Does the Market Matter for More Than Investment?

Working Paper

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Abstract

Many papers document the effect of stock prices on corporate investment. We know high stock prices imply high investment, but we know little about what low stock prices imply, other than the implied flip side (low investment). This paper studies the behavior of low stock price firms and adds to this literature in several ways. First, a theoretical model is developed reconciling this finding with the existing investment-stock price dependence empirical results. If investment is likely to increase the interim stock price, the manager will invest and monitor costs less pertinaciously. Second, a new dimension of corporate behavior that is stock price dependent is documented. Low stock prices precede a lower cost structure. Third, empirical tests provide strong support for the model. In particular, low stock prices predate lower costs, investments, and higher cash flows. Robustness checks reveal that the results are not driven by firms' financial constraints or issuance of debt and equity securities.

1 Introduction

Traditional finance theory argues that corporations make decisions, and efficient markets adjust prices accordingly. Recent research takes a more contemporary view that managers also use the market for guidance in making corporate decisions. Morck, Shleifer, and Vishny (1990), Baker, Stein, and Wurgler (2003), Polk and Sapienza (2004), and others, consider how stock prices affect corporate investment. This paper addresses a related question: Do stock prices affect more than just corporate investment? In particular, how do stock prices affect cost productivity? I develop a theoretical model to address this question and find that lower stock prices induce firms to improve their cost productivity. I then confront this prediction with the data.

All firms should strive to lower costs and improve production efficiency. Why would low stock prices affect the costs of the firm? The model developed in this paper shows that a manager uses the probability that the market will agree with the investment decision when determining whether to proceed. The key is that the manager has a scarce resource, his own effort, that he must allocate between attending to capital investment or cost reduction. If the market is likely to approve of the project, the manager will expend effort to increase investment and pay less attention to the costs incurred. If agreement is not likely, then the manager will use effort to reduce costs. Intuitively, if the market agrees with investing, then the manager will find it attractive to improve cash flow by investing. If the market disagrees with investing, the manager will find it attractive to improve cash flow by managing costs and operational efficiency.

Whether or not the market will concur with investment is central to the theory. Why would the market disagree with the manager about investing? One reason is that the manager and the investors have asymmetric information. However, with sufficient communication, both rational agents will agree on the investment decision leaving no reason for the stock price to decrease prior to the decision. Agency problems between the investors and the management could also lead to the manager's sub-optimal investment and lower stock prices. Agency issues should keep the stock price low and need not give rise to positive covariance between price and corporate decisions. In addition, funding should be more difficult to acquire and attempts should be made to align the manager's and investors' incentives. Dittmar and Thakor (2005) find that agreement between investors and the manager provides incremental explanatory power over asymmetric information in

a firm's issuance decision. Faulkender, Milbourn, and Thakor (2005) use disagreement to present an integrated theory and empirical tests of capital structure and dividend policy. In the model presented here, disagreement arises from differing priors about the project payoffs. This type of situation is most likely to occur when the project is fairly new and there is a minimal amount of objective history to guide the formation or prior distributions. High agreement is likely to occur if the project is familiar to both parities and there is less room for subjective formation of priors.

In the model developed here, the manager chooses to either exert effort for the project or exert effort to improve production efficiency, e.g. cutting costs. If agreement is likely, the manager will choose to invest and not as vigorously improve production efficiency, resulting in both higher investment and costs. Not watching costs as closely and investing more is predicted to cause cash flow to decline. If agreement is unlikely, the manager will not waste effort on the project. In this case, the manager will only put effort into improving production efficiency which should result in higher cash flow.

The manager maximizes the weighted average of the expected interim and terminal values of the firm net of the disutility of effort. The investors play a passive role in the model, existing only to guide the manager on how likely it is that the market will agree with investing through the expected interim stock price. The level of agreement is characterized by how likely it is that the manager and investors will believe that the publicly observable signal is informative. With differing priors about the informativeness of the signal, the posterior distributions of the project payoff need not be the same. Empirically, different posteriors can be thought of as the amount of agreement.

Three different measures of agreement are used. The first measure is the dispersion of analysts' forecast earnings. Since analysts are presumably analyzing the same information, the more dispersed the forecasts, the more likely it is that the investors will disagree with the manager. Price volatility of stocks is used as a control to ensure that forecast dispersion isn't being driven solely by the risk of the stock.

The last two measures are constructed following Chen, Hong, and Stein (2002). The second measure is the change in the number of mutual funds holding the stock divided by the total number of mutual funds in existence that period. Since the universe of mutual funds has grown tremendously, only funds that existed in both periods are included.

The third measure is the change in the percent of the total outstanding shares held by mutual

funds. Mutual funds would likely sell the stock if they believe the manager will not agree with their decision to invest.

Empirical results provide strong support for lower agreement followed by lower costs, investments, and higher cash flows. Net equity and debt issues combined with four different measures of financial constraints, payout ratio, size, bond rating, and commercial paper rating, are used as controls to ensure dependence on the external market doesn't force increased production efficiency improvement.

The remainder of the paper is organized as follows: Section 2 summarizes the related literature, Section 3 provides the details of the model and the empirical predictions, Section 4 discusses the data, Section 5 provides the empirical results, Section 6 discusses robustness, and Section 7 concludes.

2 Related Literature and Incremental Contribution

Boot and Thakor (1997) argue that firms extract information from the market from financial market trading. Alternatively, Subrahmanyam and Titman (2001) argue that feedback from market prices to cash flows occurs due to non-financial stakeholders' decisions based on market prices; for example, when a supplier decides to not extend trade credit because the market price declined. Allen (1993) suggests that an important role of the financial market is to provide managers with information that would be otherwise unavailable. Along the same lines as Allen (1993), Holmström and Tirole (1993) argue that a firm's stock price incorporates information about performance that cannot be obtained from the firm's current or future profit data. The model and empirical tests here show that the market price conveys information about agreement which is empirically tested and supported.

Much of the focus in the literature has been primarily on the relationship between investment and the market. To my knowledge, no one has considered the effect on costs. Subrahmanyam and Titman (2001) show, "how a firm's stock price affects how the firm is perceived by its customers, suppliers, and employees, and how this, in turn, influences their decisions". In their model, managers can have an impact on the feedback effect by controlling the precision of public information or reducing the cost of acquiring information. One finding is that young firms that wish to attract stakeholders have an incentive to increase the precision of information and reduce the

cost to avoid a negative cascade. In contrast, more established firms wish to decrease precision and increase information acquisition cost to avoid losing key stakeholders, such as, customers and employees. Their paper theoretically considers how other stakeholders indirectly affect the firm's cash flows, whereas, in the current paper management decisions directly affect the cash flows. The empirical results presented here show that agreement still matters for firms that are not *financially constrained*. In Subrahmanyam and Titman (2001) the theory indicates that other stakeholders views of the firm affect the cash flows indirectly, which is not likely to be the case in financially unconstrained firms. It should be noted that this does not refute their theory, but instead provides support for agreement.

Lamont (2000) considers the effect of time-varying discount rates on aggregate investment plans. Investment plans are shown to positively covary with stock returns.[1] Intuitively, a low stock price (high discount rate) implies less investment in the future which is captured by the investment plan today. Lamont primarily considers aggregate and not firm specific investment and focuses on the time-varying discount rate as the source of the investment change. The paper presented here is focused on firm level investment after the manager assesses how likely it is that the investors will agree with the decision. In addition, controls are included for the investment opportunity set which will change with a time-varying risk premium.

Morck, Shleifer, and Vishny (1990) use firm level data to consider whether market mispricing matters for real economic activity or is just an interesting sideshow. They find that although the market may not be a complete sideshow, it doesn't appear to be very central. Blanchard, Rhee, and Summers (1993) use aggregate data and conclude that market mispricing plays a limited role in the investment decisions of firms. Extending this literature, Baker, Stein, and Wurgler (2003) use the Kaplan and Zingales (1997) (KZ) index to rank firms from least to most equity dependent. They find empirical support for the claim that the more equity dependent a firm is, the more sensitive investment will be to mispricing. Polk and Sapienza (2004) consider if mispricing has an effect on investment through alternative channels not linked to equity issuance. They find that firms with more information asymmetry or short term investors are more sensitive to market mispricing. The

[1] If the discount rate decreases, then future cash flow increases causing the stock price and the return to increase. The low discount rate implies lower expected returns in the future. In support of this fact, Lamont empirically finds negative correlation between investment plans today and future stock returns. The source of the varying discount rate is a change in the equity risk premium, which is inferred from time-series covariation between investment and stock returns.

conclusion is that a firm's investment decision is affected by mispricing even if new projects are not financed with equity. Ovtchinnikov and McConnell (2005) run empirical tests assuming rational capital markets with imperfections. It appears that investment is sensitive to stock prices, but in reality the stock prices are adjusting to the change in available investments. In gist, the market is rationally adjusting to changes in the investment opportunity set.

In addition to verifying that a decrease in stock price predates a decrease in investment, empirical tests lend support for agreement as a unifying element between the investment results, the new costs results, and the cash flow findings. In particular, if stock mispricing matters the most for firms that are equity dependent or have a large amount of asymmetric information, there shouldn't be a relation for the firms with the least amount of financial constraints. These firms should have the most access to capital and arguably the least amount of asymmetric information. Empirical tests support the results for the least financially constrained firms.

3 Model

3.1 Heterogenous Priors

A key feature in this model is that the manager and the investors may disagree about the value of a project. This occurs since the manager and the investors may have heterogenous priors about the value the project. When all agents behave rationally, Bayes rule dictates how prior beliefs are to be updated. However, economic theory does not dictate how agents form their prior beliefs. Kreps (1990) argues that prior beliefs should be viewed the same way as preferences and endowments, that is, as primitives in the description of the economic environment. Kreps even views heterogeneous priors as a more general specification than homogenous priors.[2]

Morris (1995) points out that heterogenous prior beliefs are perfectly consistent with Bayesian rationality. The rational learning literature asserts that agents can not disagree indefinitely (Aumann (1976) and Blackwell and Dubins (1962)). However, in order for convergence to occur agents must have either sufficient time to exchange information or a sufficient amount of objective data.

[2]Kreps (1990) (p. 370) notes, "First, it is conventionally assumed that all players share the same assessments over nature's actions. This convention follows from deeply held 'religious' beliefs of many game theorists. Of course, one hesitates to criticize another individual's religion, but to my own mind this convention has little basis in philosophy or logic. Accordingly, one might prefer, being more general, to have probability distributions ρ and ρ_i, which are indexed by i, reflecting the possibly different subjective beliefs of each player."

Miller and Sanchirico (1997) show that convergence of heterogenous priors may never occur if the prior beliefs are drawn from distributions that are not absolutely continuous with respect to each other.[3]

Numerous papers have used heterogenous priors. For example, Allen and Gale (1999) examine how heterogenous priors affect new firm financing, Garmaise (2001) considers heterogenous priors in security design, and Coval and Thakor (2005) show how heterogenous priors can give rise to financial intermediation. Kandel and Pearson (1995) argue that the evidence of trading volume around public information announcements is consistent with agents interpreting the same information differently.

The standard argument for the use of homogenous priors is that by limiting modelling flexibility a certain level of discipline is maintained (Samuelson (2004)). To address this, the data is the best indicator of whether the use of heterogenous priors leads to a theoretical model that appropriately characterizes corporate behavior.

3.2 Model Details

The economy consists of several firms, j, and many investors, i.[4] Although there are many firms and multiple periods of time, the analysis is for one firm and one signal observation. The risk-free rate is assumed to be zero.[5] A firm has diverse ownership and is managed by a manager, m, with no ownership stake, who maximizes the terminal value of the firm.[6] The only asymmetric information is that the manager does not know a priori if the investors will agree with the project investment decision.

[Insert Figure 1]

Figure 1 contains the timeline. The following portion of the model is in the same spirit as Boot, Gopalan, and Thakor (2005). At time 1 a project arrives with probability $\gamma \in (0, 1)$. If I\$ is invested in the project, the payoff is realized at time 3. The NPV of the project is random and

[3] Irrational explanations for indefinite divergence of priors include the the propensity to view problems as unique and ignore history (Kahneman and Lovallo (1993)) and ignoring information which contradicts earlier beliefs (White (1971)).

[4] Subscripts will only be used when necessary for clarity.

[5] All proofs are in Appendix A.

[6] If the manager has an ownership stake, the potential dilution effect with issuing equity versus debt must be considered. Since this model combines debt and equity into external financing, it does not add any additional insights to consider this scenario. See Dittmar and Thakor (2005) for an explicit characterization of the debt versus equity tradeoff with agreement. For this same reason, taxes are not considered.

is characterized by $\xi \in \{\underline{V}, \overline{V}\}$. A priori the NPV is $\overline{V}$ with probability $p \in (0,1)$ and $\underline{V}$ with probability $1-p$. It is assumed that $\underline{V} < 0 < \overline{V}$ and that the $E(\xi) < 0$, for each firm j.

At time 0, the manager and the investors observe a public signal indicating project value. The signal, S, is binary and can be good, G, or bad, B. Since the ex ante beliefs are common, both the manager and investors believe the signal will be G with probability p and B with probability 1-p. Prior to observing the common public signal, the manager and investors (collectively) observe private realizations about the informativeness of the signal, $\zeta_m \in \{I, U\}$ and $\zeta_i \in \{I, U\}$, respectively. The probability that $\zeta_k = I$ is $\theta \in (0,1)$ and $\zeta_k = U$ is $1-\theta$ where $k \in \{m, i\}$.

This formulation allows for the manager and the investors to observe the same public signal and arrive at different posterior distributions.[7] In other words, the joint distribution is $(\gamma, \xi, \zeta_m, \zeta_i, S)$ and the investors observe (ζ_i, S) and the manager observes (ζ_m, S). If $\zeta_i \neq \zeta_m$, then the joint posterior of the signal and project payoff will be different. Since the manager doesn't observe the investors informativeness and vice versa, there is an element of asymmetric information in the model. This is not a crucial assumption and is just to enhance the clarity of the model. All that is necessary is that the manager and the investors believe that this situation can occur at some date in the future and make decisions to reflect this today.

It is assumed that if the signal is uninformative then the joint distribution of $\tilde{S}$ and $\tilde{\xi}$ is uncorrelated and if the signal is informative then the joint distribution is perfectly correlated. Thus, for each agent k, the following is true:

$$P(\xi = \overline{V} | S = G, \zeta_k = I) = 1 = P(\xi = \underline{V} | S = B, \zeta_k = I) \tag{1}$$

and

$$P(\xi = \overline{V} | S = G, \zeta_k = U) = p = P(\xi = \overline{V} | S = B, \zeta_k = U) \tag{2}$$

The informativeness signals that the manager and investors privately draw may be correlated. That is, the $P(\zeta_i = x | \zeta_m = x) = \rho$ and similarly the $P(\zeta_i = x | \zeta_m = y) = 1-\rho$ where $x, y \in \{I, U\}$. It is convenient to think of ρ as the agreement parameter. Intuitively, ρ is likely to be high when the project is familiar to the manager and the investors and low when the project is fairly new or otherwise less familiar. For example, if Intel is planning to produce the next new processor,

[7] There is nothing irrational in this formulation. The manager and the investor simply arrive to different conclusions after observing a common signal because of different prior distributions.

there is quite a bit of objective data from history to guide the formation of prior distributions. However, when Napster launched its new internet music sharing software, it may have had little objective historical data to guide prior formation. All firm specific and time notation has been suppressed for clarity, but $\rho = \rho_{j,t}$ is actually a stochastic process that varies both inter-temporally and cross-sectionally.

The manager is assumed to have the power to make the decision whether to invest or not. This rules out the possibility of the investors taking control of the firm and making the decision they believe is correct.

Given this setup, the only time the manager cares about being at odds with the investors is when the common signal is G and the manager believes the signal is informative, but the investors believe the signal is uninformative. Since this is the most interesting case, it will be the focus of the remainder of the analysis. If the signal is B, then both the manager and investors wish to pass on the project regardless of the informativeness of the signal.

The setup here implies that if the manager believes the project has a positive NPV, then with probability ρ the investors will also believe it has a positive NPV. In order to take on the project the manager must exert effort, $e_P > 0$, to oversee and facilitate implementation of the project. The model can incorporate asymmetric information between the manager and investors. All that is needed is after all discussion and exchange of information there is "residual" disagreement.

The manager can choose to improve existing production technology (e.g. cutting costs) instead of (or in addition to) taking on a project where the effort expended, e_c, provides benefit $H(e_c)$, where $H \in C^2$ and $H : \mathbb{R}^+ \to \mathbb{R}^+$ with $H' > 0, H'' < 0$, and $\forall\, e_c \geq 0 \quad H'(e_c) < \infty$.[8] Thus, $H(\cdot)$ is a function that increases in the amount of effort exerted toward improving production technology, but at a decreasing rate. It is important to note that $H(\cdot)$ is *only* a function of e_c. Expending project effort, e_P, does not improve production technology.

Any effort exerted causes the manager disutility denoted by $c(e_c + e_P)$, where $c \in C^2$ and $c : \mathbb{R}^+ \to \mathbb{R}^+$ with $c' > 0$ and $c'' > 0$. The more effort exerted increases disutility at an increasing rate. Note that, $c(\cdot)$ is a function of *both* project effort and technology effort. Effort entering the disutility additivity is common in the multi-task economics literature.[9] This rules out any case

[8] One way to think about the function $H(\cdot)$ is to view it as a reduction in costs.

[9] For example, see MacDonald and Marx (2001) and Holmstrom and Milgrom (1991).

where doing one task creates disutility and adding some marginal amount of effort to an additional task actually reduces the disutility or changes the rate at which disutility is increasing. It is assumed that $H(0) = c(0) = 0$.

At time 2, the manager realizes the payoff of any production efficiency improvements and invests this cash flow in risk-less marketable securities. The model will allow for production efficiency savings to continue through period 3, but this extension provides no additional insight so it is omitted. If \$I was invested in the project, then the cash invested is tied up until the project pays off in period 3. All that is needed here is after investing in the project there is a period of time when there is no payoff.

At time 3, all payoffs are realized.

The time 3 value of the assets in place at time 0 is agreed by everyone to be V_0. The following assumption is necessary to guarantee that the optimal amount of effort exerted to improve technology is strictly positive.

Assumption 1.

$$H'(0) > c'(0) \tag{3}$$

Assumption 1 rules out the boundary solution of no effort. If the marginal cost of exerting effort is greater than the marginal benefit, then no effort will be exerted. The strict inequality guarantees that if improving production is chosen, in lieu of the project, at least some effort is expended.

In order to guarantee that the manager will select the project if the agreement is high enough the following assumption is necessary.

Assumption 2.

$$\overline{V} + H(e_c^{**}) - c(e_P + e_c^{**}) > H(e_c^*) - c(e_c^*) \tag{4}$$

where e_c^* is the optimal effort exerted without project selection and e_c^{**} is the optimal amount of additional effort (if any) exerted after selecting the project.

Assumption 2 says that with complete agreement, the value of the high NPV project plus any additional production improvements is greater than the value of improvement production efficiency alone.

The manager maximizes the weighted average of the stock prices at time 2 and time 3 net of the disutility of effort by choosing to pursue the project and/or exert effort improving production efficiency. Objective functions where the management cares about both its own opinion and the opinions of investors have been used previously (Miller and Rock (1985) and Ofer and Thakor (1987)) and can be justified via a management compensation scheme as in Holmström and Tirole (1993). The terminal price to the manager and the interim price to the investors, respectively, are

$$P^m(e_P, e_c) = V_0 + \overline{V}\mathbf{1}_{\{e_P>0\}} + H(e_c) \tag{5}$$

$$P^i(e_P, e_c) = V_0 + \left[\rho\overline{V} + (1-\rho)\underline{V}\right]\mathbf{1}_{\{e_P>0\}} + H(e_c) \tag{6}$$

Given equations (5) and (6) the manager's utility function is

$$U^M(e_P, e_c) = (1-\delta)P^i(e_P, e_c) + \delta P^m(e_P, e_c) - c(e_P + e_c) \tag{7}$$

where $\delta \in [0,1]$ implying the manager potentially places more weight on the terminal stock price than the interim price. Since the choice to exert effort for the project is binary, the analysis simplifies to two cases: the project is selected or the project is not selected. Consider first the case where the manager does not choose the project and only invests in improving production technology. The manager's utility function reduces to

$$U^M(e_c) = V_0 + H(e_c) - c(e_c) \tag{8}$$

Lemma 1. *If the manager only chooses to improve production efficiency, then there exists a unique global maximum, $e_c^* > 0$, to equation (8).*

In the second case the manager chooses the project and may or may not choose to exert any additional effort to improve production efficiency. The manager's utility function in this case is

$$U^M(e_c) = V_0 + H(e_c) - c(e_P + e_c) + \delta\overline{V} + (1-\delta)\left(\rho\overline{V} + (1-\rho)\underline{V}\right) \tag{9}$$

The obvious question then becomes, when does the manager choose to invest in the project instead of purely improving production efficiency? The answer is given in the following proposition.

Proposition 1. *Let e_c^* be the optimal amount of production efficiency effort exerted by the manager when the project is not selected and e_c^{**} be the optimal amount of production efficiency effort (if any) exerted when selecting the project. The manager will select the project if and only if the following*

condition is satisfied:

$$(1-\delta)\rho \geq \frac{\Delta^* - \Delta^{**} - (\delta\overline{V} + (1-\delta)\underline{V})}{\overline{V} - \underline{V}} \tag{10}$$

where $\Delta^* \equiv H(e_c^*) - c(e_c^*)$ *and* $\Delta^{**} \equiv H(e_c^{**}) - c(e_P + e_c^{**})$.

Proposition 1 highlights the tradeoff that the manager faces. Assumption 2 guarantees the right hand side of equation (10) is less than one. Thus, for a sufficiently large probability of agreement the manager will always select the project regardless of the value of δ. As δ increases and the manager cares more about the terminal value the amount of agreement necessary to guarantee project acceptance declines. Intuitively, if both the investors and manager are familiar with the project, then by assumption, the project will be selected. However, if there is a large new element to the project and it is sufficiently likely that there could be disagreement, then the project will be foregone for more costly production efficiency improvements. If any additional effort is exerted on production efficiency, it reduces the hurdle of how high ρ needs to be. In addition, increasing the value of the project to the manager or the payoff of the low project also lowers the agreement hurdle. Proposition 1 characterizes the exact amount of agreement that is required to guarantee project acceptance.

The manager will exert additional effort to improve efficiency as long as the amount of effort required for the project is not too large.

Proposition 2. *Given that the manager has decided to expend effort,* e_P*, on the project,* $\exists\, \hat{e}_P > 0$ *such that* $\forall e_P < \hat{e}_P$ *the manager will choose to exert additional effort on improving production efficiency and* $\forall e_P > \hat{e}_P$ *the manager will forgo any extra effort.*

Lemma 2. *The cut off point from proposition 2 is always greater than the optimal effort for improving technology alone. That is,* $\hat{e}_P > e_c^*$.

Lemma 2 shows that it is possible to exert more effort on the project and efficiency improvement than is exerted on just improvement alone. In fact, Proposition 3 shows that this is always the case when additional effort is exerted. Intuitively, since the effort exerted on the project does not reduce the high amount of value initially to exerting effort on efficiency improvement, the higher initial cost is offset by the large marginal gain to exerting an additional unit of effort.

Lemma 3. *If* $e_P > 0$*, then* $e_c^{**} < e_c^*$.

Lemma 3 shows that if the project is chosen then the manager will optimally select to expend less effort to improve production technologies. Intuitively, by assumption the disutility of effort is increasing at an increasing rate and thus it becomes increasingly costly to exert marginal effort. Corollary 1 follows immediately from Lemma 2 combined with Proposition 2.

Corollary 1. *If $e_P < e_c^*$, then the manager will always choose additional effort.*

The next proposition characterizes the total amount of effort exerted when both the project and production efficiency improvement is selected.

Proposition 3. *If $e_c^{**} > 0$ and $e_P > 0$, then $e_P + e_c^{**} > e_c^*$.*

Proposition 3 shows that due to high marginal gain from exerting additional production efficiency effort that the total effort exerted when this occurs will be greater than if only production efficiency effort is exerted.

3.3 Empirical Predictions

The model developed in the previous section yields several distinct testable predictions summarized below:

Prediction 1. *Firms with lower stock prices have lower agreement between investors and the management.*

The motivation for the theory is from lower agreement leading to lower costs. However, the motivating empirical evidence is that lower stock prices lead to lower costs. It is important to show that lower stock prices actually imply lower agreement and that other noise in the agreement measure is not driving the result.

Prediction 2. *Firms with lower stock prices (agreement) will decrease investment relative to those with higher stock prices (agreement).*

Prediction 2 follows from Proposition 1. The lower the agreement the more likely the market will disagree and the interim stock price will be low. Although improving production efficiency is less fruitful than exerting effort to monitor investments, if disagreement is likely, the project will be foregone.

Prediction 3. *Firms with lower stock prices (agreement) will have lower costs.*

Prediction 3 follows from Proposition 1. The higher the agreement the more likely the manager will choose the project and not engage in as much cost reduction. Reducing cost is used as a proxy for improving production efficiency. If the firm is going to operate more efficiently, this can be accomplished through a reduction in costs. Lemma 3 guarantees that even if the project is selected and production efficiency improvement is undertaken, the amount of effort exerted on improvement is strictly less than the amount without selecting the project.

Prediction 4. *Firms with lower stock price (agreement) have higher cash flow.*

Prediction 4 follows from Proposition 1 combined with the assumption that after investing there is a period of time before the cash flows are realized. In particular, the more likely the investors are to agree with accepting a project the more likely cash will not be available in the interim period.

4 Data

The sample consists of all firms in the merged CRSP/Compustat database from January 1970 through December 2003. The panel excludes financial firms (firms with a one-digit SIC code of six), utility firms (firms with a two digit SIC code of 49), and firms with a book value of assets less than $10 million. The full sample includes 127,582 observations, for an average of 3,752 firms per year. Analyst forecast data is obtained for all firms in the I/B/E/S database from January 1980 through December 2003. Daily stock prices are obtained from CRSP for all firms from January 1980 to December 2003. Quarterly mutual fund data are obtained for all mutual funds in the Thompson Financial Network (tfn) database from January 1980 through December 2003.

To reduce the effect of outliers all ratios are Winsorized at the first and ninety-ninth percentile. In other words, all observations more extreme than these bounds are set to the respective level.

Investment is defined as capital expenditures (Compustat data 128). Costs are defined as selling, general, and administrative expenses (Compustat data 189) plus the cost of goods sold (Compustat data 41). Cash flow is defined as operating income before depreciation (Compustat data 13) minus the change in working capital (Compustat data 179) minus capital expenditures (Compustat data 128). For detailed variable descriptions see Appendix C. Summary statistics for each independent

and dependent variable are in Table 1.

[Insert Table 1]

Costs, capital expenditures, cash flow, sales, and equity and debt issuance are all normalized by the beginning of the period book assets. Analysts' forecast dispersion is normalized by the absolute value of the mean forecast.

All regressions include both firm, f_i, and year fixed effects, γ_t. In addition, standard errors are clustered by firm to avoid the potential bias induced by residual correlation across firms.[10] Since all regressions include firm fixed effects, effectively the results are relative to the firm mean during the sample period.[11]

4.1 Agreement Measures

Since agreement is central to the model, it is important to find good proxies. This section outlines the four proxies used and briefly discusses the advantages and disadvantages of each. Each of the agreement measures listed below has at least one alternative explanation other than agreement. However, when taken together it becomes more difficult to support other hypothesis.

4.1.1 Analyst Forecast Dispersion

Following Dittmar and Thakor (2005) and Faulkender, Milbourn, and Thakor (2005) the dispersion of analysts' forecast earnings is used as a proxy for agreement. If the analysts and investors have symmetric information regarding the firm's future prospects then the greater the differences of opinion between analysts, the greater the amount of disagreement between investors in general about the future performance of the firm. The dispersion is measured as the standard deviation of analysts' forecast earnings normalized by the absolute value of the mean earnings forecast.

4.1.2 Change in the Breadth of Mutual Fund Holdings

The intuition is that mutual funds are more likely to hold shares of funds where the manager is likely to agree with the fund manager. Otherwise, the fund manager would simply sell the stock and

[10] Petersen (2005) finds that when residuals are correlated across firms, clustering by firm with year dummy variables produces standard errors that are consistently accurate.

[11] See Appendix C for variable construction details.

purchase another. Both the measures using mutual fund holdings are calculated following Chen, Hong, and Stein (2002) to avoid data mining issues.

The breadth of mutual fund holdings, Breadth_t, is defined as the number of funds holding a particular stock in quarter t divided by the total number of funds that existed in quarter t. As noted in their paper, a problem with this measure is that the universe of mutual funds has grown dramatically during the sample period from 438 in the first quarter of 1980 to 11,415 funds in the fourth quarter of 2003. In order to capture the trading activities of funds and not increases in the size of the universe, the change in breadth for a particular quarter is calculated only for funds that are in the sample in both quarter t and quarter t-1. $\Delta\text{Breadth}_t$ is defined as the total change in breadth for the funds in the sample for four consecutive quarters.

Prior to 1985, Section 30 of the Investment Company Act of 1940 required individual funds to report holdings at the end of each fiscal quarter.[12] Beginning in 1985, the SEC required individual mutual funds to file reports twice a year. CDA/Spectrum attempted to make sure the database was as complete as possible by filling in gaps with information requested by funds and provided by the prospectus. In addition, CDA/Spectrum will fill in any missing quarters with the information reported in the last quarter. However, a cursory glace through the database reveals gaps in the reporting. Even amongst the funds that seem to only submit semi-annual reports generally there is a change in the periods. For example, see Table 12 for the reporting dates of Fidelity's Magellan fund from January 1990 through December 2003. All fund reporting dates have been adjusted to the end of the calendar quarter. For example, if a fund reports on May 15, 1988, the date is adjusted to June 30, 1988.

4.1.3 Change in the Percent of Outstanding Shares Held by Funds

The percent of shares held by mutual funds is calculated as the total number of shares held by mutual funds divided by the total number of shares outstanding at the end of each calendar quarter. The change is simply the increase of decrease in consecutive quarters.

[12] See Wermers (1999) for a detailed description of the CDA/Spectrum database (which was merged with TFN in 1999).

4.2 Financial Constraints

Of course, it could be the case that firms' investments and costs are affected through declined funding when the market disagrees with the decision. If lack of external funding is driving the results, then after controlling for equity issuance, debt issuance, and financial constraints market agreement should no longer matter.

To control for equity issuance in the investment and cost regressions, net equity issuance (NEI_t), calculated as the change in book equity less the change in retained earnings over lagged book assets, is included as a control. To control for debt issuance, net debt issuance (NDI_t), calculated as debt issued less debt reduction over lagged book assets, is included as a control.

Each firm is classified yearly as financially constrained or unconstrained. If a firm is financially unconstrained and agreement still retains power, then it can be ruled out that the market is only mattering by tightening the belt on the manger, that is, denying funding. Following Faulkender and Wang (2005) and Almeida, Campello, and Weisbach (2004) four measures of financial constraint are considered:[13]

1. *Payout Ratio*

   The payout ratio is measured as total dividends (total common dividends plus repurchases) over earnings. For each year in the sample, firms are sorted according to their annual payout ratio and assigned to the financially constrained (unconstrained) group those firms whose payout ratios are less (greater) than or equal to the payout ratio of the firm at the 30th (70th) percentile of the annual payout ratio distribution. Firms with high payout ratios are more likely to have ample funds to cover debt obligations and fund their investments. In addition, Fazzari, Hubbard, and Petersen (1988) document that financially constrained firms have significantly lower payout ratios.

2. *Firm Size*

   Larger firms are known to have better access to capital markets than smaller firms, and should face less constraints raising funds. Book assets are used as the measure of firm size. For each year in the sample, firms are sorted and ranked at the end of the previous fiscal year as constrained (unconstrained) is the book assets are less (greater) than or equal to the book

[13] Almeida, Campello, and Weisbach (2004) find the KZ index ineffective and thus it is not used.

assets at the 30th (70th) percentile of the annual book asset distribution.

3. *Long-Term Bond Rating*

   Firms that have access to public debt markets are more easily able to raise funds than firms that do not. The former firms are better known and should face less difficulty in raising funds. Compustat provides data on firms' bond ratings starting in 1985. A firm is assigned as financially unconstrained for those firm-years in which the firm has a bond rating and reports positive debt. A firm is designated as constrained if there is no bond rating, but the firm reports positive debt. Faulkender and Petersen (2004) find that firms with a public debt rating have significantly higher leverage which can not be explained by observed capital structure firm characteristics. This finding is consistent with rated firms have better access to capital markets indicating less reliance on internal funds.

4. *Commercial Paper Rating*

   Firms with a commercial paper rating are considered among the safest group of publicly traded firms. The same approach is used for commercial paper ratings as long-term bond ratings.

5 Empirical Results

5.1 Price-Cost

Four measures of price are used: market-to-book, raw return, industry adjusted market-to-book, and market adjusted return. The industry adjusted market-to-book is calculated by normalizing each firm-year observation by the industry average market-to-book for that year. The market adjusted return is calculated by subtracting the CRSP value-weighted market return from each raw return for each firm-year observation. Table 2 in Appendix B contains the correlation matrix for the various measures price.

The following cost equation is estimated for each price measure:

$$\frac{C_{i,t}}{A_{i,t-1}} = f_i + \gamma_t + \beta_1(\text{Price}) + \beta_2\left(\frac{S_{i,t}}{A_{i,t-1}}\right) + \beta_3(\text{Size}) + \beta_4(\text{A.S.G.}) + \epsilon_{i,t} \tag{11}$$

$C_{i,t}$ is costs, defined as selling, general, and administrative expenses plus the cost of goods sold.

Sales are included as a control to ensure that increases in sales are not driving the changes in cost. It is feasible to consider that there may be a mechanical relationship between sales and costs. The correlation between the variables is 11.1%. Average sales growth (A.S.G.) over a three year period is included as a proxy for growth. Size is defined to be the natural log of book assets and is included as a control for the size of the firm.

In addition, Alt. $C_{i,t}$ is defined as costs less research of development expense and advertising expense. The alternative costs are included as a robustness check to ensure that high agreement isn't preceding higher costs solely because of the growth opportunities that may be present in research and development expense and advertising expense.

Price measures should have a positive and significant sign when regressed on costs, implying a reduction in price last period results in a reduction in this period's costs. This is exactly what is found under all four price measures, as seen by the results listed in Table 3. Statistically, I estimate positive coefficients that are significant at the one percent level. Economically, a one standard deviation decrease in the market-to-book results in lower costs of approximately 3.72%. A one standard deviation decrease in any of the price variables with either standard costs or alternative costs yields similar results ranging from 2.16% to 3.72% decrease in alternative costs and costs, respectively. This confirms that lower stock prices are preceding lower costs and the changes are economically significant.

5.2 Stock Price-Agreement

The empirical results above show that lower stock prices predate lower costs. The model developed in the paper demonstrates that lower agreement predates lower costs. Thus, it is important to establish a link between stock prices and agreement. First, the correlation matrix in table 2 in Appendix B verifies that low stock price is correlated with low agreement. Second, for each of the agreement measures in Section 4.1 and for each of the price variables presented here, the following equation is estimated:

$$\text{Agreement Measure} = f_i + \gamma_t + \beta_1(\text{Price Measure}) + \epsilon_{i,t} \tag{12}$$

Equation (12) isolates the portion of the agreement measure that is explained by the stock price. The predicted portion of the agreement measure from the stock price is then used as the measure of agreement in the baseline regressions. If there is noise in the agreement measure that is not stock price related, it will be excluded from the predicted component. Virtually all results continue to hold with the exception of predicted capital expenditures using change in breadth as the agreement measure. Statistical significance is lost in that case. Interestingly, the sign on the dispersion of analysts' forecast is negative with the cash flow results, but is positive and significant when using the predicted component. The only results reported are using the prior year's return as the price variable against the various agreement measures. The other results are available upon request. The predicted agreement results are included, side-by-side, in the investment, costs, and cash flow tables.

5.3 Costs and Agreement

The following cost equation is estimated for each measure of agreement:

$$\frac{C_{i,t}}{A_{i,t-1}} = f_i + \gamma_t + \beta_1(\text{Agreement}) + \beta_2\left(\frac{S_{i,t}}{A_{i,t-1}}\right) + \beta_3(\text{Size}) + \beta_4(\text{A.S.G.}) + \epsilon_{i,t} \qquad (13)$$

Table 4 contains the relevant results.

The dispersion of analysts' forecasts, the inverse of agreement $(1-\rho)$, should have a negative coefficient. The higher the agreement the higher the cost. The coefficient is -0.058 for the dispersion of analysts' forecasts. A one standard deviation increase in the dispersion leads to an approximate reduction of 1.44% in costs, as expected. As a robustness check, the average standard deviation of daily stock prices for each firm was calculated over the previous year and used as a proxy for firm risk. If analysts' forecasts dispersion is greater simply because riskier firms are more difficult to forecast, then after controlling for the riskiness the coefficient should no longer be economically or statistically significant. In unreported results, the average standard deviation was first regressed on the dispersion of analyst forecasts then the residual portion (unexplained by the standard deviation) was regressed in place of the original standard deviation of analysts' forecasts. The results are similar in all tables.

Both the change in the breadth of mutual fund holdings and the change in percent of total

shares held have positive coefficients, 1.296 and 0.500, respectively. Both are significant at the one percent level and a one standard deviation decrease leads to a 1.05% and 1.36% decrease in costs, respectively.

The results for the alternative cost measure are similar with a one standard deviation change in the agreement measure resulting in results very close to those reported above. A standard deviation change in the agreement variable results in 0.98% to 1.41% change in the normalized costs.

As expected in all cases an increase in sales leads to an increase in cost. This is not surprising since the equations include contemporaneous sales and costs.

5.4 Investment

The following investment equation is estimated for each of the agreement proxies:

$$\begin{aligned}\frac{CAPX_{i,t}}{A_{i,t-1}} =& f_i + \gamma_t + \beta_1(\text{Agreement}) + \beta_2\frac{CF_{i,t}}{A_{i,t-1}} \\ &+ \beta_3(\text{Size}) + \beta_4(\text{A.S.G}) + \epsilon_{i,t}\end{aligned} \tag{14}$$

The regression details are in table 5. Controlling for contemporaneous cash flow eliminates the situation where investment increases simply because more cash was available. Size (natural log of book assets) is included to ensure that the magnitude of the firm is not driving the results. Average sales growth is calculated over the past three years and is included as a control for the investment opportunity set of the firm. Obviously, a firm with a large investment opportunity set should be investing much more than a firm with a small investment opportunity set.

The prediction is that the coefficient on agreement should be positive. In addition, one would expect the coefficients on cash flow, average sales growth, and size to be positive as well.

The first measure of agreement is the dispersion of analysts forecasts. The prediction is that the more dispersed analysts' forecasts are the more likely it is that the investors will disagree with manager. Thus, the coefficient on the dispersion of analysts' forecasts should be negative. The coefficient is -0.016 and significant at the one percent level. A one standard deviation increase in the dispersions leads to a decrease in investment of 6.39%. As with costs, the residual dispersion of analysts' forecasts was used and the results continue to hold.

The second measure of agreement is the breadth of mutual fund ownership. The coefficient should be positive. That is, if the fund manager believes the firm manager will disagree and make

a bad investment decision, then she will sell the stock decreasing the total number of funds holding the firm. The coefficient on the change in breadth is 0.074 and is statistically significant at the one percent level. A one standard deviation increase in the change in breadth increases investment by 0.87%.

The last measure of agreement is the change in the percent of total outstanding shares held by mutual funds. It is expected that an increase in the portion of shares held corresponds to a higher level of agreement. Thus, the coefficient should be positive. The coefficient is not statistically significant.

5.5 Cash Flow

The following cash flow equation is estimated for each of the agreement measures:

$$\frac{CF_{i,t}}{A_{i,t-1}} = f_i + \gamma_t + \beta_1(\text{Agreement}) + \beta_2(\text{Size}) + \beta_3 \left(\frac{CF_{i,t-1}}{A_{i,t-2}} \right) + \epsilon_{i,t} \tag{15}$$

Table 6 in Appendix B contains the relevant results. After inspecting the distribution of the cash flow variable, the variable was Winsorized at the 5% level. This greatly reduces the influence of outliers.

The prediction is that more agreement leads to lower cash flow. Intuitively, when the manager has good, agreeable, investment prospects, costs are not monitored as rigorously resulting in lower cash flow.

The sign on the dispersion of analyst forecast should be positive indicating that increasing disagreement raises cash flow. However, the coefficient is negative and statistically significant at the one percent level. A one standard deviation increase in the dispersion results in a decrease of approximately 7.06%. This is the only measure with an unexpected and statistically significant coefficient. The statistical and economic significance is the lowest amongst all agreement measures. It is interesting to note that the dispersion predicted from the stock price has the correct sign and is significant at the one percent level indicating perhaps other noise in the dispersion was driving the incorrect sign. Using the predicted dispersion, an increase of one standard deviation results in an increase of cash flow of 38.93%.

As expected both the change in breadth and change in holdings coefficients are negative and significant at -0.551 and -0.171, respectively. A one standard deviation increase in each leads to an

15.41% and 24.36% decrease in cash flow, respectively.

5.6 External Financing

Both costs and investment regressed are calculated with controls for equity and debt issuance. The change in breadth and change in the percent of outstanding shares held all have positive coefficients which remain statistically and economically significant. The dispersion of analysts' forecasts has a negative coefficient which is also both statistically and economically significant.

The investment regression results are more mixed. The dispersion of analysts' forecasts is statistically and economically significant, but the change in breadth and change in the percent of the outstanding shares held are statistically insignificant.

5.7 Financial Constraints

Of course it is possibly that the market may "force" its will upon financially constrained firms, but unconstrained firms are free to invest and manage costs as deemed appropriate. To address this, all statistical tests are rerun for firms that have been separated into financially constrained and unconstrained groups. In each of the equations, costs, investments, and cash flows, all the previous controls including net equity and debt issues are included. The firms contained in the constrained set are regressed separately from the firms in the unconstrained set. If the results still hold for the least constrained firms, controlling for issuance, then it provides evidence against the market influencing the corporation solely by withholding funding. In all the following discussions only the payout ratio will be discussed. Other results are similar and available upon request.

All predictions hold for both constrained and unconstrained firms except the coefficient on the unconstrained change in breadth is insignificant, but still remains positive. The average impact of a one standard deviation decrease in the agreement measures results in an average decrease of 0.65% for the unconstrained firms and 0.68% for the constrained firms. This gives an indication that the economic impact of agreement is similar regardless of how financially constrained or unconstrained the firm is.

Overall, there is strong evidence that agreement matter for the firms cost management decisions. Virtually all results retain statistical and economic significance.

Investment results are not quite as strong as the cost results. Both the market-to-book and the standard deviation of analysts' forecasts retain the correct sign and are statistically significant with a one standard deviation increase in the agreement parameter resulting in an average of 9.97% increase in investment. However, neither of the two measure retain statistical significance for either the constrained or unconstrained tests. Some of the other measures of financial constraint due have the correct sign for the last two measures and are statistically significant. Only the unconstrained coefficient for long-term bond rating is statistically significant and negative.

With the exception of the standard deviation of analysts' forecast, virtually all the cash flow results continue to be statistically and economically significant. This is not surprising given the cash flow result for the baseline measure. However, only one of the eight coefficients has the incorrect sign and is not statistical significant. Of the remaining seven, only one is statistically significant.

6 Robustness

As mentioned earlier, investment may be larger simply because of a larger investment opportunity set. Lower investment opportunity sets could force the manger to focus on cost reduction. As a robustness check for the investment opportunity set, a dummy variable is included for each four digit industry code. Firm fixed effects are not included since most firms have not changed their primary industry during the sample. In addition, the market-to-book is included as an additional control for the investment opportunity set, as well as, an agreement variable. All results continue unaffected. The untabulated results are available upon request.

An alternative explanation of my results is that costs and stock prices may be low simply because other stakeholders have control of the firm. For instance, General Motors may be managing capital expenditures and costs to meet future pension obligations. As such, it may not take on risky investment and be extremely cautious with investing to ensure future obligations are met. Firms with lower agreement (stock prices) may just have larger amounts of other stakeholder control. Similar stories may be told about labor union control. Multiple robustness checks using various proxies for labor bargaining power were performed. Proxies include the number of employees in the firms, total labor expenses, and total pension and retirement expenses. In all cases, the results are unaffected. In fact, most of the added variables are not statistically significant. Debt holders

could also represent a stakeholder with significant bargaining power. The most equity dependent firms (financially constrained) should not be subject to this criticism. The results are robust to this group of firms.

7 Conclusion

This paper elucidates the interaction between investors and managers. The main finding is that low stock prices induce improved cost productivity.

The model developed shows how differing priors affect the decisions managers make within the firm. This occurs because the manager is trading off whether or not investors will agree when making a project decision. Empirical tests, with four different proxies for agreement, lend support to managers systematically making different decisions based on the level of agreement with the market. In particular, lower agreement leads to lower costs, investments, and higher cash flows.

The evidence supports the hypothesis that the manager of a corporation that is in agreement with investors prefers to grow the top line of the firm by taking on investment and choosing to worry less about costs. Without agreement, the manager must tighten the proverbial belt and serve his fiduciary duty by improving efficiency through cost cutting, that is, growing the bottom line. The results are robust to financial constraints.

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A Proofs

Proof of Lemma 1. Since both functions are twice continuously differentiable by assumption, consider the first order conditions:

$$H'(e_c^*) - c'(e_c^*) = 0 \tag{16}$$

Since $H'(0) > c'(0)$ by assumption (1) and $H'' < 0$ and $c'' > 0$, it follows that $\exists\, e_c^* > 0$. The second order conditions give

$$H''(e_c^*) - c''(e_c^*) \tag{17}$$

which is less than zero since $H'' < 0$ and $c'' > 0$. Thus, e_c^* is the unique global maximum. □

Proof of Proposition 1. For a given ρ, the manager will choose the project over improving efficiency if and only if the utility from project selection and any additional production improving efficiency is greater than the utility of just improving efficiency. That is,

$$U^m(e_c^{**}, e_P) \geq U^m(e_c^*) \tag{18}$$

It immediately follows that

$$V_0 + H(e_c^{**}) - c(e_P + e_c^{**}) + \delta\overline{V} + (1-\delta)\left(\rho\overline{V} + (1-\rho)\underline{V}\right) \geq V_0 + H(e_c^*) - c(e_c^*) \tag{19}$$

where $e_c^{**} \geq 0$ is the optimal amount of additional effort exerted in improving efficiency above and beyond the effort exerted for a project. Simplifying equation (19) and the result is obtained. □

Proof of Proposition 2. Assumption (1) guarantees $H'(0) > c'(0)$. Since $c'' > 0$, c' is continuous, and $H'(0) < \infty$, then $\exists \hat{e}_P > 0$ such that $H'(0) = c'(\hat{e}_P)$.

Suppose $e_P < \hat{e}_P$, then $H'(0) > c'(e_P)$. Since $H'' < 0$ and $c'' > 0$, then increasing e_c from zero to e_c^{**} lowers H' and increases c' until the first order condition is satisfied.

Suppose $e_P > \hat{e}_P$, then $H'(0) < c'(e_P)$. Since $H'' < 0$ and $c'' > 0$, then increasing e_c from zero implies $H'(e_c) \ll c'(e_P + e_c)$ which can never satisfy the first order condition implying $e_c^{**} = 0$. □

Proof of Proposition 3. Suppose instead that $e_P + e_c^{**} \leq e_c^*$. Then

$$c'(e_P + e_c^{**}) \leq c'(e_c^*)$$

since $c'' > 0$. The first order conditions guarantee that

$$c'(e_c^*) = H'(e_c^*)$$

and since $H'' < 0$ if follows that

$$H'(e_c^*) < H'(e_c^{**})$$

by Lemma 3. Thus,

$$c'(e_P + e_c^{**}) < H'(e_c^{**})$$

violating the first order conditions. By contradiction, it follows that $e_P + e_c^{**} > e_c^*$. □

Proof of Lemma 2. Recall that $H'(e_c^*) = c'(e_c^*)$ and $H'(0) = c'(\hat{e})$. Since $H'' < 0$, $H'(0) > H'(e_c^*)$ which immediately implies that $c'(\hat{e}) > c'(e_c^*)$. Since $c'' > 0$, it follows that $\hat{e} > e_c^*$. □

Proof of Lemma 3. Consider the first order condition for additional efficiency effort given project selection and define this as follows:

$$H'(e_c^{**}) - c'(e_P + e_c^{**}) \equiv G(e_P, e_c^{**}(e_P)) \tag{20}$$

Treat e_c^{**} as an implicit function of e_P and apply the implicit function theorem to $G(\cdot)$ to yield

$$\frac{de_c^{**}(e_P)}{de_P} = \frac{c''(e_P + e_c^{**})}{H''(e_c^{**}) - c''(e_P + e_c^{**})} \tag{21}$$

Since $H'' < 0$ and $c'' > 0$, it follows that

$$\frac{de_c^{**}(e_P)}{de_P} < 0 \tag{22}$$

Thus, increasing e_P strictly lowers the optimal value of additional effort exerted on improving efficiency. Finally, it must be shown that if $e_P = 0$, then $e_c^* = e_c^{**}$. A quick inspection of the related first order conditions is sufficient to verify that this is indeed true. □

B Figures and Tables

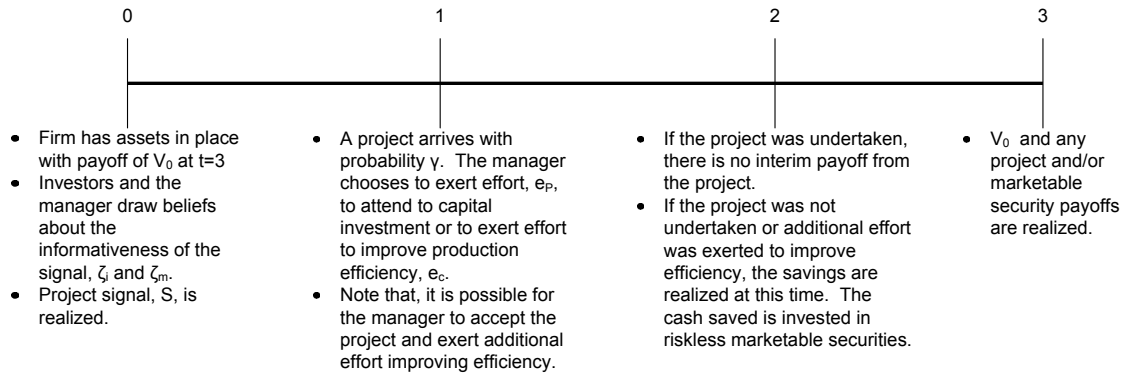

Figure 1: Timeline

Table 1: Summary Statistics

	Mean	Median	St. Dev.	Min	Max
MB_{t-1}	1.922	1.471	1.339	0.596	7.877
$SDAF_{t-1}$	0.136	0.038	0.331	0.000	2.418
R_SDAF_{t-1}	0.000	-0.069	0.326	-0.751	2.400
$\Delta Breadth_t$	0.001	0.000	0.010	-0.169	0.168
$\Delta Held_t$	0.823	0.065	3.419	-0.965	27.066
CF_t	0.018	0.052	0.208	-1.083	0.440
$Size_t$	5.457	5.194	1.806	2.303	13.381
$Capex_t$	0.083	0.055	0.091	0.000	0.532
C_t	1.323	1.144	0.950	0.077	5.472
Alt. C_t	1.269	1.084	0.947	0.077	5.337
$Sales_t$	1.169	1.099	0.421	0.398	3.672
NEI_t	0.057	0.002	0.198	-0.148	1.338
NDI_t	0.025	0.000	0.125	-0.247	0.702
Raw Ret_{t-1}	0.092	-0.012	0.639	-0.860	3.550
Ind MB_{t-1}	1.137	1.010	0.526	0.372	3.261
Mkt Adj Ret_{t-1}	-0.025	-0.127	0.629	-1.392	3.878
A.S.G.	0.149	0.104	0.243	-0.571	2.597

Table 1 contains the means, medians, standard deviations, minimums, and maximums for all dependent and independent variables for the firm-years in the sample. Note that all variables reported here are taken from the largest sample available. See Appendix C variable definitions.

Table 2: Correlation Matrix

	MB_{t-1}	Raw Ret_{t-1}	Ind MB_{t-1}	Mkt Adj Ret_{t-1}	$SDAF_{t-1}$	$\Delta Breadth_t$	$\Delta Held_t$
MB_{t-1}	1.000						
Raw Ret_{t-1}	0.256	1.000					
Ind MB_{t-1}	0.778	0.226	1.000				
Mkt Adj Ret_{t-1}	0.253	0.967	0.225	1.000			
$SDAF_{t-1}$	-0.132	-0.071	-0.138	-0.078	1.000		
$\Delta Breadth_t$	0.217	0.263	0.197	0.265	-0.078	1.000	
$\Delta Held_t$	0.049	0.214	0.037	0.211	0.000	0.161	1.000

Table 2 contains the correlation between the measures of agreement and the measures of stock price.

Table 3: Estimation results : Cost-Price Regression

	Costs				Alt. Costs			
	I	II	III	IV	V	VI	VII	VIII
MB_{t-1}	0.041***				0.031***			
	(0.004)				(0.004)			
Raw Ret_{t-1}		0.051***				0.048***		
		(0.003)				(0.002)		
Ind MB_{t-1}			0.066***				0.052***	
			(0.007)				(0.007)	
Mkt Adj Ret_{t-1}				0.051***				0.048***
				(0.003)				(0.002)
A.S.G.	0.243***	0.261***	0.249***	0.261***	0.245***	0.258***	0.249***	0.258***
	(0.016)	(0.016)	(0.016)	(0.017)	(0.016)	(0.015)	(0.015)	(0.015)
$Sales_t$	0.392***	0.382***	0.393***	0.382***	0.372***	0.362***	0.373***	0.362***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.011)	(0.011)	(0.011)	(0.011)
$Size_t$	-0.128***	-0.124***	-0.126***	-0.124***	-0.122***	-0.119***	-0.120***	-0.119***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Intercept	1.491***	1.541***	1.470***	1.531***	1.451***	1.491***	1.433***	1.481***
	(0.053)	(0.054)	(0.053)	(0.054)	(0.052)	(0.053)	(0.052)	(0.053)
N	87288	87392	87288	87392	87288	87392	87288	87392
R^2	0.2238	0.2245	0.2224	0.2245	0.2170	0.2190	0.2163	0.2190

Significance levels : $***$: 1% $**$: 5% $*$: 10%

Table 3 presents the results from regressing the four price variables on costs. In I-IV costs, C_t, are defined as selling, general, and administrative expenses plus the cost of goods sold. In V-VIII, costs, Alt. C_t, are net of research and development and advertising expenses. Contemporaneous sales and size are included as controls, as well as, the average sales growth over three years, A.S.G., as a proxy for the investment opportunity set. All regressions include both firm and year fixed effects with clustered standard errors. $Sales_t$ is normalized by the beginning of the year value of book assets. Standard errors are reported in parenthesis.

Table 4: Estimation results : Costs

	Costs			Alternative Costs			Predicted Costs		
	I	II	III	IV	V	VI	VII	VIII	IX
$SDAF_{t-1}$	-0.058***			-0.054***			-1.056***		
	(0.007)			(0.007)			(0.078)		
$\Delta Breadth_t$		1.296***			1.143***			11.391***	
		(0.164)			(0.150)			(0.921)	
$\Delta Held_t$			0.500***			0.443***			6.166***
			(0.068)			(0.062)			(0.467)
A.S.G.	0.173***	0.266***	0.203***	0.169***	0.256***	0.196***	0.176***	0.226***	0.217***
	(0.024)	(0.025)	(0.019)	(0.023)	(0.023)	(0.018)	(0.022)	(0.021)	(0.019)
$Sales_t$	0.402***	0.376***	0.369***	0.374***	0.342***	0.340***	0.383***	0.354***	0.352***
	(0.019)	(0.020)	(0.016)	(0.018)	(0.018)	(0.015)	(0.017)	(0.017)	(0.014)
$Size_t$	-0.141***	-0.137***	-0.134***	-0.131***	-0.127***	-0.125***	-0.142***	-0.124***	-0.125***
	(0.012)	(0.011)	(0.010)	(0.011)	(0.011)	(0.010)	(0.010)	(0.011)	(0.010)
Intercept	1.613***	1.555***	1.550***	1.525***	1.484***	1.474***	1.757***	1.484***	1.456***
	(0.083)	(0.079)	(0.064)	(0.082)	(0.075)	(0.062)	(0.069)	(0.073)	(0.063)
N	32451	29987	40642	32451	29987	40642	42033	36777	47659
R^2	0.2735	0.2302	0.2135	0.2645	0.2230	0.2072	0.2676	0.2278	0.2260

Significance levels : $***$: 1% : $**$: 5% $*$: 10%

Table 4 presents the results from regressing the four measures of agreement on costs, defined as $C_{i,t}/A_{i,t-1}$, and alternate costs, defined as Alt. $C_{i,t}/A_{i,t-1}$. Recall that alternate costs is equal to costs less research and development expense and advertising expense. The change in the breadth of ownership ($\Delta Breadth_t$) and the change in the percent of outstanding shares held ($\Delta Held_t$) are proxies for agreement, ρ. The standard deviation of analysts' forecast earnings ($SDAF_{t-1}$) is a proxy for the inverse of agreement, $1-\rho$. In results VII-IX, the portion of agreement due to stock price is used. All regressions include both time and firm fixed effect with clustered standard errors. $Sales_t$ is normalized by the beginning of the year value of book assets. Standard errors are reported in parenthesis.

Table 5: Estimation results : Investment

	Investment			Predicted Investment		
	I	II	III	IV	V	VI
$SDAF_{t-1}$	-0.016***			-0.276***		
	(0.001)			(0.015)		
$\Delta Breadth_t$		0.074**			0.128	
		(0.029)			(0.138)	
$\Delta Held_t$			0.009			0.001
			(0.011)			(0.001)
A.S.G.	0.071***	0.065***	0.054***	0.066***	0.061***	0.056***
	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)	(0.003)
CF_t	0.030***	0.029***	0.024***	0.029***	0.026***	0.025***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)
$Size_t$	0.001	0.002	0.005***	0.003**	0.004***	0.005***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Intercept	0.033***	0.022**	0.013	0.053***	0.011	0.006
	(0.011)	(0.010)	(0.008)	(0.009)	(0.009)	(0.008)
N	31384	28888	39175	40701	35444	45919
R^2	0.1436	0.0953	0.0922	0.1321	0.0990	0.1029

Significance levels : $***$: 1% $**$: 5% $*$: 10%

Table 5 presents the results from regressing the four different measures of agreement on the firm capital expenditures. The change in the breadth of ownership ($\Delta Breadth_t$) and the change in the percent of outstanding shares held ($\Delta Held_t$) are proxies for agreement, ρ. The standard deviation of analysts' forecast earnings ($SDAF_{t-1}$) is a proxy for the inverse of agreement, $1-\rho$. In results IV-VI, the portion of agreement due to stock price is used. All regressions include both firm and year fixed effects with clustered standard errors. CF_t is normalized by the beginning of the year value of book assets. Standard errors are reported in parenthesis.

Table 6: Estimation results : Cash Flow

	Cash Flow			Predicted Cash Flow		
	I	II	III	IV	V	VI
$SDAF_{t-1}$	-0.006***			0.286***		
	(0.002)			(0.031)		
$\Delta Breadth_t$		-0.551***			-2.929***	
		(0.068)			(0.332)	
$\Delta Held_t$			-0.170***			-1.850***
			(0.027)			(0.176)
CF_{t-1}	-0.046***	-0.077***	-0.079***	-0.059***	-0.073***	-0.072***
	(0.003)	(0.009)	(0.008)	(0.008)	(0.009)	(0.007)
A.S.G.	-0.033***	-0.017**	-0.018***	-0.026***	-0.019***	-0.020***
	(0.006)	(0.007)	(0.006)	(0.006)	(0.006)	(0.007)
$Size_t$	-0.012***	-0.011***	-0.010***	-0.014***	-0.011***	-0.012***
	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)	(0.002)
Intercept	0.153***	0.142***	0.113***	0.123***	0.142***	0.139***
	(0.019)	(0.020)	(0.016)	(0.017)	(0.019)	(0.015)
N	31321	28831	39082	37644	32249	42418
R^2	0.0160	0.0192	0.0170	0.0216	0.0205	0.0209

Significance levels : $***$: 1% : $**$: 5% $*$: 10%

Table 6 presents the results from the regression analysis where the dependent variable is defined as $CF_{i,t}/A_{i,t-1}$ and the four different agreement measures as the independent variable. The change in the breadth of ownership ($\Delta Breadth_t$) and the change in the percent of outstanding shares held ($\Delta Held_t$) are proxies for agreement, ρ. The standard deviation of analysts' forecast earnings ($SDAF_{t-1}$) is a proxy for the inverse of agreement, $1-\rho$. In results IV-VI, the portion of agreement due to stock price is used. All regressions include both year and firm fixed effects with clustered standard errors. Standard errors are reported in parenthesis.

Table 7: Estimation results : Cost - External Financing

	I	II	III
$SDAF_{t-1}$	-0.052***		
	(0.007)		
$\Delta Breadth_t$		0.709***	
		(0.148)	
$\Delta Held_t$			0.314***
			(0.061)
Equity Issuance	0.418***	0.429***	0.400***
	(0.022)	(0.020)	(0.018)
Debt Issuance	0.442***	0.475***	0.470***
	(0.022)	(0.024)	(0.022)
A.S.G.	0.160***	0.208***	0.200***
	(0.024)	(0.021)	(0.018)
$Sales_t$	0.325***	0.302***	0.294***
	(0.018)	(0.015)	(0.014)
$Size_t$	-0.167***	-0.168***	-0.169***
	(0.012)	(0.010)	(0.009)
Intercept	1.879***	1.868***	1.849***
	(0.088)	(0.058)	(0.053)
N	31988	36389	42905
R^2	0.3242	0.2789	0.2685

Significance levels : $***$: 1% $**$: 5% $*$: 10%

Table 7 presents the costs regression results accounting for both external debt and equity financing. Net equity issuance, NEI_t is the change in book equity less the change in retained earnings over lagged book assets and net debt issuance, NEI_t is new debt issued less debt reduction over lagged book assets. The change in the breadth of ownership ($\Delta Breadth_t$) and the change in the percent of outstanding shares held ($\Delta Held_t$) are proxies for agreement, ρ. The standard deviation of analysts' forecast earnings ($SDAF_{t-1}$) is a proxy for the inverse of agreement, $1-\rho$. All regressions include both year and firm fixed effects with clustered standard errors. Standard errors are reported in parenthesis.

Table 8: Estimation results : Investment - External Financing

	I	II	III
$SDAF_{t-1}$	-0.012***		
	(0.001)		
$\Delta Breadth_t$		-0.034	
		(0.024)	
$\Delta Held_t$			-0.005
			(0.010)
Equity Issuance	0.112***	0.104***	0.093***
	(0.005)	(0.005)	(0.004)
Debt Issuance	0.175***	0.169***	0.169***
	(0.007)	(0.007)	(0.006)
A.S.G.	0.045***	0.039***	0.038***
	(0.003)	(0.003)	(0.003)
CF_t	0.112***	0.097***	0.093***
	(0.006)	(0.005)	(0.004)
$Size_t$	-0.007***	-0.005***	-0.004***
	(0.001)	(0.001)	(0.001)
Intercept	0.084***	0.067***	0.059***
	(0.010)	(0.009)	(0.007)
N	31000	35130	41428
R^2	0.2829	0.2427	0.2401

Significance levels : $***$: 1% $**$: 5% $*$: 10%

Table 8 presents the investment regression results accounting for both external debt and equity financing. Net equity issuance, NEI_t is the change in book equity less the change in retained earnings over lagged book assets and net debt issuance, NEI_t is new debt issued less debt reduction over lagged book assets. The change in the breadth of ownership ($\Delta Breadth_t$) and the change in the percent of outstanding shares held ($\Delta Held_t$) are proxies for agreement, ρ. The standard deviation of analysts' forecast earnings ($SDAF_{t-1}$) is a proxy for the inverse of agreement, $1-\rho$. All regressions include both year and firm fixed effects with clustered standard errors. Standard errors are reported in parenthesis.

Table 9: Estimation results : Financial Constraint - Cost

Financial	Payout Ratio					
Criteria	(C)	(U)	(C)	(U)	(C)	(U)
$SDAF_{t-1}$	-0.032**	-0.050***				
	(0.013)	(0.010)				
$\Delta Breadth_t$			1.847***	0.275		
			(0.466)	(0.180)		
$\Delta Held_t$					0.290**	0.344***
					(0.115)	(0.095)
NEI_t	0.431***	0.395***	0.411***	0.390***	0.418***	0.396***
	(0.032)	(0.032)	(0.032)	(0.032)	(0.029)	(0.027)
NDI_t	0.397***	0.356***	0.463***	0.428***	0.456***	0.407***
	(0.043)	(0.039)	(0.045)	(0.042)	(0.041)	(0.037)
A.S.G.	0.099**	0.217***	0.149***	0.227***	0.143***	0.222***
	(0.045)	(0.035)	(0.036)	(0.035)	(0.032)	(0.030)
$Sales_t$	0.300***	0.278***	0.275***	0.266***	0.291***	0.251***
	(0.029)	(0.028)	(0.027)	(0.026)	(0.024)	(0.023)
$Size_t$	-0.159***	-0.165***	-0.143***	-0.152***	-0.133***	-0.157***
	(0.021)	(0.015)	(0.017)	(0.016)	(0.016)	(0.015)
Intercept	1.712***	1.878***	1.653***	1.731***	1.555***	1.755***
	(0.143)	(0.115)	(0.109)	(0.110)	(0.094)	(0.097)
N	6717	14315	9321	14631	11492	17832
R^2	0.3291	0.3201	0.2776	0.2672	0.2714	0.2547

Significance levels : $***$: 1% $**$: 5% $*$: 10%

Table 9 presents presents the costs regression results for both financially constrained and unconstrained firms determined by the payout ratio (See Section (4.2), Item (1) for calculation details). In addition, both the net external equity, NEI_t, and net external debt, NDI_t, issues are included as controls. The change in the breadth of ownership ($\Delta Breadth_t$) and the change in the percent of outstanding shares held ($\Delta Held_t$) are proxies for agreement, ρ. The standard deviation of analysts' forecast earnings ($SDAF_{t-1}$) is a proxy for the inverse of agreement, $1-\rho$. All regressions include both year and firm fixed effects with clustered standard errors. Standard errors are reported in parenthesis.

Table 10: Estimation results : Financial Constraint - Investment

Financial	Payout Ratio					
Criteria	(C)	(U)	(C)	(U)	(C)	(U)
$SDAF_{t-1}$	-0.011***	-0.012***				
	(0.002)	(0.002)				
$\Delta Breadth_t$			0.149	-0.037		
			(0.098)	(0.034)		
$\Delta Held_t$					0.007	0.010
					(0.019)	(0.017)
NEI_t	0.116***	0.092***	0.104***	0.088***	0.097***	0.085***
	(0.010)	(0.007)	(0.009)	(0.007)	(0.008)	(0.006)
NDI_t	0.183***	0.136***	0.185***	0.137***	0.175***	0.139***
	(0.014)	(0.010)	(0.013)	(0.010)	(0.011)	(0.009)
A.S.G.	0.041***	0.041***	0.031***	0.038***	0.034***	0.036***
	(0.006)	(0.005)	(0.006)	(0.005)	(0.005)	(0.004)
CF_t	0.102***	0.081***	0.093***	0.073***	0.083***	0.071***
	(0.011)	(0.007)	(0.009)	(0.007)	(0.007)	(0.006)
$Size_t$	-0.004	-0.004*	-0.001	-0.003	0.002	-0.002
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Intercept	0.064***	0.058***	0.040***	0.053***	0.026**	0.043***
	(0.022)	(0.016)	(0.014)	(0.014)	(0.012)	(0.012)
N	6561	13965	9048	14240	11168	17333
R^2	0.2830	0.2291	0.2684	0.2016	0.2514	0.2007

Significance levels : $***$: 1% $**$: 5% $*$: 10%

Table 10 presents the investment regression results for both financially constrained and unconstrained firms determined by the payout ratio (See Section (4.2), Item (1) for calculation details). In addition, both the net external equity, NEI_t, and net external debt, NDI_t, issues are included as controls. The change in the breadth of ownership ($\Delta Breadth_t$) and the change in the percent of outstanding shares held ($\Delta Held_t$) are proxies for agreement, ρ. The standard deviation of analysts' forecast earnings ($SDAF_{t-1}$) is a proxy for the inverse of agreement, $1-\rho$. All regressions include both year and firm fixed effects with clustered standard errors. Standard errors are reported in parenthesis.

Table 11: Estimation results : Financial Constraint - Cash Flow

Financial	Payout Ratio					
Criteria	(C)	(U)	(C)	(U)	(C)	(U)
$SDAF_{t-1}$	-0.006	-0.016***				
	(0.006)	(0.006)				
$\Delta Breadth_t$			-2.756***	-0.870***		
			(0.391)	(0.133)		
$\Delta Held_t$					-0.404***	-0.307***
					(0.080)	(0.080)
CF_{t-1}	-0.163***	-0.097***	-0.163***	-0.146***	-0.161***	-0.114***
	(0.022)	(0.018)	(0.020)	(0.019)	(0.018)	(0.016)
A.S.G.	-0.072**	-0.060***	-0.007	-0.038*	-0.022	-0.023
	(0.035)	(0.021)	(0.025)	(0.022)	(0.021)	(0.020)
$Size_t$	-0.057***	-0.034***	-0.036***	-0.034***	-0.044***	-0.036***
	(0.012)	(0.006)	(0.010)	(0.008)	(0.080)	(0.007)
Intercept	0.406***	0.344***	0.258***	0.291***	0.256***	0.283***
	(0.082)	(0.047)	(0.060)	(0.055)	(0.046)	(0.044)
N	6542	13942	7963	13094	11114	17290
R^2	0.0672	0.0329	0.0711	0.0446	0.0572	0.0352

Significance levels : $***$: 1% $**$: 5% $*$: 10%

Table 11 presents the cash flow regression results for both financially constrained and unconstrained firms determined by the commercial paper rating (See Section (4.2), Item (1) for calculation details). In addition, both the net external equity, NEI_t, and net external debt, NDI_t, issues are included as controls. The change in the breadth of ownership ($\Delta Breadth_t$) and the change in the percent of outstanding shares held ($\Delta Held_t$) are proxies for agreement, ρ. The standard deviation of analysts' forecast earnings ($SDAF_{t-1}$) is a proxy for the inverse of agreement, $1-\rho$. All regressions include both year and firm fixed effects with clustered standard errors. Standard errors are reported in parenthesis.

Table 12: Fidelity's Magellan Fund

	March	June	September	December
1990		X		X
1991	X		X	
1992	X	X	X	X
1993	X	X	X	
1994		X	X	
1995	X		X	
1996	X		X	
1997	X		X	
1998		X	X	
1999		X		X
2000	X			X
2001		X		X
2002		X		X
2003	X		X	

C Variable construction

- $\text{MB}_{t-1} = \frac{M_{i,t-1}}{B_{i,t-1}}$ = the market value of equity (common shares outstanding (data 25) times price (data 199)) plus assets minus the book value of equity (data 60 + data 74) over book value of assets (data 6) - all lagged;
- SDAF_{t-1} = standard deviation of analyst forecast over the absolute value of the mean forecast;
- R_SDAF_{t-1} = residual standard deviation of analyst forecast after removing the portion explained by the volatility of stock prices over the absolute value of the mean forecast;
- $\Delta\text{Breadth}_t$ = Change in the number of funds holding a particular stock from t-1 to t only if the fund is in the sample in both t-1 and t;
- ΔHeld_t = Change in the percent of total outstanding shares held by funds from t-1 to t;
- $\text{CF}_t = \frac{CF_{i,t}}{A_{i,t-1}}$ = operating income before depreciation (data 13) minus the change in working capital (Δ data 179) minus the capital expenditures (data 128) over lagged assets (data 6);
- Size_t = ln(book assets);
- $\text{Capex}_t = \frac{CAPX_{i,t}}{A_{i,t-1}}$ = capital expenditures (data 128) over lagged total assets (data 6);
- $\text{C}_t = \frac{C_{i,t}}{A_{i,t-1}}$ = SG & A (line 189) plus cost of goods sold (line 41) over lagged assets (data 6);
- Alt. C_t = C_t less research and development expense (data 46) less advertising expense (data 45);
- $\text{Sales}_t = \frac{S_{i,t}}{A_{i,t-1}}$ = sales (data 12) over lagged assets (data 6);
- NEI_t = Change in book equity (data 60) less change in retained earnings (data 36) over lagged book assets;
- NDI_t = Debt issued (data 111) less debt reduction (data 114);
- Raw Ret_{t-1} = Closing price at the end of the period (data 199) less last period's closing price over the beginning of the period price;
- Ind MB_{t-1} = MB_{t-1} divided by the average industry market-to-book for each sample year;
- Mkt Adj Ret_{t-1} = Raw Ret_{t-1} less the CRSP value weighted market return over the fiscal year;
- A.S.G = Three year average sales growth;