically significant at the 0.05 level or better for insider ownership less than 5 percent and between 5 and 25 percent and significant at the 0.11 level for ownership greater than 25 percent. On average, the entrenchment effect dominates the alignment

effect in all three groupings; however, both of these effects strengthen in magnitude as the level of insider ownership increases. In the group where insiders own less than 5 percent of their firm, the alignment semi-elasticity is 0.3915; in the 5-to-25-percent group, 0.4924; and in the greater-than-25-percent group, 0.6363. Thus, a 10 percent increase in insider ownership in the three groups is associated with an increase in the Q ratio of 0.03915, 0.04924, and 0.06363 respectively. The mean Q ratio is 1.032. While a higher level of insider ownership strengthens the alignment-of-interests effect, it also strengthens the entrenchment effect. In the group where insider own less than 5 percent, the entrenchment semi-elasticity equals -0.4429 ; in the 5-to-25-percent group, -0.5781 ; and in the greater-than-25-percent group, -0.7018 . A 10 percent increase in insider ownership, then, is associated with a reduction in the Q ratio of -0.04428 , -0.05781 , and -0.07018 respectively. Thus, both the entrenchment effect and the alignment-of-interest effect are strongest at the highest levels of insider ownership. While the entrenchment effect dominates the alignment effect in all three groups, the magnitude of the composite effect is rather small: -0.0513 in the less-than-5-percent group, -0.0857 in the 5-to-25-percent group, and -0.0656 in the greater-than-25-percent group.

While the entrenchment effect dominates the alignment-of-interest effect in the composite effect for all three divisions of the sample by the proportion of insider ownership, the three divisions of the sample by the proportion of ownership by outside block-holders exhibit a strikingly different pattern. Again, the dominance of entrenchment over alignment is evident in the sub-sample where there is no outside block-holder ownership since the composite effect on performance of a variation in insider ownership is significantly negative. However, for low and high levels of outside block-holder ownership, the alignment effect dominates the entrenchment effect so that the utility-maximizing Q ratio is positively and significantly related to insider ownership. The relationship between the composite semi-elasticity, $\partial Q^*/\partial \ln \alpha_E$, and the proportion of shares, α_B , owned by outside block-holders is given by the second derivative, $\partial^2 Q^*/\partial (\ln \alpha_E)(\ln \alpha_B)$, whose fitted value is positive. Thus, the composite insider ownership effect and the proportion of outside block-holder ownership and are positively related. For sufficiently high levels of block-holder ownership, a negative composite price effect (at lower levels of block-holder ownership) becomes positive. Apparently, the relatively large stake of these outside owners gives them the incentive to discipline insiders.

In all other sub-samples, the composite price effect is negative and usually statistically significant. The partition of the sample by the share of agency goods in potential value — that is, by the level of inefficiency — offers further insight into the reasonableness of the results. The mean composite effect on the Q ratio of a variation in insider ownership varies from -0.0504 in the third of the sample with the lowest share of agency good consumption to -0.0909 in the third with the highest share of agency good consumption, which reflects a relative strengthening of the entrenchment (wealth) effect from -0.3883 in

the least inefficient partition to -0.7629 in the most inefficient partition. A weaker strengthening of the alignment effect from the least inefficient (0.3378) to the most inefficient (0.6720) suggests that a higher proportion of insider ownership among the more inefficient banks (Table 1) is raising their price of consuming agency goods. Nevertheless, the higher insider ownership appears to entrench insiders more than it aligns their interests with outsiders.

B. Performance Effects of a Variation in Ownership by Outside Block-holders

The effect on the utility-maximizing Q ratio of a proportional variation in the ownership of outside block-holders is given by the semi-elasticity, $\partial Q^*/\partial \ln \alpha_B$, which is reported in the last column of Table 2. While the effect of block-holder ownership on value is positive for the full sample and for all sub-samples, it is rarely statistically significant. Only 51 banks have large outside block-holders. Nevertheless, the cases where their influence is significant suggest that block-holders ameliorate value-destroying entrenchment. When the full sample is partitioned by the level of insider ownership, the relationship between value and block-holder ownership is positive and significant at the 0.10 level for the range of insider ownership 5 to 25 percent and at the 0.16 level for the range greater than 25 percent. It is also positive and significant for banks in the third of the sample with the lowest Q ratio, for banks that have not engaged in acquisitions or sales over the period 1992-1994, for banks in the third of the sample with the highest share of agency goods (highest inefficiency), and for the banks with the smallest asset value.

C. Performance Effects of a Variation in Capital-to-Assets Ratio

The effect on the utility-maximizing Q ratio of a proportional variation in the capital-to-assets ratio is given by the semi-elasticity, $\partial Q^*/\partial \ln k$. An increase in the capital ratio influences managers' demand for agency goods in several ways. First, for a given level of total assets and insider ownership, it represents a substitution of equity for debt in the bank's capital structure and, hence, increase in insiders' *net* wealth. Second, by decreasing the amount of debt in the bank's capital structure, an increase in the capital-to-assets ratio reduces the pressure on managers to produce sufficient revenues to cover the debt payments. Third, by reducing the probability of financial distress, an increase in the capital-to-assets ratio can increase the market value of banks whose charter is especially valuable (because of valuable investment opportunities). Fourth, decreasing the amount of debt funding reduces the under-investment problem identified by Myers (1977). The first and second effects can be expected to diminish financial performance while the third and fourth are likely to improve it at banks with better investment opportunities.

The estimated semi-elasticity of Q^* with respect to the capital ratio is positive for 111 banks and

negative for 58. The fifth and sixth columns of Table 4 compare these two groups. The group exhibiting a negative semi-elasticity has a higher level of insider ownership, more market power, poorer financial performance (higher agency goods share), a lower Q ratio, more valuable investment opportunities (measured by the ratio of potential value to book value), and poorer asset quality.

Table 2 reports the mean values of the semi-elasticity in the fifth column. When the sample is partitioned by the level of insider ownership, performance is positively related to the capital ratio for the sub-sample with the lowest managerial ownership while it is negatively associated with capital ratio for the sub-sample with highest level. Apparently, managers with a greater ability to resist market discipline respond to the larger equity interest and the lessened performance pressure with a greater consumption of agency goods.

A similar dichotomy of effect is found when the sample is partitioned into those banks that are net acquirers of assets over the period 1992-1994, those that neither acquired nor sold assets, and those that are net sellers of assets. Financial performance and the capital ratio are positively associated for the sub-sample of positive net acquirers and negatively related for the sub-sample of negative net acquirers. The net sellers of assets are significantly less efficient than the net buyers — that is, their share of agency good consumption in potential value is much higher — and their proportion of the firm owned by insiders is also much higher. To the extent that their managers are better able to resist market discipline, they may take advantage of the greater claim on equity and the lessened performance pressure to increase their consumption of agency goods. In fact, when the sample is divided by the level of agency good consumption, the positive association between financial performance and the capital ratio is found for the most efficient managers while an insignificantly negative association is obtained for the least efficient managers.

When the sample is partitioned by the amount of options granted to insiders, the sub-sample with no options granted to insiders exhibits a negative association between financial performance and the capital ratio, which is significant at the 0.15 level, while the sub-samples with low and high levels of options granted shows a positive association, which is significant at the 0.03 level for the low group and at the 0.16 level for the high group. These results offer weak evidence that managers who lack the performance incentives generated by options may take advantage of the lessened performance pressure and the increased wealth effect of a higher capital ratio to consume more agency goods.

D. Performance Effects of Asset Size

The effect of asset size on the utility-maximizing Q^* ratio can be assessed by considering a proportional variation in both the book-value investment in assets and in the assets' potential value. When

both the potential value and the investment expenditure increase proportionately, the *potential Q* ratio remains constant, which focuses attention on how the realized *Q* ratio responds to the increased investment. For 151 banks, the response is positive, while, for 18 banks, it is negative. The sixth and seventh columns of Table 4 compare these two groups of banks. In the group where the size effect is negative, managers own 2.0 percent of their bank versus 14.2 percent where it is positive while outside block-holders own 8.4 percent in the negative case and 2.7 percent in the positive case. Notably, the mean size of banks in the negative case, \$75.07 billion, exceeds the mean size, \$4.25 billion, of the positive case while the inefficiency ratio (agency good share, V_B^*/V_p) of the negative case, 1.4 percent, contrasts sharply with the 22.0 percent of the positive case. The mean investment opportunity ratio (V_p/A) of the negative case, 1.038, falls short of the 1.399 ratio of the positive case.

The very small degree of inefficiency in the group of banks with a negative semi-elasticity suggests that their large scale of operations is closer to maximizing value than the small scale of the group with a positive semi-elasticity. The relatively large investment opportunity ratio of the group with a positive scale effect suggests that the banks in this group have on average many good investment opportunities to exploit. If a firm has exhausted all positive net-present-value projects and has avoided investing in negative net-present-value projects, the semi-elasticity of the *Q* ratio with respect to this proportional variation would approximately equal zero. Out of the 151 observations with a positive semi-elasticity, 5 values are not statistically different from zero; and, out of the 18 observations with a negative semi-elasticity, 8 values are not different from zero. To consider whether these 13 observations whose semi-elasticity equals zero seem to have achieved a value-maximizing scale, we divide both the positive and the negative-valued groups into banks with statistically significant semi-elasticities and banks with insignificant semi-elasticities, and we compare them. Table 5 reports these comparisons. The average size, \$29.46 billion, of the 5 banks in the positive-valued group whose semi-elasticity is insignificantly different from zero is much larger than the average size, \$3.97 billion, of the 148 banks whose semi-elasticity is significantly positive. Moreover, the average inefficiency (agency good share) of these 5 banks, 2.0%, contrasts sharply with the 22.7% inefficiency of the smaller 148 banks. On the other hand, the average size, \$49.56 billion, of the 8 banks in the negative-valued group whose scale effect is insignificantly different from zero is smaller than the average size, \$99.53 billion, of the 10 banks with a significantly negative scale effect. The average inefficiency of both groups is very small: 1.9 percent for the former and 1.0 percent for the latter. If, instead, we consider the partition of the sample by the degree of inefficiency (Table 2, column 6), we find that, for the *least inefficient* third of the sample, a proportional expansion in asset size and in the potential value of assets is associated with the smallest increase in the *Q* ratio: 0.0197. For the middle third, the increase in the *Q* ratio

is 0.0981, and for the *most inefficient* third, 0.2075.

The partition of the sample by asset size reveals that banks in the smallest fifth of the sample have the largest increase in the Q ratio, 0.2343, which decreases to 0.0541 in the largest four-fifths of the sample. In the largest fifth of the sample, the change in the Q ratio is not significantly different from zero. Moreover, the change in the Q ratio is the smallest, 0.0795, for banks that are net buyers of assets and the largest, 0.1588, for banks that neither buy nor sell, while the effect for net sellers, 0.1203, falls between these two values. If the smallest value for the net buyers indicates that they are better at exploiting their investment opportunities, the largest value for the net sellers indicates that they are engaged in a generally perverse investment strategy. The partition of the sample by the investment opportunity ratio, the ratio of potential value of assets to the book-value investment in assets, shows that firms with the most valuable investment opportunities have the highest scale effect, 0.1353, while those with the least valuable investment opportunities have over-invested: -0.0313 .

The partition by the level of insider ownership suggests that lower levels of ownership make better investment decisions. The relationship between the Q ratio and the proportional variation is smallest, 0.0454 in the under 5-percent ownership group and largest, 0.1820, in the over-25-percent group. Similarly, the relationship is largest, 0.1193, in the group with no outside block-holders and smallest in the group with the largest ownership by outside blockholders.

VI. Conclusions

When studies consider the relationship of firms' financial performance to their ownership structure, they often employ Tobin's Q ratio in an *ad hoc* specification of the performance regression, but the estimated performance equation does not obtain any of the logical benefits that are enjoyed by a performance equation derived from a model of optimizing managerial behavior. For example, applying the envelope theorem to the maximum profit function yields the profit-maximizing output supply and input demand functions while the profit function's convexity in prices restricts the signs of the price derivatives of these functions as well as the signs of the substitution and output effects of the Slutsky-like decomposition of the input derivatives. Unfortunately, the logical structure of the maximum profit function cannot explain how such important phenomena as agency problems and risk influence production and investment decisions. To obtain a choice-theoretic performance equation that can explain how managers allocate the potential market value of their firm to the production of market value and the consumption of agency goods, we employ Jensen and Meckling's model of constrained managerial utility maximization. From it, we derive a utility-maximizing

performance equation, stated either in terms of produced value or in terms of the demand for agency goods, that enjoys logical benefits analogous to those of the consumer's demand function. The proportion of the firm owned by managers represents the price to them of consuming agency goods. The logic of utility maximization does not restrict the sign of the effect of a change in this price (managerial ownership) on the utility-maximizing level of performance; but, it does permit a Slutsky-like decomposition of the effect into a substitution and a wealth effect, which parallel the alignment-of-interests and entrenchment effects that are frequently discussed in the literature. And, the logic of utility maximization restricts the sign of the alignment effect. Hence, the logic of constrained managerial utility maximization generates a performance equation with structural properties that permit a deeper empirical investigation of managerial incentives than the traditional *ad hoc* specification.

The empirical implementation of the model developed by Jensen and Meckling (1976) to explain how managers allocate their firm's potential value to the consumption of agency goods and to the achievement of market value requires a measure of potential value. By using the stochastic frontier technique to gauge potential value and to minimize the influence of luck on achieved market value, we can measure the extent of agency problems by the difference between a firm's potential value and its noise-adjusted achieved value, and, we can estimate a utility-maximizing market-value function and agency-good demand function.

The estimated utility-maximizing demand for agency goods and the derived utility-maximizing Q ratio are well behaved and indicate that the Almost Ideal Demand System fits the data well. The estimated alignment and entrenchment effects of a variation in the proportion of insider ownership are large relative to the composite effect, and they increase in magnitude with the proportion of the firm owned by insiders and with the share of agency goods in potential value (the inefficiency ratio). The magnitude of these effects is quite different when the sample is divided into sub-samples by the level of block-holder ownership. A positive level of ownership by block-holders is associated with an entrenchment effect which is sufficiently reduced in magnitude that the alignment effect dominates and the composite effect reverses sign to become positive. These empirical findings are intuitively reasonable and point to the usefulness of the empirical modeling of managerial decisions by utility theory.

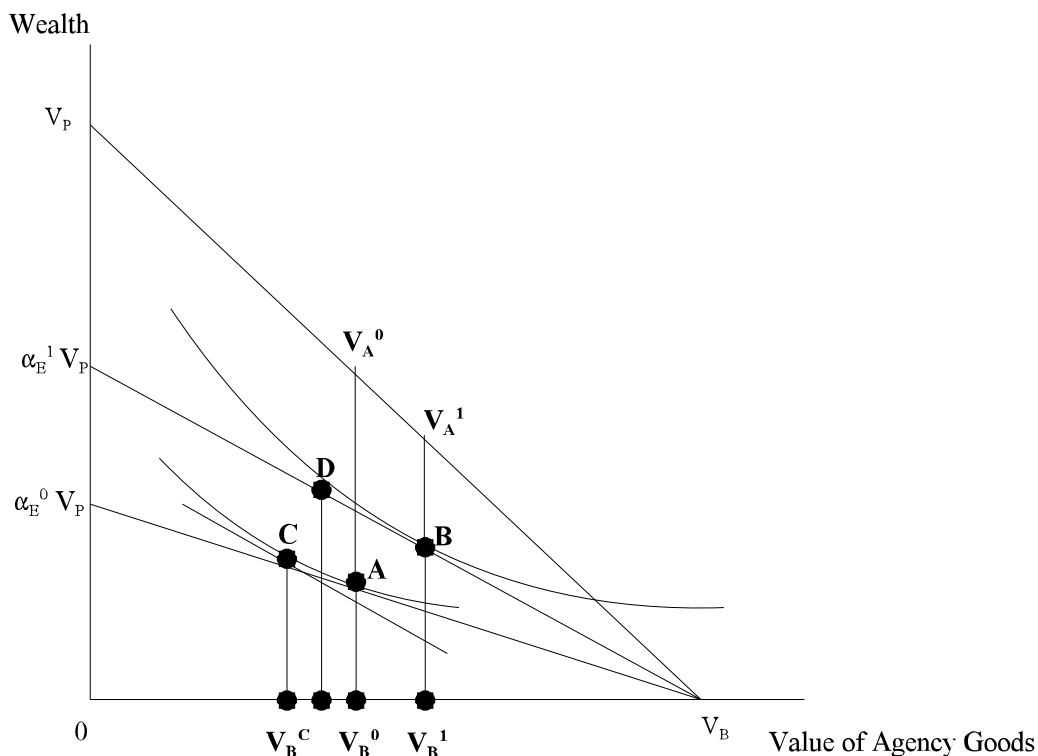
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Figure 1



The trade-off between the value of the firm's assets and the value of managers' consumption of agency goods is given by the line $V_P V_B$. Managers' preferences for agency goods and wealth are represented by the indifference map while their trade-off between their wealth and their consumption of agency goods is defined by the line $\alpha_E^0 V_P V_B$, where α_E^0 gives the proportion of the firm they own. The utility-maximizing combination of wealth and agency goods, W_0 and V_B^0 , is designated by point A, and the resulting value of the firm's assets is given by V_A^0 .

The improved trade-off between wealth and agency goods on the line $\alpha_E^1 V_P V_B$ represents an increase in the proportion of the firm owned by managers—an increase in the price of agency goods. At point B, the new equilibrium, the demand for agency goods increases from V_B^0 to V_B^1 . On the other hand, the value of the firm's assets falls from V_A^0 to V_A^1 . In contrast, if the new equilibrium had occurred at point D instead of B, the demand for agency goods would have decreased and the value of the firm's assets would have increased.

The total effect of the increase in ownership can be decomposed into a substitution effect and a wealth effect. The substitution effect is defined by the compensated equilibrium, point C, on the original indifference curve. After compensating so that utility remains constant when the price of agency goods increases, the (compensated) demand for agency goods falls from V_B^0 to V_B^C . The increase in the demand for agency goods from V_B^C to V_B^1 represents the wealth effect of the increase in the price of agency goods.

Table 1
Summary Statistics

Two values in bold in a row indicate that they are significantly different from each other at the 0.10 level.

	Full Sample (N=169)		Inefficient Banks (Value of Agency Goods/Potential Value > Median Value)		Efficient Banks (Value of Agency Goods/Potential Value < Median Value)	
	Mean	Std Dev.	Mean	Std Dev.	Mean	Std Dev.
Book Value of Assets (1000s)	11,796,318	27,384,207	901,818	510,838	22,820,516	35,679,798
Market Value of Assets (1000s)	12,080,636	27,679,599	934,920	525,748	23,359,038	35,979,814
Potential Value of Assets (1000s)	12,537,013	27,828,281	1,310,093	535,787	23,897,587	36,159,341
Value of Agency Goods (1000s)	456,377	374,109	379,046	16,908	534,629	520,266
Agency Goods/Potential Value	0.198	0.168	0.336	0.127	0.058	0.043
<i>Q</i> Ratio	1.036	0.033	1.036	0.037	1.036	0.027
<i>Q</i> Ratio (Noise-Adjusted)	1.032	0.020	1.028	0.023	1.036	0.015
Potential Value/Book Value	1.360	0.366	1.614	0.365	1.103	0.057
Insider Ownership	0.129	0.134	0.181	0.152	0.076	0.086
Options Granted to Insiders	0.003	0.006	0.004	0.007	0.002	0.003
Outside Block-holder Ownership	0.033	0.066	0.017	0.044	0.049	0.079
Capital-to-Assets (book value)	0.085	0.016	0.090	0.017	0.080	0.014
Nonperforming Loans/Assets	0.010	0.010	0.012	0.013	0.009	0.006
Average Growth Rate GDP	0.095	0.028	0.093	0.020	0.096	0.035
Average Unemployment Rate	0.065	0.012	0.061	0.011	0.065	0.013
Macro Diversification Index	0.935	0.295	0.884	0.265	0.985	0.317
Herfindahl Index	0.238	0.116	0.248	0.141	0.228	0.083

Table 2

The Effects of Managerial Incentives on the Utility-Maximizing Q Ratio

This table reports the estimated change in the utility-maximizing Q ratio as a semi-elasticity: $(\partial Q_i / \partial \ln x_j)$ where x_j is the perturbing variable. The reported values are means over bank holding companies in the full sample or in the designated subsample. The values in parentheses are standard errors. Values in bold are significant at least at the 0.10 level.

Mean Semi-elasticity of demand for agency goods for . . .	Uncompensated Composite Price Semi-elasticity	Compensated (Substitution) Price Semi-elasticity	Composite Wealth Semi-Elasticity	Capital-to-Assets Ratio Semi-elasticity	Semi-elasticity for a scaled change in total assets and their potential value	Block-holder ownership semi-elasticity
All BHCs	-0.0717 (0.0313)	0.4837 (0.0554)	-0.5555 (0.0387)	0.0112 (0.0113)	0.1079 (0.0101)	0.0051 (0.0047)
Insider Ownership						
0 to 5 %	-0.0513 (0.0246)	0.3915 (0.0511)	-0.4429 (0.0387)	0.0329 (0.0157)	0.0454 (0.0061)	0.0010 (0.0048)
5 to 25 %	-0.0857 (0.0338)	0.4924 (0.0568)	-0.5781 (0.0388)	0.0140 (0.0130)	0.1228 (0.0117)	0.0089 (0.0054)
≥ 25%	-0.0656 (0.0413)	0.6363 (0.0629)	-0.7018 (0.0382)	-0.0406 (0.0221)	0.1820 (0.0215)	0.0103 (0.0073)
Outside Block-holder Ownership						
0 %	-0.1105 (0.0450)	0.4710 (0.0657)	-0.5815 (0.0387)	0.0022 (0.0143)	0.1193 (0.0121)	not defined
Low %	0.0138 (0.0074)	0.5138 (0.0407)	-0.5000 (0.0388)	0.0342 (0.0267)	0.0874 (0.0090)	0.0042 (0.0070)
High %	0.0222 (0.0088)	0.5126 (0.0410)	-0.4904 (0.0384)	0.0296 (0.0162)	0.0755 (0.0073)	0.0061 (0.0063)
Options Granted						
Zero %	-0.0166 (0.0478)	0.6114 (0.0695)	-0.6281 (0.0386)	-0.0254 (0.0174)	0.1445 (0.0178)	0.0085 (0.0067)
Low %	-0.0945 (0.0330)	0.3723 (0.0552)	-0.4668 (0.0389)	0.0328 (0.0146)	0.0615 (0.0057)	0.0023 (0.0050)
High %	-0.0926 (0.0315)	0.4949 (0.0533)	-0.5875 (0.0386)	0.0185 (0.0132)	0.1258 (0.0118)	0.0062 (0.0050)

Mean Semi-elasticity of demand for agency goods for . . .	Uncompensated Composite Price Semi-elasticity	Compensated Price Semi-elasticity	Composite Wealth Semi-Elasticity	Capital-to-Assets Ratio Semi-elasticity	Semi-elasticity for scaled change: assets and potential value	Block-holder ownership semi-elasticity
Investment Opportunity Ratio						
Lowest 1/3	-0.0337 (0.0161)	0.3265 (0.0455)	-0.3602 (0.0381)	0.0243 (0.0242)	-0.0313 (0.0137)	0.0035 (0.0049)
Middle 1/3	-0.0489 (0.0193)	0.3283 (0.0470)	-0.3773 (0.0389)	0.0363 (0.0178)	0.0119 (0.0080)	0.0021 (0.0043)
Highest 1/3	-0.0786 (0.0349)	0.5230 (0.0581)	-0.6016 (0.0387)	0.0057 (0.0125)	0.1353 (0.0137)	0.0069 (0.0055)
Q-ratio						
Lowest 1/3	-0.0595 (0.0293)	0.5468 (0.0536)	-0.6063 (0.0379)	-0.0027 (0.0133)	0.1308 (0.0137)	0.0090 (0.0055)
Middle 1/3	-0.0754 (0.0320)	0.4152 (0.0561)	-0.4907 (0.0388)	0.0073 (0.0125)	0.0746 (0.0071)	0.0006 (0.0046)
Highest 1/3	-0.0803 (0.0331)	0.4868 (0.0569)	-0.5672 (0.0394)	0.0289 (0.0150)	0.1172 (0.0105)	0.0034 (0.0046)
From 1992 - 1994 . . .						
+ Net Acquisitions	-0.0613 (0.0283)	0.4361 (0.0536)	-0.4974 (0.0389)	0.0218 (0.0122)	0.0795 (0.0072)	0.0023 (0.0043)
0 Net Acquisitions	-0.0889 (0.0370)	0.5659 (0.0592)	-0.6549 (0.0383)	-0.0025 (0.0141)	0.1588 (0.0168)	0.0119 (0.0063)
- Net Acquisitions	-0.0876 (0.0315)	0.5292 (0.0540)	-0.6168 (0.0543)	-0.0362 (0.0206)	0.1203 (0.0131)	0.0053 (0.0059)
Agency Goods Share						
Lowest 1/3	-0.0504 (0.0207)	0.3378 (0.0483)	-0.3883 (0.0388)	0.0306 (0.0157)	0.0197 (0.0070)	0.0026 (0.0042)
Middle 1/3	-0.0742 (0.0312)	0.4440 (0.0555)	-0.5182 (0.0389)	0.0079 (0.0118)	0.0981 (0.0088)	0.0049 (0.0046)
Highest 1/3	-0.0909 (0.0432)	0.6720 (0.0642)	-0.7629 (0.0384)	-0.0052 (0.0194)	0.2075 (0.0238)	0.0128 (0.0087)
Asset Size						
Smallest 1/5	-0.1024 (0.0453)	0.7125 (0.0651)	-0.8149 (0.0381)	-0.0107 (0.0239)	0.2343 (0.0282)	0.0161 (0.0100)
2/5	-0.0736 (0.0390)	0.5785 (0.0620)	-0.6521 (0.0389)	-0.0007 (0.0155)	0.1511 (0.0157)	0.0070 (0.0064)
3/5	-0.0684 (0.0299)	0.4455 (0.0549)	-0.5140 (0.0390)	0.0112 (0.0114)	0.1008 (0.0089)	0.0042 (0.0054)
4/5	-0.0695 (0.0268)	0.3532 (0.0519)	-0.4228 (0.0389)	0.0235 (0.0128)	0.0541 (0.0054)	0.0026 (0.0046)
Largest 5/5	-0.0444 (0.0183)	0.3278 (0.0465)	-0.3723 (0.0386)	0.0327 (0.0192)	-0.0008 (0.0095)	0.0025 (0.0044)

Table 3

The Effects of Managerial Incentives on the Utility-Maximizing Share of Agency Goods in Potential Value (Inefficiency Ratio)

This table reports the estimated change in the utility-maximizing share of agency goods in potential value as a semi-elasticity: $(\partial Share_i / \partial \ln x_j)$ where x_j is the perturbing variable. The reported values are means over bank holding companies in the full sample or in the designated subsample. The values in parentheses are standard errors. Values in bold are significant at least at the 0.10 level.

Mean Semi-elasticity of demand for agency goods for . . .	Uncompensated Composite Price Semi-elasticity	Compensated (Substitution) Price Semi-elasticity	Composite Wealth Semi-Elasticity	Capital-to-Assets Ratio Semi-elasticity	Semi-elasticity for a scaled change in total assets and their potential value	Block-holder ownership semi-elasticity
All BHCs	0.0532 (0.0228)	-0.2205 (0.0419)	0.2738 (0.0301)	-0.0113 (0.0086)	-0.0702 (0.0062)	-0.0035 (0.0036)
Insider Ownership						
0 to 5 %	0.0449 (0.0208)	-0.2664 (0.0445)	0.3113 (0.0342)	-0.0292 (0.0138)	-0.0311 (0.0055)	-0.0011 (0.0043)
5 to 25 %	0.0618 (0.0244)	-0.2053 (0.0421)	0.2671 (0.0293)	-0.0114 (0.0095)	-0.0835 (0.0077)	-0.0058 (0.0037)
≥ 25%	0.0416 (0.0242)	-0.1807 (0.0385)	0.2224 (0.0244)	0.0239 (0.0135)	-0.1035 (0.0119)	-0.0057 (0.0046)
Outside Block-holder Ownership						
0 %	0.0811 (0.0326)	-0.1842 (0.0484)	0.2654 (0.0291)	-0.0041 (0.0104)	-0.0773 (0.0075)	not defined
Low %	-0.0092 (0.0056)	-0.3021 (0.0337)	0.2929 (0.0321)	-0.0329 (0.0215)	-0.0599 (0.0067)	-0.0023 (0.0056)
High %	-0.0132 (0.0058)	-0.3071 (0.0341)	0.2939 (0.0323)	-0.0231 (0.0132)	-0.0475 (0.0054)	-0.0047 (0.0051)
Options Granted						
Zero %	0.0118 (0.0321)	-0.2373 (0.0479)	0.2492 (0.0273)	0.0174 (0.0119)	-0.0896 (0.0110)	-0.0058 (0.0045)
Low %	0.0778 (0.0273)	-0.2264 (0.0468)	0.3042 (0.0334)	-0.0291 (0.0125)	-0.0465 (0.0047)	-0.0020 (0.0045)
High %	0.0614 (0.0210)	-0.2012 (0.0382)	0.2627 (0.0288)	-0.0163 (0.0090)	-0.0789 (0.0068)	-0.0038 (0.0038)

Mean Semi-elasticity of demand for agency goods for . . .	Uncompensated Composite Price Semi-elasticity	Compensated Price Semi-elasticity	Composite Wealth Semi-Elasticity	Capital-to-Assets Ratio Semi-elasticity	Semi-elasticity for scaled change: assets and potential value	Block-holder ownership semi-elasticity
Investment Opportunity Ratio						
Lowest 1/3	0.0327 (0.0156)	-0.3043 (0.0442)	0.3370 (0.0370)	-0.0235 (0.0235)	0.0305 (0.0133)	-0.0033 (0.0047)
Middle 1/3	0.0461 (0.0182)	-0.2877 (0.0443)	0.3338 (0.0366)	-0.0341 (0.0167)	-0.0110 (0.0075)	-0.0020 (0.0040)
Highest 1/3	0.0560 (0.0244)	-0.2024 (0.0417)	0.2585 (0.0284)	-0.0064 (0.0086)	-0.0882 (0.0085)	-0.0042 (0.0037)
Q-ratio						
Lowest 1/3	0.0401 (0.0190)	-0.2127 (0.0376)	0.2528 (0.0277)	-0.0016 (0.0085)	-0.0748 (0.0072)	-0.0057 (0.0039)
Middle 1/3	0.0612 (0.0257)	-0.2348 (0.0461)	0.2960 (0.0325)	-0.0089 (0.0105)	-0.0553 (0.0053)	-0.0005 (0.0043)
Highest 1/3	0.0587 (0.0240)	-0.2147 (0.0425)	0.2735 (0.0300)	-0.0234 (0.0109)	-0.0800 (0.0069)	-0.0028 (0.0035)
From 1992 - 1994 . . .						
+ Net Acquisitions	0.0505 (0.0226)	-0.2438 (0.0439)	0.2944 (0.0323)	-0.0188 (0.0102)	-0.0581 (0.0052)	-0.0021 (0.0037)
0 Net Acquisitions	0.0582 (0.0236)	-0.1802 (0.0391)	0.2385 (0.0262)	-0.0013 (0.0083)	-0.0919 (0.0091)	-0.0067 (0.0039)
- Net Acquisitions	0.0540 (0.0194)	-0.1997 (0.0368)	0.2537 (0.0278)	0.0192 (0.0135)	-0.0755 (0.0078)	-0.0044 (0.0049)
Agency Goods Share						
Lowest 1/3	0.0468 (0.0193)	-0.2830 (0.0451)	0.3299 (0.0362)	-0.0286 (0.0148)	-0.0176 (0.0067)	-0.0024 (0.0039)
Middle 1/3	0.0603 (0.0252)	-0.2272 (0.0449)	0.2875 (0.0316)	-0.0069 (0.0096)	-0.0786 (0.0070)	-0.0039 (0.0037)
Highest 1/3	0.0527 (0.0247)	-0.1503 (0.0370)	0.2031 (0.0223)	0.0017 (0.0107)	-0.1155 (0.0130)	-0.0059 (0.0045)
Asset Size						
Smallest 1/5	0.0553 (0.0237)	-0.1282 (0.0342)	0.1835 (0.0201)	0.0041 (0.0119)	-0.1198 (0.0142)	-0.0070 (0.0048)
2/5	0.0509 (0.0267)	-0.1923 (0.0425)	0.2433 (0.0267)	0.0007 (0.0106)	-0.1027 (0.0106)	-0.0050 (0.0043)
3/5	0.0556 (0.0243)	-0.2335 (0.0447)	0.2892 (0.0317)	-0.0093 (0.0093)	-0.0818 (0.0072)	-0.0035 (0.0044)
4/5	0.0623 (0.0241)	-0.2565 (0.0467)	0.3189 (0.0350)	-0.0213 (0.0115)	-0.0484 (0.0048)	-0.0024 (0.0042)
Largest 5/5	0.0421 (0.0173)	-0.2925 (0.0443)	0.3347 (0.0367)	-0.0310 (0.0183)	0.0012 (0.0091)	-0.0024 (0.0041)

Table 4

Difference-in-Means Tests Across Sub-samples

The second and third columns compare the sample divided into banks for which the composite effect of a variation in insider ownership on the utility-maximizing Q ratio is positive (dominance of the alignment-of-interest effect) with those for which it is negative (dominance of the entrenchment effect). The fourth and fifth columns compare the partition of the sample into banks for which the effect on the Q ratio of a variation in the capital-to-assets ratio is positive with those for which it is negative. The sixth and seventh columns compare the partition of the sample into banks for which the effect on the Q ratio of a proportional variation in the investment in assets and in their potential value is positive with those for which it is negative (or zero). Values in bold are significantly different from each other at the 0.10 level. A standard t -test is used compare means when an F -test did not reject the hypothesis of equal variances between the two sub-samples. Welch's (1933) t -test is employed when the F -test rejects the equal variance hypothesis.

Variable	$\partial Q^*/\partial \ln \alpha_E > 0$ Composite Insider Ownership Effect > 0 N = 25	$\partial Q^*/\partial \ln \alpha_E < 0$ Composite Insider Ownership Effect < 0 N = 144	$\partial Q^*/\partial \ln k > 0$ Capital Ratio Semi-Elasticity > 0 N = 111	$\partial Q^*/\partial \ln k < 0$ Capital Ratio Semi-Elasticity < 0 N = 58	$[\partial Q^*/\partial \ln V_P$ + $\partial Q^*/\partial \ln A] > 0$ Asset Expansion Semi-Elasticity > 0 N = 151	$[\partial Q^*/\partial \ln V_P$ + $\partial Q^*/\partial \ln A] < 0$ Asset Expansion Semi-Elasticity < 0 N = 18
Insider Ownership	0.116	0.131	0.091	0.201	0.142	0.020
Outside Block-holder Own.	0.115	0.019	0.038	0.024	0.027	0.084
Options Granted	0.005	0.003	0.003	0.003	0.004	0.002
Book Value Assets (1000s)	5,380,728.490	12,910,136.757	14,618,882.176	23,463,515.494	4,253,357	75,073,384
Capital-to-Assets Ratio	0.079	0.086	0.085	0.085	0.087	0.071
Herfindhal Index	0.214	0.242	0.215	0.282	0.241	0.209
Agency Goods Share (V_B^*/V_P)	0.235	0.192	0.160	0.271	0.220	0.014
Q Ratio (V_A^*/A)	1.028	1.033	1.035	1.027	1.033	1.024
Investment Opportunity Ratio (V_P/A)	1.444	1.346	1.286	1.503	1.399	1.038
Asset Quality (Nonper- forming Loans/Assets)	0.011	0.010	0.008	0.015	0.010	0.012

Table 5

**Difference-in-Means Tests between Statistically Significant and Insignificant Positive and Negative Semi-Elasticities
with Respect to a Proportional Variation in the Investment in Assets and in the Potential Value of the Investment in Assets**

The second and third columns repeat the comparison of means in the last two columns of Table 4 for the partition of the sample into positive and negative-valued semi-elasticities. The fourth and fifth columns compare means for banks with a significantly positive semi-elasticity to those with an insignificantly positive semi-elasticity (at the 0.10 level). The sixth and seventh columns compare means for banks with a significantly negative semi-elasticity to those of banks with an insignificantly negative semi-elasticity (at the 0.10 level). Values in bold are significantly different from each other at the 0.10 level. A standard *t*-test is used compare means when an *F*-test did not reject the hypothesis of equal variances between the two sub-samples. Welch’s (1933) *t*-test is employed when the *F*-test rejects the equal variance hypothesis.

Variable	$[\partial Q^*/\partial \ln V_P + \partial Q^*/\partial \ln A] > 0$ Asset Expansion Semi-Elasticity > 0 N = 151	$[\partial Q^*/\partial \ln V_P + \partial Q^*/\partial \ln A] < 0$ Asset Expansion Semi-Elasticity < 0 N = 18	$[\partial Q^*/\partial \ln V_P + \partial Q^*/\partial \ln A] > 0$ Asset Expansion Semi-Elasticity Significantly > 0 N = 146	$[\partial Q^*/\partial \ln V_P + \partial Q^*/\partial \ln A] > 0$ Asset Expansion Semi-Elasticity Insignificantly > 0 N = 5	$[\partial Q^*/\partial \ln V_P + \partial Q^*/\partial \ln A] < 0$ Asset Expansion Semi-Elasticity Significantly < 0 N = 10	$[\partial Q^*/\partial \ln V_P + \partial Q^*/\partial \ln A] < 0$ Asset Expansion Semi-Elasticity Insignificantly < 0 N = 8
Insider Ownership	0.142	0.020	0.145	0.042	0.018	0.022
Outside Block-holder Own.	0.027	0.084	0.026	0.065	0.115	0.044
Options Granted	0.004	0.002	0.004	0.004	0.001	0.003
Book Value Assets (1000s)	4,253,357	75,073,384	3,442,981	27,916,329	97,189,015	47,428,845
Capital-to-Assets Ratio	0.087	0.071	0.087	0.081	0.071	0.070
Herfindhal Index	0.241	0.209	0.243	0.211	0.215	0.202
Agency Goods Share (V_B^*/V_P)	0.220	0.014	0.227	0.020	0.010	0.019
<i>Q</i> Ratio (V_A^*/A)	1.033	1.024	1.033	1.035	1.021	1.027
Investment Opportunity Ratio (V_P/A)	1.399	1.038	1.410	1.057	1.032	1.047
Asset Quality (Nonper- forming Loans/Assets)	0.010	0.012	0.010	0.011	0.013	0.010