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Why Do Firms Issue Equity?

AMY DITTMAR and ANJAN THAKOR*

ABSTRACT

We develop and test a new theory of security issuance that is consistent with the puzzling stylized fact that firms issue equity when their stock prices are high. The theory also generates new predictions. Our theory predicts that managers use equity to finance projects when they believe that investors' views about project payoffs are likely to be aligned with theirs, thus maximizing the likelihood of agreement with investors. Otherwise, they use debt. We find strong empirical support for our theory and document its incremental explanatory power over other security-issuance theories such as market timing and time-varying adverse selection.

A CENTRAL QUESTION IN CORPORATE FINANCE IS: Why and when do firms issue equity? Recent empirical papers have exposed significant gaps between the stylized facts and theories of security issuance and capital structure, so we seem to lack a coherent answer to this question. Our purpose is to develop a new theory of security issuance that is consistent with these difficult-to-explain stylized facts.

One empirical regularity is the genesis of the current debate: Firms issue equity when their stock prices are high. This fact is inconsistent with the two main theories of security issuance and capital structure: tradeoff and pecking order. The tradeoff theory asserts that a firm's security issuance decisions move its capital structure toward an optimum that is determined by a tradeoff between the marginal costs (bankruptcy and agency costs) and benefits (debt tax shields and reduction of free cash flow problems) of debt. Thus, an increase in a firm's stock price, which effectively lowers its leverage ratio, should lead to debt issuance. However, the evidence suggests the opposite is true. While CEOs do consider stock prices to be a key factor in security issuance decisions (Graham and Harvey (2001)), firms issue equity rather than debt when stock prices are high (e.g., Asquith and Mullins (1986), Baker and Wurgler (2002), Jung, Kim, and Stulz (1996), Marsh (1982), and Mikkelson and Partch (1986)). Moreover, Welch (2004) finds that firms let their leverage ratios drift with their stock

*Dittmar is at University of Michigan Business School, Ann Arbor, Michigan and Thakor is at John M. Olin School of Business, Washington University in Saint Louis. Without implicating them for possible errors on our part, we would like to thank Sreedhar Bharath, Kent Daniels, Andrew Ellul, Bob Jennings, Clemens Sialm, Rob Stambaugh, Ivo Welch, and seminar participants at the University of Michigan, University of Oregon, University of New Orleans, and University of Toronto, and particularly an anonymous referee and an associate editor for many useful suggestions. We would also like to thank Brad Bernatek, Brandon Fleming, and Amrita Nain for excellent research assistance, and Art Durnev and Nejat Seyhun for supplying some of the data.

prices, rather than returning to their optimal ratios by issuing equity when prices drop and debt when prices rise.

Myers and Majluf's (1984) pecking order theory assumes that managers are better informed than investors, and this generates adverse selection costs that could dominate the costs and benefits embedded in the tradeoff theory. Firms will therefore finance new investments from retained earnings, then riskless debt, then risky debt, and only in extreme circumstances (e.g., financial duress) from equity. Fama and French (2005) provide two strong pieces of evidence against this theory. First, firms frequently issue stock; 86% of the firms in their sample issued equity of some form during the 1993 to 2003 period. Second, equity is typically not issued under duress, nor are repurchases limited to firms with low demand for outside financing. Between 1973 and 2002, the annual equity decisions of more than 50% of the firms in their sample violated the pecking order. Fama and French therefore conclude (p. 551), "the pecking order, as the stand-model of capital structure alone, is dead."

Two explanations have been offered for these stylized facts. Baker and Wurgler (2002) hypothesize that firms issue equity to "time" the market, that is, they issue equity when it is overvalued by irrational investors who do not revise their valuations to reflect the information conveyed by the equity issuance. The other explanation, "time-varying adverse selection," is a dynamic analog of the static pecking order theory. According to this explanation, firms will issue equity when stock prices are high if a high stock price coincides with low adverse selection. That is, adverse selection costs are time-varying, as are stock prices.

One difficulty with the timing hypothesis is that it was formulated to explain the conundrum of equity issuance during periods of high stock prices. Thus, the documented empirical regularity cannot be taken as support for the hypothesis, or in other words, it provides a potential explanation but is not a refutable theory of security issuance. Time-varying adverse selection is potentially more testable,[1] and we will examine the incremental explanatory power of our theory relative to it. However, in the original pecking order theory of Myers and Majluf (1984), there is no a priori reason for the amount of asymmetric information to be related to the stock price level and, hence, it is quite plausible to hypothesize that asymmetric information is actually higher when stock prices are higher.

Our goal in this paper is to provide an alternative theory of security issuance that is consistent with recent empirical findings, and then test it. The theory rests on the simple idea that the manager's security issuance decision depends on how this decision will affect the firm's investment choice and how this choice in turn will affect the firm's post-investment stock price. The manager cares both about the stock price immediately after he invests in the project for which the financing was raised and about the firm's long-term equity value. The price

[1] Lucas and McDonald (1990) extend this theory to an infinite horizon and provide additional implications, including the predictions that firms will issue equity after a stock price run-up. They also generate predictions that go beyond the observed relationship between equity issues and stock prices. Adverse selection that varies over time also appears in Choe, Masulis, and Nanda (1993), who explore the implications for aggregate equity issues.

reaction to the firm's investment decision depends on whether investors endorse the decision or think it is a bad idea. To the extent that the manager can anticipate the degree of agreement between what he thinks is a good project and what investors think is a good project, he can form an expectation about how the stock price will react when he makes his investment decision. It is this expectation that drives the issuance decision. Thus, the degree of agreement is central to the manager's financing choice.

Because the manager's objective function is based on the firm's equity value, there is no divergence of goals between the manager and the shareholders. The shareholders may object to the manager's investment only because they have different beliefs about the value of the project. In our model, this difference in beliefs arises from heterogeneous prior beliefs that lead to different interpretations of the same information. In order to focus on disagreement based on interpretations, we shy away from agency and asymmetric information problems, but discuss why our empirical findings cannot be explained by these problems.

The situation is different with debt. Bondholders may object to the manager's project choice either because they disagree with him about project value (like shareholders) or because their objective function differs from that of the manager and shareholders. This dual source of disagreement can make debt financing particularly expensive for the firm. There are conditions under which avoiding this cost makes it ex ante optimal for the manager to accept covenants in the debt contract that limit his choice only to projects that can neither hurt bondholders' interest ex post nor be subject to disagreement. Debt financing is then a double-edged sword. On the one hand the manager gains the debt tax shield, but on the other hand he loses the "autonomy" to invest in a project with a potentially higher shareholder value. Equity provides the manager greater autonomy in project choice, although the manager's concern with the stock price immediately after the investment limits this autonomy since the price will drop if shareholders disapprove of the manager's choice.

The manager's security issuance choice trades off the greater elbow room in project choice associated with equity against the debt tax shield. The autonomy that equity provides is greater, the smaller the likelihood that shareholders will disagree with the manager. Moreover, the firm's stock price is also high when the likelihood of this disagreement is lower, since the shareholders face a smaller probability that the manager will do something of which they disapprove. The model therefore predicts that equity will be issued when stock prices and agreement are high and debt will be issued when stock prices and agreement are low. Our analysis also predicts that the manager will not issue equity but may issue debt if the firm does not have a project.

Our prediction regarding the link between equity issuance and stock price is consistent with the main implication of timing and time-varying adverse selection. The difference is that in our model this link emerges because a high stock price is evidence of market agreement, whereas in the timing hypothesis it is because the firm is overvalued and in the time-varying adverse selection hypothesis it is because information asymmetry is low. For sharper delineation

between these hypotheses, we conduct an empirical horse race. We separate firms into equity issuers and non-equity issuers, defining non-equity issuers as debt issuers, rather than nonissuers, because the predictions versus this group are the most clear. We use several "price variables" to determine whether a firm has a "high" stock price. We also choose several proxies unrelated to market timing or information asymmetry to measure the extent of investor–manager agreement and test our model's predictions using other variables to control for information asymmetry and the implications of market timing.

We take a four-pronged empirical approach to test our theory. First, we confirm that equity is issued when stock prices are high. Second, we examine whether firms with high agreement parameters issue equity regardless of their stock price. We find that they do. Third, we show that firms that issue equity have significantly higher agreement parameters than firms that do not. We then ask if our agreement proxy has incremental power in explaining equity issuance beyond timing considerations and proxies for information asymmetry. Again, we find that it does, supporting our theory. Fourth, while the other hypotheses imply that the manager will issue equity when the stock price is high, regardless of whether the firm has a project, our theory implies that equity will be issued only to finance a project. Hence, we further discriminate among the different hypotheses by asking whether capital expenditures (CAPEX) increase after equity issues. We find a significant increase in CAPEX after equity issues, but *not* after debt issues. We also find that this increase is greatest when investor–manager agreement is the highest. In a nutshell, the empirical results provide support for our theory's central prediction that anticipated investor endorsement of future managerial investment decisions is an important determinant of the security issuance decision. Our findings do not rule out market timing or time-varying adverse selection as possible motivations for equity issues. Rather, we make a strong case that anticipated investor agreement has *incremental* explanatory power relative to these motivations.

Because agreement among agents is the driving force of our model, it is useful to note that our main idea has a flavor that is the opposite of one interpretation of the recent literature on disagreement-based overpricing. Chen, Hong, and Stein (2002), Diether, Malloy, and Scherbina (2002), and others suggest that the combination of differences of opinion among investors and short-sale constraints can cause overpricing. This observation together with the market-timing hypothesis implies that managers may issue equity when disagreement among investors is high. That is, whereas our theory predicts that equity will be issued when *agreement* between the manager and investors is high, the overpricing-based timing argument asserts that equity will be issued when *disagreement* among investors is high. We address this contrast in two ways. First, our findings are not necessarily inconsistent with those of the overpricing literature since our focus is on a difference of opinion *between* the managers and investors as a group, whereas the overpricing literature is concerned with disagreement *among* investors. Second, we perform three kinds of tests to distinguish our predictions from overvaluation; two of which are "one-sided" tests, where the proxies we use have an unambiguous prediction with respect to either our theory or overvaluation but not both, and one is a "two-sided" test, where

the proxies are such that our theory and overvaluation generate diametrically opposite predictions.

In our first set of one-sided tests, we use three proxies for agreement between investors and the manager—two related to managers' performance in delivering earnings per share (EPS) exceeding analysts' forecasts and one representing abnormal returns associated with acquisition announcements—that have nothing to do with disagreement among investors. We find strong support for our theory. In the second set of one-sided tests, we use two proxies for disagreement among investors—change in ownership breadth and turnover—that have little to do with agreement between the manager and investors. In these tests, we also include one of our measures of agreement. We find modest support for overvaluation-based issuance timing based on disagreement among investors, but our measure of agreement between the manager and investors remains significant in these tests. Finally, in our two-sided tests, we use dispersion of analyst forecasts and the premia in the prices of dual-class stocks. Our theory predicts that equity should be issued when dispersion and dual-class premia are small, whereas market timing predicts the opposite. Again, we find strong support for our theory.

The rest of this paper is organized as follows. Section I has the literature review. Section II develops the theory. The analysis and derivations of the testable hypotheses appear in Section III. Section IV describes the data, and Section V discusses the empirical results. Section VI concludes.

I. Related Literature on Disagreement

Since the notion that the manager and the shareholders can disagree about project value even when faced with the same information and objectives plays a central role in our theory, we briefly review why we believe such disagreement is common in economic interactions.

In our model, disagreement arises because of heterogeneous prior beliefs. Although rational agents must use Bayes rule to *update* beliefs, economic theory does not restrict prior beliefs. Kreps (1990) argues that prior beliefs should be viewed in the same way as preferences and endowments—as primitives in the description of the economic environment—and that heterogeneous priors are a more general specification than homogeneous priors.[2] Kurz (1994) provides the foundations for heterogeneous but rational priors.[3]

[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_t, which are indexed by i, reflecting the possibly different subjective beliefs of each player." See also Morris (1995).

[3] A related issue is whether heterogeneous beliefs will converge to the same posterior beliefs. The rational learning literature asserts that agents cannot disagree forever (e.g., Aumann (1976) and Blackwell and Dubins (1962)). However, convergence may not occur if there is insufficient time to exchange information, lack of sufficient objective data, or heterogeneous priors that are drawn randomly from distributions that are not absolutely continuous with respect to each other (Miller and Sanchirico (1999)).

There are previous models of heterogeneous priors. Allen and Gale (1999) examine how heterogeneous priors affect new firm financing. Coval and Thakor (2005) show that heterogeneous priors can give rise to financial intermediation. Garmaise (2001) examines the implications of heterogeneous beliefs for security design. Harris and Raviv (1993) use differences of opinion to explain empirical regularities about the relation between stock price and volume. Kandel and Pearson (1995) make the case that their evidence of trading volume around public information announcements can be best understood within a framework in which agents interpret the same information differently. Boot and Thakor (2006) use heterogeneous priors to develop a theory of "managerial autonomy" that characterizes the allocation of control rights among financiers and its capital structure implications. In their survey, Barberis and Thaler (2002) note that a key ingredient of behavioral models that provide explanations for asset pricing anomalies is disagreement among market participants.

II. The Model

A. *Preferences and Time Line*

There are four points in time. All agents are risk-neutral, the financial market is perfectly competitive, and the riskless rate of interest is zero. Thus, there is no discounting of payoffs. At $t = 0$, the firm is all-equity financed and has existing assets in place, with an expected (after-tax) value of V at $t = 3$ that everybody agrees on. The firm's equity is traded and its stock price is observed. It is known at $t = 0$ that a new investment may arrive at $t = 1$. This investment opportunity is actually a portfolio of projects. Every project in the portfolio requires an investment of $\$I$ at $t = 2$. This portfolio consists of three mutually exclusive projects: a safe mundane project that pays off $\$M > I$ for sure at $t = 3$, a risky innovative project that pays off a random amount $\$Z$ at $t = 3$, where $Z \in \{L,H\}$, with $L < I$, $M < H < \infty$, and a risky lemon project that pays off a random amount ξ with probability density function $f(\xi)$. We assume that $\int \xi f(\xi) d\xi + V < I$, so that even if the bondholder had a claim to the entire cash flow of the lemon project and the firm's assets in place, it would fall short of I. Viewed at $t = 0$, the probability that the opportunity will arrive at $t = 1$ is $\theta \in (0,1)$.

At $t = 1$, arrival of the investment opportunity is observed, the manager decides whether to issue a security to raise the $\$I$ for the project, and whether it should be debt or equity. We assume that if there is no project to invest in but the manager raises $\$I$ at $t = 1$ anyway, it will be worth only λI at $t = 3$, where $\lambda \in (0, 1)$. One can attribute this value loss to free cash flow problems or other idle-cash inefficiencies.

At $t = 2$, there is a common signal S about the innovative project, assuming that the investment opportunity arrived at $t = 1$. This signal contains information about the date-3 payoff on the innovative project. After observing this common signal, the manager decides in which of the three projects to invest. The payoff on the project is observed at $t = 3$. All payoffs are taxed at a rate $T \in (0, 1)$.

We view the mundane project as an extension of the firm's existing operations. Therefore, it is familiar to everybody, with unanimous agreement it will pay off M at $t = 3$. The lemon is a project that everybody agrees is bad, so it may create asset-substitution moral hazard with debt. We assume that while investors can tell whether the manager is investing in the mundane project or risky project, they cannot distinguish ex ante between the two risky projects (innovative and lemon) in that they cannot tell which the manager is investing in.

We view the innovative project as being different from the firm's existing operations. It thus has more "unfamiliar" risks and is also subject to greater potential disagreement about its value. Examples are a new business design such as e-Bay's launching of an on-line auction business, a company's market entry into a new country, a biotech company researching a new drug, and so on. The basic idea is that the innovative project is a break from the past, so that its prospects cannot be predicted based on historical data the way one would predict the future ($t = 3$) value of the firm's existing assets. That is, the innovative project has a lot of soft information that is particularly susceptible to subjective evaluation that can potentially differ across individuals.

B. Disagreement over Future Payoffs

Everybody agrees that the assets in place at $t = 0$ have an expected value of V at $t = 3$, the mundane project will pay off M at $t = 3$, and the lemon will pay off ξ according to the density function $f(\xi)$. If the innovative project is available at $t = 1$, management as well as investors receive a common signal S at $t = 2$ about the $t = 3$ payoff on the project. The interpretation of this signal may differ across management and investors. Management will interpret the signal $x \in \{L, H\}$ and investors (collectively) will interpret it as $y \in \{L, H\}$. The interpretations are private assessments not observed by anyone other than the agent making the assessment. Viewed at $t = 0$, x and y are random variables whose conditional probabilities capture potential disagreement between management and investors. One could view x and y as posterior means arrived at via different prior beliefs on the part of the manager and investors about either the value of the innovative project or the precision of S, and these prior beliefs are drawn randomly from two probability distributions exhibiting a particular correlation structure. (See Boot, Gopalon, and Thakar (2006).) We assume

$$\begin{aligned} &\Pr(x = H) = q, \Pr(x = L) = 1 - q, \quad \text{and} \\ &\Pr(y = H \mid x = H) = \Pr(y = L \mid x = L) = \rho \in [0, 1]. \end{aligned} \tag{1}$$

We can understand equation (1) as follow: If $\rho = 1$, then x and y are perfectly correlated, signifying "complete agreement" between management and investors. If $\rho = 0$, then x and y are perfectly negatively correlated, signifying "complete disagreement." When the views of management and investors are uncorrelated, we have:

$$\Pr(y = H \mid x = H) = q, \Pr(y = L \mid x = L) = 1 - q, \tag{2}$$

which means that $\rho = q$ corresponds to zero correlation between x and y. We will refer to ρ as the *agreement parameter*. The higher is ρ, the greater is the likelihood that management and investors will agree on the value of the new project at $t = 2$. Note that there is only potential disagreement at $t = 2$. All payoffs are publicly observed at $t = 3$, so there is no disagreement then. S is common knowledge once it is realized.

Note that the manager–investor difference in opinions is not due to asymmetric information, nor is it due to incomplete information aggregation, since everybody sees the *same* signal S.[4] It is a difference in beliefs about what S means that leads to possibly divergent assessments of project value. Think of this divergence as the "residual disagreement" left over after all possible exchange of information between the manager and investors. Moreover, there is no managerial self-interest here either since the manager is maximizing the interim stock price and terminal shareholder value, that is, there is no manager–shareholder agency problem.

Note that the manager makes his project choice before he knows how investors interpret S. That is, he interprets S as x, computes his expectation about how investors will interpret S, and then makes a project choice. It is the stock price reaction to this choice that reveals to him how investors interpreted S.

C. Manager's Objective Function

The manager's objective is to maximize a weighted average of the stock prices at $t = 2$ and $t = 3$. That is, the manager maximizes the expected terminal ($t = 3$) wealth of the $t = 0$ shareholders, but also cares about how this terminal wealth is perceived by investors at $t = 2$, when the project choice is made. Specifically, given a positive weighting constant $\delta > 1$, the manager maximizes[5]

$$W = P_2^y + \delta P_2^x, \tag{3}$$

where P_2^x is the expected value of the firm at $t = 2$ to the shareholders at $t = 0$, as assessed by the manager at $t = 2$ based on his interpretation x of the signal S, and P_2^y is the firm's value to its $t = 0$ shareholders based on the stock price at $t = 2$ as set by investors based on their assessment of the firm's terminal value at $t = 3$ using their interpretation y of the signal S after they have noted the firm's investment decision at $t = 2$.

D. Manager's Choice of Security at $t = 1$

The manager can issue either debt or equity at $t = 1$. If equity is chosen, we assume that a fraction $\alpha \in (0, 1)$ of the firm will have to be sold, so the initial

[4] However, this does not mean that our model cannot accommodate situations of asymmetric information. All we are arguing is that after the initial updating in case of asymmetric information, there will be some (possibly soft) information on which the two parties may simply disagree.

[5] Objective functions of this type have been used before, for example Miller and Rock (1985) and Ofer and Thakor (1987), and can be justified via a management compensation scheme as in Holmstrom and Tirole (1993).

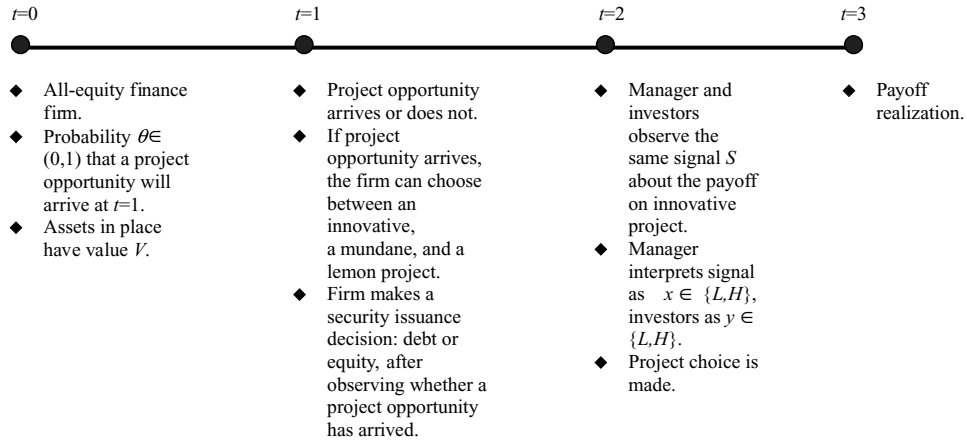

Figure 1. Sequencing of events.

shareholders will have a claim to a fraction $(1 - \alpha)$ of the terminal payoff. If debt is chosen, repayment will have to be made at $t = 3$.

E. Manager's Actions in the Face of Disagreement

We assume equity does not contractually restrict the manager's project choice. Debt may restrict it, depending on the manager's choice of covenants.

Consider equity first. The manager will clearly have a stronger incentive to invest in the innovative project when $x = H$ than when $x = L$. If the manager was concerned solely with the firm's terminal value, he would always invest in the innovative project when $x = H$ and the mundane project when $x = L$. But his concern with the interim stock price at $t = 2$ makes him consider the *expected* stock price reaction to his decision, given x and the agreement parameter ρ. It is clear that the manager will never invest in the lemon if he issues equity.

Now consider debt. The manager can either issue debt with no covenant restrictions on his project choice at $t = 2$ or he can issue debt with a covenant that allows the bondholders to dictate project choice at $t = 2$. Figure 1 summarizes the sequence of events in our model, which is a special case of the more general framework in Boot and Thakor (2006).

F. Parametric Restrictions

We restrict the exogenous parameters to focus on the cases of interest. First,

$$[M - L] > \delta[H - M]. \tag{4}$$

This restriction states that the mundane project is sufficiently attractive than the innovative project would not be preferred independently of the interpretation of the signal about the innovative project's value. Given (4), the manager

will choose the mundane project when $x = L$ and, given ρ high enough, will choose the innovative project when $x = H$. Our second restriction is

$$V + L < I\,. \tag{5}$$

This restriction simply ensures that riskless debt cannot be issued when the innovative project promises a low payoff. Third, we assume that:

$$[1+\delta]\,[H + V - I] \;<\; \int_{I-V}^{\infty} [\xi + V - I]\, f(\xi)\, d\xi\;. \tag{6}$$

This restriction ensures that there is an asset-substitution moral hazard problem with debt. The left-hand side of (6) is the value of equity with the innovative project when $x = H$ and the right-hand side is the (pre-tax) value of equity with the lemon project at a zero debt interest rate. For (6) to hold, $I - V$ must be sufficiently large and the variance of ξ must be high enough. Finally, we assume that

$$q[H - M] > \frac{IT}{[1-T]\,[1+\delta]}. \tag{7}$$

This inequality guarantees that the set of exogenous parameters for which equity issuance will be chosen is nonempty. This will happen when the highest possible value of the innovative project relative to the mundane project is high enough relative to the value of the debt tax shield.

III. Analysis

The analysis proceeds by backward induction. Since there is nothing of any significance happening at $t = 3$ other than the realization of payoffs, we begin at $t = 2$, and then work back to $t = 1$.

A. *Events at $t = 2$*

At $t = 2$, the manager either has debt, equity, or nothing, based on the security issuance decision made earlier at $t = 1$. Consider first the scenario in which debt was issued at $t = 1$. We can prove

LEMMA 1: *If debt issued at $t = 1$ gives the manager the latitude to select whichever project he wants, the manager will unconditionally prefer the lemon project at $t = 2$.*

This result is a consequence of the asset-substitution moral hazard at play in the model, and will affect the type of debt contract that will be feasible at $t = 1$. We now turn to the case in which equity was raised at $t = 1$.

LEMMA 2: *Suppose equity was issued at $t = 1$. Then at $t = 2$, the manager prefers the mundane project regardless of his interpretation of the signal about the*

payoff on the innovative project if the agreement parameter $\rho < \rho^*$, where $\rho^* \in (0, 1)$ is a critical cutoff. If $\rho \geq \rho^*$, the manager prefers the innovative project if $x = H$ and the mundane project if $x = L$.

This lemma asserts that for sufficiently low values of the agreement parameter, the manager ignores his signal about the innovative project and unconditionally invests in the mundane project. The intuition is that at low ρs, investors' opinions become negatively correlated with the manager's opinion. Thus, when the manager observes $x = H$, he actually assigns a high probability to the event that investors will assign $y = L$, so that investing in the innovative project will reduce the post-investment stock price, which the manager dislikes. Given our parametric assumptions, the manager invests in the mundane project even when $x = H$. When $x = L$, the manager always assesses the value of the mundane project as being higher than that of the innovative project; this is guaranteed by our assumption that $\delta > 1$, so that the manager cares more about the terminal value of the firm than the interim stock price. We now move back to $t = 1$.

B. Events at $t = 1$

We will focus on events after θ is realized and the manager knows he has a project. Our first result is about the kind of debt contract that will be chosen.

LEMMA 3: *If the manager prefers to issue debt at $t = 1$, he will issue debt that has a covenant that forces him to invest in the mundane project at $t = 2$.*

The intuition is straightforward. From Lemma 1, we know that the manager invests in the lemon at $t = 2$ if he has issued debt at $t = 1$. But, since the lemon has negative-NPV, bondholders will refuse funding. Given this, the manager finds it optimal to issue debt at $t = 1$ with a covenant that ties the firm's hands at $t = 2$. Our next result is one of the key empirical predictions.

PROPOSITION 1: *There exists a critical cutoff value of the agreement parameter $\rho^{**} \in (\rho^*, 1]$ such that the manager prefers to issue equity at $t = 1$ if $\rho^* \geq \rho^{**}$ and debt if $\rho^* < \rho^{**}$.*

This proposition states that the manager makes his security issuance decision in favor of equity if he perceives a high probability that the shareholders will endorse his project choice. The intuition is as follows. We know from Lemma 2 that for $\rho \leq \rho^*$, the manager prefers the mundane project with equity regardless of his interpretation of the signal at $t = 2$. We know from Lemma 3 that the manager chooses the mundane project with debt. Given the tax shield advantage of debt, the manager will therefore prefer debt to equity for $\rho \leq \rho^*$. Now, at sufficiently high values of ρ, the manager prefers equity to debt because the innovative project has a higher value than the mundane project when $x = H$, the relatively high ρ ensures that the stock price will not react adversely

to the innovative project choice, and in the event that $x = L$ the manager can always revert to the mundane project. That is, the higher expected value of the innovative project overwhelms the debt tax shield value when ρ is high enough. Further, since debt is *strictly* preferred to equity at $\rho = \rho^*$, the critical cutoff value of ρ at which the manager will be indifferent between debt and equity is some $\rho^{**} \in (\rho^*, 1]$.

PROPOSITION 2: *The firm's stock price at both $t = 0$ and $t = 1$ is strictly increasing in the agreement parameter for $\rho \geq \rho^{**}$ and invariant to ρ for $\rho < \rho^{**}$. Hence, the likelihood of an equity issue is nondecreasing in the stock price.*

The intuition is that a higher agreement parameter leads to a lower likelihood that the manager will make a project choice that investors do not like. This increases the expected value of the terminal payoff as assessed by investors. This is relevant only when equity is issued ($\rho \geq \rho^{**}$). When debt is issued ($\rho < \rho^{**}$), ρ does not affect the stock price because the firm invests in the mundane project for all $\rho < \rho^{**}$. We now examine the firm's issuance decision when there is no project.

PROPOSITION 3: *Given a project opportunity at $t = 1$, the firm chooses debt or equity in accordance with Proposition 2. If no project arrives, the firm will never issue equity, but may issue debt, depending on parameter values. The firm's stock price when it issues equity is higher than when it issues debt or no security.*

The reason why the firm never issues equity if a project opportunity does not arrive is that there is value dissipation from idle cash. Issuing debt suffers from the same problem, but may be worthwhile if the value dissipation is small relative to the debt tax shield benefits.

C. Testable Predictions

PREDICTION 1: *Firms will issue equity when their stock prices are high and either debt or no security when their stock prices are low*.

This prediction, common to our model and the other hypotheses, follows from Propositions 2 and 3.

PREDICTION 2: *Firms will issue equity when the agreement parameter is high, regardless of the stock price*.

This prediction follows from Proposition 1 and distinguishes our model from what the timing and time-varying adverse selection hypotheses imply.

PREDICTION 3: *The average value of the agreement parameter will be higher among firms that issue equity than those that issue debt or do not issue any security. This relation will hold for potentially undervalued firms* (*not probable*

timers) *and potentially overvalued firms* (*not probable timers*). *It will also hold after controlling for variation in information. Thus, the agreement parameter has incremental explanatory power in predicting the firms that will actually issue equity.*

This prediction follows from Proposition 1. It is one that allows us to distinguish our predictions from the timing and time-varying adverse selection hypotheses, as we explain below.

PREDICTION 4: *On average, firms that issue equity will have higher capital expenditures after the issue than firms that either issue debt or do not issue any security.*

This prediction follows from Proposition 3. A firm that has no project will not increase its capital expenditures after a security issuance. Since an equity issue occurs only when there is a project, whereas a debt issue may occur even without a project, the prediction follows. This prediction is unique to our model and not related to the timing or time-varying adverse selection hypotheses.

Figure 2 juxtaposes the predictions of our model with those of the timing and the time-varying adverse selection hypotheses. It shows that firms with high prices and high ρ values issue equity; the predictions overlap here. Where

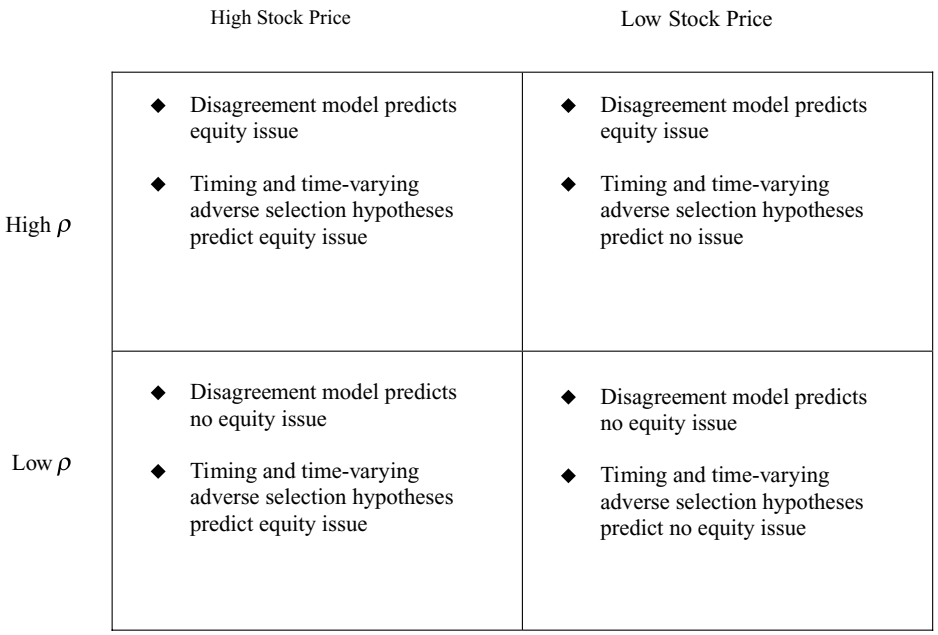

Figure 2. Testable predictions of our model and the timing and time-varying adverse selection hypotheses.

our predictions diverge from the implications of the other hypotheses are in the other two boxes. Our model predicts that equity will be issued by high-ρ firms regardless of stock price, whereas the timing hypothesis says that these firms will not issue equity unless they have high stock prices. Moreover, our model predicts that firms with low ρs but high stock prices will not issue equity, whereas the timing hypothesis suggests that they will. To distinguish our predictions from time-varying adverse selection, we will test whether ρ has incremental power in predicting when equity will be issued, even after controlling for asymmetric information in various ways.

IV. Data and the Variables Chosen as Empirical Proxies

A. Sample and Data

We use a sample of firms that issued seasoned equity or nonconvertible debt between 1993 and 2002. Security issuance data are from the Security Data Corporation (SDC) New Issues database. We focus our analysis on equity issuers and use debt issuers as a comparison group, referring to the latter as nonequity issuers, because the model predicts that if the firm does not have a project, it will either issue debt or issue no security, but it will not issue equity. That is, in these circumstances, nonissuers and debt issuers represent a homogeneous group, distinct from equity issuers. Debt issuers, rather than nonissuers, provide a logical control sample, because both debt and equity issuers experience similar cash inflows. Thus, our sample is conditional on security issuance and our results should be interpreted accordingly. Because many of our variables are time dependent and many firms have multiple debt issues in a calendar year, we use only the first debt issue in a year. We further delete 843 issues by firms that issue debt and equity in the same calendar year.[6] This produces a sample of 4,496 equity issues and 3,321 nonconvertible debt issues.

We obtain returns data from Center for Research in Security Prices (CRSP), accounting data from Compustat, analyst forecast data from I/B/E/S, and mutual fund ownership data from CDA Spectrum. We also examine firms' prior Mergers and acquisition (M&A) activity, taking M&A announcements from the SDC Mergers and Acquisition Database. Data on business cycles are from the Federal Reserve and Global Insight. We discuss the variables used in our analysis in the following section.

B. Description of Variables

To distinguish our predictions from those of other hypotheses, we control for measures of the firm's stock price, which are often associated with market

[6] These firms are similar to both the equity and the debt issuing samples. They tend to be larger than the equity issuers but smaller than the debt issuers, thus lying between the two subsamples. The only striking difference between this sample of excluded firms and the sample used in this paper is that the deleted firms have significantly higher leverage than either debt or equity issuers in our sample.

timing, and measures of information asymmetry, which are unrelated to stock prices.

The variables we use to measure changes or levels in stock price are: (i) raw returns for the 3, 6, 9, and 12 months preceding the issue date; (ii) market-adjusted returns (raw return – market return) for the 3, 6, 9, and 12 months preceding the issue date; (iii) the market-to-book ratio at the fiscal year-end preceding the issue date; and (iv) the industry-adjusted market-to-book ratio at the fiscal year end preceding the issue date, where the industry is determined using three-digit SIC codes. We refer to these variables as the *Price Variables*. To conserve space, we present results with the raw returns 3 and 12 months prior to the issue date and the market-to-book ratio at the fiscal year-end preceding the issue date. Results are robust to using alternative price variables; these are available upon request.

These price variables measure agreement as well as timing and time-varying adverse selection, and thus do not permit one to draw distinctions among the three hypotheses. We discuss below the distinguishing measures we use for agreement (our theory), overvaluation (timing hypothesis), and information asymmetry (time-varying adverse selection theory), as well as control variables.

Although stock price is an obvious measure of agreement, it is not a distinguishing measure. So, we examine two distinguishing measures of agreement. The first is the difference between a firm's EPS from the quarter prior to the issue and the mean analyst forecast of EPS that occurs just prior to the actual EPS disclosure divided by the actual EPS. The analyst forecast is no more than 50 days prior to the actual EPS. We refer to this variable as *Actual − Forecast EPS* (ρ). We interpret investors' propensity to agree with the manager as increasing in the amount by which the firm's EPS exceeds the forecast. The idea is that the greater the manager's ability to deliver better-than-expected earnings, the less likely are investors to question the manager's decisions.[7] We predict that firms with higher *Actual − Forecast EPS* (ρ) are more likely to issue equity.

Because analyst forecasts may be biased, we repeat much of our analysis controlling for potential biases. Richardson, Teoh, and Wysocki (1999, 2004) show that analysts' forecasts may be downward-biased shortly prior to an earnings announcement and this pessimism is stronger for higher market-to-book firms, for larger firms, and in periods of higher real GDP growth. They also show that forecasts are more accurate for firms issuing equity, but not if this is done following an earnings announcement. Elton, Gruber, and Gultekin (1984) show that these biases may be worse at fiscal year-end. We thus include the following

[7] Teoh, Welch, and Wong (1998) show that firms are more likely to engage in earnings management prior to an equity issuance. Due to potential earnings management that is rationally anticipated by investors, a firm beating its forecast slightly may not affect the agreement parameter. In our tests, we control for this in three ways. First, the continuous nature of the variable will naturally control for this effect. Second, in untabulated tests, we repeat the analysis setting the variable equal to zero if EPS is within \$0.02 of the forecast. None of the results are affected. Third, we rely on several additional measures of agreement to confirm the findings based on analyst forecasts.

variables: the growth in GDP in the quarter of the forecast, *GDP Growth*; a dummy variable equal to one if the issuance occurs within 30 days after an earnings announcement, *30 Days Post EPS Dummy*;[8] and a dummy variable equal to one if the forecast is for the fiscal year-end, *Year-end Dummy*.[9] Additionally, we control for firm size and the market-to-book ratio.

The *Actual−Forecast EPS* (ρ) examines the EPS in the quarter prior to the equity issuance. Since performance over multiple quarters may affect the agreement parameter, we also examine the number of consecutive quarters prior to the issue that the firm beats the forecast. We look at four quarters prior to the issue; thus, the variable, number of *Quarters Beat Forecast EPS* (ρ), will be between zero and four. We predict that firms with higher values of this variable are more likely to issue equity.

The second distinguishing agreement proxy we use is the standard deviation of raw (i.e., not split-adjusted) analysts' forecasts in the quarter prior to the issuance divided by book equity.[10] This variable measures agreement among analysts and thus potentially among investors. Assuming that agreement among analysts is highly correlated with agreement between management and investors, we interpret higher dispersion to connote lower agreement. Thus, this variable, which we refer to as *Dispersion* ($1 - \rho$), is a measure of the inverse of ρ or ($1 - \rho$), and the prediction is that firms with low dispersion are more likely to issue equity.[11]

To verify for robustness, we use two other proxies, closely linked to our model, which may measure agreement with greater precision than the proxies we discuss above. While we present results using these proxies, we do not focus on them because data availability on these proxies is limited to a subset of our sample.

The first alternative proxy we use is the control premium for dual-class stock. Dual-class stock typically has two classes of stock with equal cash flow rights but different voting rights. The superior stock, commonly held by insiders, has more voting rights and thus trades at a premium. The inferior stock has fewer voting rights and is widely held. The control premium, the difference in the prices of these two classes of stock, should represent the level of agreement between investors at large and insiders (managers) in control, with a smaller control premium denoting higher agreement. We measure the control premium (called *Dual-Class Premium* ($1 - \rho$)) as the superior stock price minus the inferior stock price divided by the inferior stock price one month prior to the equity issuance. To identify traded dual-class stocks, we first find firms with CRSP

[8] We also use dummy variables equal to one if the issuance occurs within 7, 14, or 45 days after the earnings announcement. And, in untabulated results we also include a dummy variable for issuances that occur just before an earnings announcement, that is, during the period farthest from the last announcement, and that may be more subject to these biases.

[9] We also consider using a dummy variable to indicate an expansionary period; however, during our sample period, only 8 months are *not* an expansionary period.

[10] *Dispersion* ($1 - \rho$) and *Actual − Forecast EPS* (ρ) are usually highly correlated and thus the tests involving these two variables may not be truly independent.

[11] References to *Dispersion* ($1 - \rho$) are to the standard deviation scaled by book equity. When we discuss the unscaled standard deviation it will be noted.

pricing data for more than one class of stock.[12] We then use proxy statements to exclude any tracking stocks, determine the voting rights, and identify the superior stock. There are 74 firms in our sample with dual-class stock prior to the issuance. We predict that firms with higher dual-class premia are less likely to issue equity.

An additional proxy for agreement that we use is investors' reaction to a previous management decision. Our model implies that the higher the agreement parameter, the more positively the firm's stock price will react to management decisions. Unfortunately, most management decisions do not have identifiable announcement dates, and, price reactions may also be influenced by asymmetric information. One event that permits us to avoid these two difficulties is an acquisition by the issuing firm. An acquisition has an identifiable announcement date and it is less likely to be biased by asymmetric-information-induced price reactions since the acquirer and target have relatively strong incentives to disclose private information prior to the announcement. We measure this proxy by finding announcements in which a sample firm was the acquirer in a successful acquisition during the 12 months prior to the issuance. If multiple acquisitions were made, we use the most recent. We then measure the abnormal return (derived via the market model) from the day prior to the day after an M&A announcement using the market model to adjust returns. We refer to this measure as *CAR from M&A* (ρ) and expect that firms with a high CAR are more likely to issue equity.

While this is an attractive proxy, it has limitations. First, the price reaction to an acquisition is impacted by the method of payment. Since a stock merger is more likely to be motivated by overvaluation and it is important that we distinguish agreement from overvaluation, we focus on cash mergers. Another limitation is that only 795 of over 7,800 sample firms have a cash acquisition in the 12 months prior to the security issuance (422 equity issuers and 373 debt issuers). So, we use this proxy merely as a robustness check.

B.1. Measures of Overvaluation

To distinguish overvaluation-based market timing from our model, we examine measures of overvaluation that are unrelated to stock price. According to the timing hypothesis, equity issuers are overvalued; this overvaluation should thus become apparent in below-expectations post-issuance performance. To test this prediction, we employ two earnings-based overvaluation measures. The first is *Post-Issue EPS Change*, which is the difference between a firm's EPS following the issue and its EPS the quarter prior to the issue divided by the prior EPS. We measure the post-issue EPS at six points, from one to six quarters following the issue. A negative value indicates that the pre-issue EPS is greater than the post-issue EPS. Assuming that the firm's stock price is increasing in its

[12] One difference in our study and other studies of dual-class stock, such as Gompers, Ishii, and Metrick (2004), is that we are only interested in those firms with dual-class stock when both classes trade.

EPS and that asymmetric information takes the form of the manager knowing the post-issue EPS prior to the issue but investors discovering this EPS only when it is observed, a negative value of this proxy indicates overvaluation due to asymmetric information. Market timing implies that such firms are more likely to issue equity.[13] To account for changes in investors' expectations due to the equity issue itself, we also include the change in analysts' forecasts during this period in the multivariate analysis. To provide a clear comparison of our results to the literature on post-issue operating performance of equity issuers (e.g., Loughran and Ritter (1997)), we also examine the change in operating income before depreciation plus interest income divided by sales from the year prior to the 4 years following the issue, *Post-Issue Operating Income*.

The second measure we employ is the 3-day cumulative abnormal return at the EPS announcement for one and three quarters following the issue, *Post-Issue EPS Abnormal Return*. The logic is that a negative reaction to the post-issue EPS announcements indicates that the pre-issue earnings expectations were higher than the post-issue earnings expectations, and that managers timed the equity issue in anticipation of this.

A third overvaluation proxy is suggested by Diether (2004). The evidence of Chen et al. (2002), Diether et al. (2002), and Diether (2004) suggests a link between "difference of opinions" and stock returns: Overvaluation will result if prices are dominated by the valuations of optimistic investors due to short-sale constraints that keep out pessimistic investors (Miller (1977)). Chen et al. (2002) test this prediction and show that firms that experience reductions in ownership breadth have higher prices and lower subsequent returns; they interpret the change in ownership breadth as an overvaluation proxy. We therefore use $\Delta Breadth$, which we define as the number of mutual funds that hold the stock in the quarter prior to the issuance $(q-1)$ less the number holding the stock the previous quarter $(q-2)$ for those funds reporting in both quarters, as a measure of overvaluation. If data are not available for the quarter prior to the issue, we step back and compare the change as of $q-2$. We scale $\Delta Breadth$ by the number of available mutual funds reporting in both quarters.[14]

Diether et al.'s (2002) investigation of the relation between the dispersion of analyst forecasts and stock prices suggests a fourth overvaluation proxy. They find that firms with higher dispersion experience lower stock returns; and, they interpret higher dispersion as a sign of greater overvaluation. Johnson (2004) challenges this interpretation and provides both theory and empirical

[13] Teoh, Welch, and Wong (1998) and Shivakumar (2000) show firms are more likely to manage earnings around the time of a seasoned equity offering announcement, which may impact this measure, if investors are unaware that the information content of earnings announcement changes in this way. However, it does not matter for our interpretation of this variable whether earnings were managed since what matters is whether the equity issue was intended to exploit overvaluation, and not the linkage between possible earnings management and overvaluation. We simply interpret the drop in EPS as indicating a lowering of investor expectations after the issuance.

[14] We follow Chen, Hong, and Stein (2002) and use change in breadth rather than the level of breadth because the level of breadth is highly correlated with many firm characteristics and is highly autocorrelated.

support for the hypothesis that the relation is due to unpriced idiosyncratic risk. However, since we interpret the dispersion of analyst forecasts as a proxy for agreement and predict that lower dispersion implies a greater likelihood of an equity issuance, whereas Diether et al. (2002) interpret dispersion as an overvaluation proxy, this variable allows us to directly test our model against the timing hypothesis.[15]

A final possible overvaluation proxy is suggested by Lee and Swaminathan (2000), who find evidence that higher turnover is linked with lower stock returns and the conjecture of Diether et al. (2002) and Chen et al. (2002) that higher turnover may be due to higher disagreement among investors, which in combination with short-sales constraints, could engender overvaluation. Accordingly, we examine *Turnover*, which we defined as the trading volume in the three calendar months prior to the issuance divided by the trading volume of all stocks that trade on the same exchange. We view the *Turnover* proxy with a great deal of circumspection, however. There are likely many factors that drive cross-sectional differences in turnover,[16] such as liquidity differences and trading due to a change in firm characteristics. Nagel (2004) documents that approximately 22% of the trading volume of stocks is due to "rule-based" trading—resulting from a change in firm characteristics that leads rule-based traders to shift their portfolio positions—and that half of this explained turnover is related to prior returns. This makes the use of *Turnover* as a measure of overvaluation problematic.

B.2. Measures of Information Asymmetry

The time-varying adverse selection hypothesis is that equity issues occur when information asymmetry is low. A plausible conjecture is that a price run-up will be associated with reduced information asymmetry since it may be the gradual resolution of information asymmetry that triggered the run-up. This interpretation blurs the distinction between asymmetric information and agreement. Additionally, some of our measures of agreement may be correlated in other ways with information asymmetry. To disentangle these effects, we include several commonly used measures of information asymmetry that are unrelated to agreement. Korajczyk, Lucas, and McDonald (1991) show that equity issuances follow information releases such as earnings announcements because these are periods of low information asymmetry. We therefore include a control variable to indicate if the issuance is within 30 days of the prior-quarter EPS announcement, *30-Day Post-EPS Dummy*. In untabulated results, we confirm our findings for 7, 14, and 45 days. Korajczyk et al. (1991) also show

[15] Diether (2004) examines how these variables impact the long-run stock performance of firms issuing equity and finds a similar result to those in these more general papers on a subset of firms that issue equity.

[16] Chen, Hong, and Stein (2002) are careful to acknowledge that their interpretation is more appropriately viewed as applying in *a time-series* sense, rather than cross-sectionally. Our analysis is cross-sectional, which makes the interpretation of turnover as overvaluation problematic.

that there is a significant run-up in earnings prior to an equity issuance. This run-up could lead to a high value of our agreement proxy, *Forecast − Actual EPS*, for equity issuers and thus bias the results in favor of our model. We control for this by including the change in EPS from two quarters prior to the quarter preceding the issuance (since the latter is when agreement is measured), *EPS Run-Up*. We repeat this analysis for the two, three, and four quarters and 2 years preceding the issuance.

Information asymmetries may also be related to the business cycle. Choe, Masulis, and Nanda (1993) show that the volume of equity issuances is higher during periods of economic growth (because adverse selection costs are lower then they suggest)[17] and after periods of a stock market run-up (an indication of momentum). We therefore use these additional control variables in examining the significance of agreement. We measure *Momentum* as the value-weighted market return from CRSP over the 12 months prior to the issuance ending the calendar month before the issue occurred.[18] We also examine the influence of the business cycle by including the growth in the industrial production over the 3 months prior to the issuance ending the calendar month before the issue occurred, *Industrial Production Growth*; the growth in the leading economic indicator over the same time period, *Leading Indicator Growth*; and the growth in the coincident economic indicator over the same time period, *Coincident Indicator Growth*.[19]

We also include two other measures of information asymmetry; one is a direct measure and the other an indirect measure. We rely on Durnev, Morck, and Yeung (2004) for the direct measure. They show that greater firm-specific variation in stock price reflects more information getting into the stock price and thus less information asymmetry. We use their measure of firm-specific variation, *Psi* (ψ), as our measure of information asymmetry. It is a relatively clean measure of asymmetric information that is not confounded by any apparent links to agreement, and it is increasingly employed (see, for example, Morck, Yeung, and Yu (2000), Durnev et al. (2003), and Bushman, Piotroski, and Smith (2004)). Specifically, $Psi(\Psi) = \ln(\frac{1-R_i^2}{R_i^2})$, where R_i^2 is industry is average R^2 from a regression of firm-specific weekly returns on value-weighted market and value-weighted industry indices. The industry is defined at the three-digit SIC code. Details of this variable are in Durnev et al. (2003).[20] Based on the predictions of the time-varying adverse selection theory, firms are more likely to issue equity when *Psi* (ψ) is high, denoting low information asymmetry.

Insider trading provides an indirect measure of asymmetric information since insiders may trade on their superior information. We therefore use *Insider Trading*, defined as the net purchases (+) or sales (−) of stock by insiders during

[17] Of course, as indicated earlier, a competing explanation for why equity is issued during periods of high growth is that the agency costs of debt are high at that time.

[18] We also use other windows to measure a period of market run up and find similar the results.

[19] We use these indicators to be consistent with Choe, Masulis, and Nanda (1993). As we discuss above, we also include the growth in GDP to control for other effects.

[20] We thank Art Durnev for providing the data.

the 3 and 12 months prior to the issuance divided by the number of common shares outstanding, as a measure of information asymmetry. This variable may also reflect misvaluation, such that insiders may sell (buy) when the stock is overvalued (undervalued), and can thus control for overvaluation-based market timing as well. The insider trading data we use are described in Seyhun (1986),[21] and they are sourced from SEC filings that are required of insiders. The number of shares outstanding is from Compustat.

Although we are not directly testing our model against the tradeoff and pecking order theories, we do want to make sure that evidence in support of our model is not driven by tradeoff or pecking order considerations. Thus, we introduce control variables used previously (e.g., Rajan and Zingales (1995)). All of these variables are measured as of the fiscal year-end prior to the issue date. The natural log of sales is a measure of firm size. Larger firms often have lower costs of debt and may prefer debt to equity for this reason. Return on assets, defined as operating income divided by total assets, is a measure of profitability. Many capital structure studies have shown that more profitable firms have lower leverage ratios (e.g., Rajan and Zingales (1995)), perhaps due to higher agency costs associated with greater growth opportunities. Using return on assets as a control variable should account for this. However, the documented relationship between leverage and profitability is also sometimes attributed to an implication of the pecking order hypothesis that firms with high profitability generate high retained earnings and use these to finance projects internally, thereby precluding the need to borrow and producing the inverse relation between leverage and profitability. We use financial slack to control for this. Cash and equivalents divided by assets is a measure of the firm's financial slack, and firms with greater financial slack are expected to rely less on external financing. In addition to profitability, research and development (R&D) expenses divided by sales are also a measure of firms' growth opportunities, so again using the argument that the agency costs of debt are higher for firms with higher growth opportunities (e.g., Myers (1977)), we would expect firms with higher R&D to sales ratios to be more likely to issue equity. Many firms do not separately report R&D expenses and thus the variable is missing in Compustat for many firms. We assume that any firm that reports total assets but not R&D expenses had no R&D expenses in that year. Further, the firm's choice of debt versus equity is also presumed to be affected by the tangibility of assets; Rajan and Zingales (1995) propose that firms with more tangible assets are more likely to use debt. We control for this by measuring asset tangibility as net fixed assets divided by assets. We also control for a firm's book leverage ratio, defined as total debt divided by total assets. Based on the tradeoff theory, an "overlevered" firm is more likely to issue equity and an "underlevered" firm is more likely to issue debt.[22]

[21] We thank Nejat Seyhun for providing the data.

[22] Many of these variables will control for both the capital structure influences as well as a firm's ability to access security markets, that is, their potential degree of financial constraint or equity dependence (Lamont, Polk, and Saa-Requejo (2001) and Baker, Stein, and Wurgler (2003)).

Table I provides summary statistics. Panel A summarizes the full sample and shows that firms that issue equity are smaller and less profitable, and have more R&D expense, fewer intangible assets, more cash, and less debt than other firms. Panels B and C provide similar statistics for high-agreement

Table I

Summary Statistics of Control Variables for Various Subsamples

Table I provides medians for control variables for the full sample and several subsamples. The variables detailed below are: lnSales, the natural log of sales; Return on Assets, operating income divided by total assets; Cash to Assets, cash and equivalents to total assets; R&D to Sales, research and development expense divided by sale (missing values for R&D are set equal to zero); net fixed assets divided by assets; and debt to assets. All variables are measured in the fiscal year prior to the security issuance. *p*-values indicate if the debt and equity issuers are significantly different using a nonparametric Wilcoxon Rank-sum test. When the two subgroups have the same median, a "+" is used to indicate which sample is significantly greater. Panel A details the full sample. Panel B details firms in the upper (high agreement) and lower (low agreement) quartile of the agreement parameter, ρ, EPS Forecast, which equals (Actual EPS − Mean Analyst Forecast)/Actual EPS in the quarter prior to the issue. Panel C details firms in the lower (high agreement) and upper (low agreement) quartile of the agreement parameter, ρ, Dispersion, which is standard deviation of raw analyst forecasts in the quarter prior to the issuance divided by book equity. Panel D details firms in the upper (high) and lower (low) quartiles of the market-to-book ratio.

	Debt Issuers	Equity Issuers	*p*-Value
Panel A: Full Sample			
lnSales	7.99	4.78	0.00
Return on assets	0.12	0.11	0.00
Cash to assets	0.03	0.07	0.00
R&D to sales	+0.00	+0.00	0.00
Fixed assets to assets	0.32	0.19	0.00
Debt to assets	0.25	0.18	0.00
No. of observations	2,718	3,453	
Panel B: High & Low Agreement by EPS Forecast			
High Agreement			
lnSales	7.85	8.11	0.00
Return on assets	0.11	0.11	0.83
Cash to assets	0.02	0.09	0.00
R&D to sales	0.00	+0.00	0.00
Fixed assets to assets	0.44	0.21	0.00
Debt to assets	0.30	0.17	0.00
No. of observations	478	961	
Low Agreement			
lnSales	7.88	4.91	0.00
Return on assets	0.12	0.09	0.00
Cash to assets	0.02	0.05	0.00
R&D to sales	0.00	+0.00	0.00
Fixed assets to assets	0.44	0.23	0.00
Debt to assets	0.28	0.26	0.00
No. of observations	776	653	

(*continued*)

Table I—*Continued*

	Debt Issuers	Equity Issuers	*p*-Value
Panel C: High & Low Agreement by Dispersion			
High Agreement			
lnSales	7.90	4.92	0.00
Return on assets	0.12	0.16	0.00
Cash to assets	0.04	0.14	0.00
R&D to sales	0.00	+0.00	0.00
Fixed assets to assets	0.21	0.16	0.62
Debt to assets	0.20	0.09	0.00
No. of observations	224	606	
Low Agreement			
lnSales	8.37	5.93	0.00
Return on assets	0.11	0.08	0.00
Cash to assets	0.02	0.05	0.00
R&D to sales	0.00	+0.00	0.00
Fixed assets to assets	0.48	0.35	0.00
Debt to assets	0.28	0.28	0.10
No. of observations	862	569	
Panel D: High & Low Market-to-Book			
High Market-to-book			
lnSales	8.71	4.09	0.00
Return on assets	0.21	0.12	0.00
Cash to assets	0.03	0.28	0.00
R&D to sales	0.00	0.01	0.00
Fixed assets to assets	0.34	0.13	0.00
Debt to assets	0.20	0.04	0.00
No. of observations	363	1,360	
Low Market-to-book			
lnSales	7.76	5.23	0.00
Return on assets	0.07	0.07	0.64
Cash to assets	0.03	+0.03	0.01
R&D to sales	0.00	+0.00	0.00
Fixed assets to assets	0.12	0.19	0.12
Debt to assets	0.27	0.26	0.81
No. of observations	951	585	

and low-agreement firms. In Panel B, high (low) agreement is defined as the highest (lowest) quartile of the agreement measure *Actual* − *Forecast EPS* (ρ). In Panel C, high (low) agreement is defined as the lowest (highest) quartile of the agreement parameter, *Dispersion*$(1 - \rho)$. The subsample results mirror the full sample results except that high-agreement equity issuers are *not* less profitable. Panel D breaks the sample into highest and lowest quartile market-to-book firms. Here we see that most of the results apparent for the full sample are quite strong for the high market-to-book firms. However, low market-to-book equity issuers are not less profitable, do *not* have fewer fixed assets, and do *not* display significantly lower leverage ratios. As we show in Tables II and

IV, equity issuers also have higher agreement and higher market-to-book ratios, consistent with the model's predictions.

V. Results

A. Testing Predictions 1 and 2

PREDICTION 1: *Firms will issue equity when their stock prices are high and either debt or no security when their stock prices are low.*

Table II presents summary statistics for the *Price Variables* for debt and equity issuers. Firms that issue equity have significantly higher raw and market-adjusted stock returns in the 3, 6, 9, and 12 months preceding the issue. Additionally, equity issuers have significant higher market-to-book ratios and industry-adjusted market-to-book ratios than debt issuers. These results are consistent with our model, market timing, and time-varying adverse selection. However, they are obviously inconsistent with the tradeoff theory. They are also inconsistent with the pecking order hypothesis, which predicts equity issuance only as a last resort such as financial duress; high stock prices are unlikely to accompany financial duress.

To more specifically test the timing hypothesis, we also examine *Post-Issue EPS Change*. According to the timing hypothesis, this variable should be significantly negative for equity issuers and the stock price reaction to the post-issue earnings announcement, *Post-Issue EPS Abnormal Return*, should be negative for equity issuers, indicating a negative surprise for the market.

Panel A of Table III presents summary statistics for the *Post-Issue EPS Change* for the full sample and likely timers (those with high market-to-book

Table II
Price Variables

Table II provides medians for several measures of relative stock prices: Prior period raw and market-adjusted returns and raw and industry-adjusted market-to-book statistics are provided for the equity and debt issuing subgroups. *p*-values indicate if the two subsets are significantly different using a nonparametric Wilcoxon Rank-sum test.

	Debt Issuers	Equity Issuers	*p*-Value
Average prior 3-month return	0.04	0.11	0.00
Average prior 6-month return	0.06	0.26	0.00
Average prior 9-month return	0.10	0.38	0.00
Average prior 12-month return	0.14	0.50	0.00
Average MB	1.19	1.68	0.00
Average market-adjusted prior 3-month return	−0.01	0.08	0.00
Average market-adjusted prior 6-month return	0.00	0.18	0.00
Average market-adjusted prior 9-month return	−0.01	0.27	0.00
Average market-adjusted prior 12-month return	−0.01	0.34	0.00
Average industry-adjusted MB	0.02	0.15	0.00

This table shows that equity issuers have higher stock prices and greater stock run-up than debt issuers. Going forward we will present results using three of these measures; all analysis has been done and is robust to using all measures.

Table III
Post-Issuance Operating Performance

Table III provides summary statistics for several measures of post-issue operating performance for equity and debt issuers for both the full sample and firms in the upper quartile of the market-to-book ratio. Panel A presents the median change in earnings per share (EPS) from the quarter prior to the issue to the first through the sixth quarters after the issue. Panel B presents the change in the operating income before depreciation plus interest income divided by total sales from the year prior to the 1 through 4 years following the issue. Panel C presents the median abnormal return at the EPS announcement one and three quarters after the issue. All quarterly EPS data are from IBES. *p*-values indicate if the two subgroups are significantly different using a nonparametric Wilcoxon Rank-sum test.

	Debt Issuers	Equity Issuers	*p*-Value
Panel A: Change in EPS from Quarter Prior to Issue to:			
Full sample			
First quarter following issue	0.05	0.09	0.00
Second quarter following issue	0.06	0.10	0.00
Third quarter following issue	0.09	0.15	0.00
Fourth quarter following issue	0.10	0.14	0.03
Fifth quarter following issue	0.13	0.11	0.68
Sixth quarter following issue	0.13	0.11	0.38
High market-to-book sample			
First quarter following issue	0.04	0.13	0.00
Second quarter following issue	0.04	0.19	0.00
Third quarter following issue	0.09	0.21	0.00
Fourth quarter following issue	0.07	0.19	0.02
Fifth quarter following issue	0.08	0.17	0.21
Sixth quarter following issue	0.06	0.16	0.58
Panel B: Change in Op Inc/Sales from Year Prior to Issue to:			
Full sample			
First year following issue	0.00	0.03	0.00
Second year following issue	0.00	0.00	0.98
Third year following issue	0.00	−0.04	0.00
Fourth year following issue	−0.01	−0.06	0.00
High market-to-book sample			
First quarter following issue	0.01	0.02	0.29
Second quarter following issue	0.00	−0.03	0.14
Third quarter following issue	−0.01	−0.16	0.00
Fourth quarter following issue	−0.02	−0.25	0.00
Panel C: Three-Day CAR of EPS Announcement at:			
Full sample			
First quarter following issue	0.01%	0.0%	0.04
Third quarter following issue	0.1%	0.0%	0.13
High market-to-book sample			
First quarter following issue	0.1%	0.0%	0.15
Third quarter following issue	0.2%	−1.0%	0.13

This table shows that firms do not have a significant decrease in EPS and operating income immediately following an equity issue relative to a debt issue and that the stock price reaction to these earnings announcements is not more negative for equity-issuing firms relative to debt-issuing firms.

ratios) for the first through six quarters following the issuance.[23] The results show that equity issuers have a greater EPS increase for the first four quarters following an issue than do debt issuers. This is inconsistent with overvaluation, since that would require a significantly negative difference. The finding that the *Post-Issue EPS Change* for equity issuers is positive is also inconsistent with previous findings (e.g. Teoh, Welch, and Wong (1998), Lee (1997), Hansen and Crutchley (1990), and Loughran and Ritter (1997)). There are many possible reasons for this. First, our sample period begins in 1993; the other studies end prior to this time. Second, while we compare equity to nonbank debt issuers, other papers compare across subcategories of equity issuers or to matched nonissuers. Given that we know that all external financing, other than bank debt, is followed by long-run underperformance (see Lewis, Rogalski, and Seward (2001) and Spiess and Affleck-Graves (1999)), this difference in reference groups for comparison can matter greatly. Third, the underperformance in Loughran and Ritter (1997) is most severe for small firms; the median equity issuer in our sample has total assets of $469 million which, even CPI-adjusting to 1993 dollars, puts it in the largest quartile of their sample. Lastly, these papers examine earnings changes using fiscal year-end data for 4 years following the issue with the decrease in earnings most pronounced in *later* years. If managers are timing the market, they should be choosing the peak and thus the change should be detected within the several quarters we examine. Thus, in Panel B of Table III, we examine *Post-Issue EPS Change* from the year prior to the issue to the 1 through 4 years following the issue.[24] The results for the first and second year following the issue provide a similar picture to those using the quarterly EPS: In the first year after the issue, equity issuers have significantly greater operating performance than debt issuers; in the second year, the difference is insignificant. It is not until the third and fourth years after issuance that equity issuers underperform debt issuers. These results support market timing only if managers are assumed to possess foresight beyond 2 years from the issuance, which is somewhat tenuous support.

Our second proxy for overvaluation is *Post-Issue EPS Abnormal Return* for one and three quarters following the issue. Panel C presents summary statistics for this variable. These returns are lower for the firms issuing equity, as suggested by the timing hypothesis, but the difference is only significant in the full sample, whereas the timing hypothesis would predict the results to be strongest in the high market-to-book sample. This is modest support for market timing and will be more thoroughly examined in the multivariate analysis.

PREDICTION 2: *Firms issue equity when the agreement parameter is high, regardless of the stock price.*

[23] In untabulated statistics, we repeat this analysis for all price variables.

[24] This measure of operating performance is similar to that used in Loughran and Ritter (1997). We scale by sales rather than assets because firms issuing equity have a large increase in assets relative to those issuing debt. The average equity issuer in our sample has a 43% increase in assets from the year prior to the year after the issue, whereas the average debt issuer has only a 9% increase over this same time period.

This prediction is unique to our model and not implied by the other hypotheses. To test it, we divide the sample into quartiles based on each of the price variables and then into quartiles by ρ, defining the highest (lowest) quartile as consisting of those with the most (least) agreement. Specifically, we examine the number of firms that issue equity or do not (debt issuers) for four types of firms: high price with high agreement, high price with low agreement, low price with high agreement, and low price with low agreement, similar to Figure 2. In untabulated results, we find that a higher-than-expected number of firms issue equity (debt) when agreement is high (low) even though price is low (high). Using a chi-squared test for independence to determine if there are more or fewer firms than expected in each category, we show that each of these frequencies is significant. This evidence supports our theory: For at least some firms, investor agreement with managerial decisions is an important determinant of the security issuance choice.

B. Testing Predictions 3 and 4

PREDICTION 3: *The average value of the agreement parameter, ρ, will be higher among equity issuers than among firms that issue debt or do not issue any security. This relation will hold for potentially undervalued firms (not probable timers) and potentially overvalued firms (probable timers). Thus, ρ has incremental explanatory power in predicting the firms that will actually issue equity.*

Table IV presents summary statistics for each of our five measures of agreement, plus a measure of unscaled *Dispersion* $(1 - \rho)$. Our model predicts that equity issuers have higher *Actual − Forecast EPS* (ρ), higher number of *of Qtrs Beat Forecast EPS* (ρ), higher *CAR from M&A* (ρ), lower *Dispersion* $(1 - \rho)$, and lower *Dual-Class Premium* $(1 - \rho)$ than firms that issue debt. Table IV shows that equity issuers have higher agreement than debt issuers. Differences between these two samples are statistically significant for all of our proxies except *Dual-Class Premium* $(1 - \rho)$ and (scaled) *Dispersion* $(1 - \rho)$. The insignificant difference in *Dual-Class Premium* $(1 - \rho)$ may be due to the small sample size and potential noise. Although *Dispersion* $(1 - \rho)$ is significantly lower when the variable is unscaled, it is not so once we scale *Dispersion* $(1 - \rho)$ by book equity. This difference in results between the scaled and unscaled measures arises because our scaler is highly correlated (46%) with firm size, which, as we show in Table I, is significantly lower for equity issuers. Thus, the scaled variable presents the effects of both dispersion and firm size. In our multivariate analysis, we control for this effect by including firm size.

The statistics in Panel A of Table IV show that equity issuers have higher agreement than debt issuers. However, there are no controls for price or other variables. To further distinguish our model from timing and time-varying adverse selection, we examine the impact of the price variables and the agreement parameter, ρ, on security issuance in multivariate analysis. In Tables V through X, we present results from logit analyses where the dependent variable is 1 if the firm issued equity and 0 otherwise. The primary explanatory variables of

Table IV
Agreement Parameter Proxies

Table IV details means (medians) of five measures of either the agreement parameter (ρ) or the inverse of the agreement parameter ($1 - \rho$) for the full sample and for firms that issued debt or equity. The measures used for ρ are: (Actual EPS−Mean Analyst Forecast)/Actual EPS in the quarter prior to the issue; the number of consecutive quarters prior to the issue that the firm has beaten the mean analyst EPS forecast; and the market-adjusted CAR three-day announcement return from most recent acquisition of the firm if that acquisition was a cash deal. The measures of ($1 - \rho$) are the dispersion (standard deviation) of the analyst raw forecasts in the quarter prior to the issue (presented in unscaled form and divided by book equity), and the dual-class control premium, defined as the difference in the superior voting rights stock price less the inferior rights stock price divided by the inferior rights stock price. The *p*-values indicate if the group that issued equity is significantly different from the group that issued debt using a *t*-test (in parentheses) or a nonparametric Wilcoxon Rank-sum test.

Panel A: Summary Statistics

Measure of Agreement		Full Sample	Issued Debt	Issued Equity	*p*-Value: Difference between Equity & Debt
Actual − forecast EPS (ρ)	Mean	0.01	−0.03	0.05	0.02
	Median	(0.03)	(0.01)	(0.06)	(0.00)
	No. of observations	4,893	2,381	2,512	
No. of quarters beat forecast EPS (ρ)	Mean	1.32	1.12	1.52	0.00
	Median	(1.00)	(1.00)	(1.00)	(0.00)
	No. of observation	4,893	2,381	2,512	
CAR from M&A (ρ)	Mean	0.01	0.01	0.02	0.00
	Median	(0.01)	(0.01)	(0.02)	(0.02)
	No. of observation	795	373	422	
Dispersion ($1 - \rho$)	Mean	0.04	0.04	0.03	0.00
	Median	(0.02)	(0.02)	(0.01)	(0.00)
	No. of observations	4,265	2,223	2,042	
Dispersion/book equity × 100	Mean	0.01	0.01	0.01	0.68
	Median	(0.00)	(0.00)	(0.01)	(0.00)
	No. of observations	4,200	2,194	2,006	
Dual-class premium ($1 - \rho$)	Mean	1.39	2.93	0.04	0.12
	Median	(0.02)	(0.04)	(0.02)	(0.26)
	No. of observations	74	34	40	

(*continued*)

interest are agreement (ρ), the price variables, controls for market timing, and information asymmetry. Panel B of Table IV provides correlation coefficients for all agreement variables. We find that many of our measures of agreement are highly correlated.

Table V provides results in which agreement is measured using *Actual − Forecast EPS* (ρ).[25] The first through third columns include the agreement

[25] Because secondary equity offerings may be more prevalent in hot markets, we confirm that all results in this paper are robust to running the logit analyses with clustered standard errors by issue year.

Table IV—*Continued*

Panel B: Correlations

	Actual − Forecast EPS (ρ)	No. of Quarters Beat Forecast EPS (ρ)	CAR from M&A (ρ)	Dispersion ($1-\rho$)	Dispersion/ Book Equity ($1-\rho$)	Dual-Class ($1-\rho$)
Actual − forecast EPS (ρ)	1.00					
No. of quarters beat forecast EPS (ρ)	0.82	1.00				
CAR from M&A (ρ)	−0.88	−0.46	1.00			
Dispersion ($1-\rho$)	−0.32	0.28	0.73	1.00		
Dispersion/book equity ($1-\rho$)	0.19	0.71	0.30	0.87	1.00	
Dual-class premium ($1-\rho$)	0.98	0.70	−0.95	−0.49	0.00	1.00

This table shows that the agreement parameter is higher for firms issuing equity.

variable, price variable, and control variables related to the tradeoff and pecking order hypotheses. The fourth through eighth columns include these and the timing variables used to measure the post-issue change in operating performance.

The results support our theory. When market-to-book is used to measure price, the price variable and the agreement parameter (ρ) are highly significant in explaining equity issuance. The significance of ρ is less when prior returns measure price, but ρ remains significant at traditional levels. Thus, firms are more likely to issue equity when their stock prices and agreement parameter are high. More importantly, ρ has both statistically and economically significant incremental explanatory power over the price variable, providing strong support for our theory. Table V presents the coefficients from the logit analysis. When we transform these coefficients, the odds ratio on agreement, using the coefficient from the seventh column (0.13), is 1.2. As we detail in Table IV, the mean *Actual − Forecast EPS* (ρ) is 0.01. If this variable increased from the 25^{th} (−0.03) to the 75^{th} (0.13) percentile, the probability of an equity issuance would increase approximately 20%.

The findings provide no additional support for market timing. The fourth column includes the one-quarter *Post-Issue EPS Change*, on which the coefficient is positive and insignificant, even though timing predicts it should be negative. The fifth column controls for the change in the forecast over the same period and also finds a positive and insignificant coefficient on *Post-Issue EPS Change*. In untabulated results, we include other quarters to measure the EPS change and encounter similar results. The sixth and seventh columns present similar results on the impact of longer run performance on equity issuance and find similar results. The evidence using 3-year long-run performance is especially

Table V

Logit Analysis of Effect of Agreement on Issuance Decision: EPS –Forecast Agreement Measure

Table V presents the results from a logit analysis where the dependent variable equals one if the firm issues equity and zero if it issues debt. The agreement parameter, ρ, is defined as (Actual EPS − Mean Analyst)/Actual EPS prior quarter. The price variable is indicated at the top of each column. Post-Issue EPS Change is the change in EPS from the quarter prior to the quarter 1 or 3 after the issue. Change in Forecast is the change in the Analyst forecast from the quarter prior to the quarter one or three after the issue. Post-Issue EPS Abnormal Return is the 3-day abnormal return at the announcement of the EPS one and three quarters after the issue. Post-Issue Operating Inc is the change in operating income before depreciation plus interest income divided by sales from the year prior to the 1 and 3 years following the issue. Two variables are included to control for potential biases in the analyst forecasts used to calculate ρ in the quarter prior to the issuance: GDP Growth, the growth in GDP during the quarter the forecast is made; and, Year-End Dummy, a dummy variable equal to one if the forecast is the fiscal year end forecast. All control variables are measured in the year prior to the issue and described in Table I. *p*-values are in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

	(1) 3-Month Return	(2) 12-Month Return	(3) MB	(4) MB	(5) MB	(6) MB	(7) MB	(8) MB	(9) MB	(10) MB
Actual − forecast EPS (ρ)	0.08*	0.08*	0.14***	0.16***	0.14***	0.15***	0.13**	0.15***	0.16***	0.15***
	(0.07)	(0.07)	(0.00)	(0.00)	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)	(0.00)
Price variable	2.67***	1.53***	0.27***	0.27***	0.27***	0.26***	0.27***	0.27***	0.27***	0.26***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Post-issue EPS (1 quarter)				0.01	0.00				0.01	0.01
				(0.60)	(0.87)				(0.58)	(0.52)
Change in forecast (1 quarter)					0.00					
					(0.90)					
Post-issue operating inc (1 year)						0.00				
						(0.83)				
Post-issue operating inc (3 year)							0.00			
							(0.83)			
Post-issue EPS return (1 quarter)								−0.78		
								(0.22)		
GDP growth									6.17)	
									(0.54)	
Year-end dummy										0.26***
										(0.01)

LnSales	−0.98***	−0.91***	−0.98***	−1.01***	−1.02***	−0.99***	−1.02***	−1.00***	−1.01***	−0.98***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Return on assets	3.87***	3.22***	2.04***	2.29***	2.34***	2.09***	2.27***	2.25***	2.28***	2.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Cash to assets	2.69***	2.73***	2.22***	2.12***	2.20***	2.24***	2.21***	2.30***	2.11***	2.39***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
R&D to sales	8.30***	8.18***	7.25***	7.57***	7.51***	7.33***	6.40***	7.37***	7.55***	7.20***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Fixed assets to assets	−0.54***	−0.26	−0.48***	−0.56***	−0.61***	−0.48***	−0.54***	−0.53***	−0.57***	−0.53***
	(0.00)	(0.14)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)
Debt to assets	0.48**	0.66***	0.59***	0.59***	0.70***	0.49**	0.28	0.59***	0.59**	0.68***
	(0.05)	(0.01)	(0.01)	(0.01)	(0.01)	(0.04)	(0.31)	(0.01)	(0.02)	(0.01)
Intercept	5.57***	4.78***	5.63***	5.81***	5.90***	5.73***	5.95***	5.76***	5.90***	5.72***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Pseudo R^2	0.47	0.47	0.44	0.45	0.45	0.45	0.46	0.45	0.45	0.45
No. of observations	4,573	4,267	4,606	4,515	4,418	4,517	3,620	4,486	4,519	4,243

This table shows that firms with high agreement parameter are more likely to issue equity.

compelling since, as Table III shows, equity issuers significantly underperform debt issuers over this longer horizon. However, this performance does not significantly impact the issuance decision, making it unlikely that the managers foresaw this and timed the market. To more thoroughly test market timing, we also include in the eighth column *Post-Issue Abnormal Return* for the first quarter following the issue, but find no additional support for timing.[26]

B.1. Controlling for Forecast Biases and Other Influences in Testing Our Theory versus Market Timing

The results we present thus far support the predictions of our model, but as we discuss earlier, analysts' forecasts may be biased. Thus, in the ninth and tenth columns of Table V, we control for factors that may bias forecasts. Two factors suggested by the literature, firm size and market-to-book ratios, are already included in our analysis and controlled for throughout. Additional factors are the business cycle and the forecast beginning in the last quarter of the fiscal year-end. In Table V, we include the *GDP Growth* (column 9) and *Year-end Dummy* (column 10). In Table IX, we will examine other business cycle variables in greater detail and thus the evidence presented there can also be considered to control for potential biases in analysts' forecasts. The coefficient on *Actual − Forecast EPS* (ρ) remains positive and significant after controlling for periods when analysts' forecasts are more likely biased. The results also show that firms are less likely to issue equity just after the end of the fiscal year.

Next, we deal with the impact of other influences on our results by relying on not one but several measures of agreement. In Table VI, we present results similar to those in Table V, but using *Dispersion* $(1 - \rho)$ as our measure of disagreement, the prediction being that higher *Dispersion* $(1 - \rho)$ implies a lower likelihood of equity issuance. To control for correlation with size, we scale dispersion by book equity in all multivariate analyses and include size as a control. In the first three columns, we show that firms with less dispersion (more agreement) are more likely to issue equity after controlling for the price variable and other firm characteristics. These results strongly support our theory and provide evidence against market timing; recall, Diether et al.'s (2002) interpretation that higher dispersion means greater overvaluation and hence a greater likelihood of equity issuance. In the third through sixth columns, we include the change in *Post-Issue EPS Change* and this test further supports our findings. The coefficient on *Dispersion* $(1 - \rho)$ is quite large (in absolute value), which results from the fact that the variable is scaled by book equity. The scaled average (median) dispersion value is 0.0001 (0.00002).[27] Thus, the

[26] For brevity, the table only presents quarterly results with one quarter's post earnings data. However, we have performed similar analysis using one through six quarters. The conclusions are not materially different, that is, the significance of Rho and the price variables remains. For similar reasons, we also do not present results with operating performance 2 and 4 years after the issue. The results using 2 years are similar to those using 1 year and the results using 4 years are similar to those using 3 years.

[27] Summary statistics for *Dispersion* $(1 - \rho)$ are provided in Table IV, multiplied by 100 to reduce decimals.

average firm may be a large firm like Boise Cascade with dispersion of 0.16 and book equity of $1.3 billion or it may be a smaller firm such as Vishay Intertechnology with dispersion of 0.05 and book equity of $0.37 billion. To examine the economic significance, we use the coefficient (−97.64) from column six to calculate a transformed odds ratio of −3.95. A one standard deviation (0.00728) decrease in *Dispersion* $(1 - \rho)$ increases the probability of an equity issue by 3%. This increase is clearly economically significant, although not as large as that of a change in *Actual − Forecast EPS*. The other results in Table VI mirror those of Table V; the price variables are positive and significant, supporting all

Table VI

Logit Analyst of Effect of Agreement on Issuance Decision: Forecast Dispersion Agreement Measure

Table VI presents the results from a logit analysis where the dependent variable equals one if the firm issues equity and zero if it issues debt. The agreement parameter used is equivalent to $(1 - \rho)$ and is defined as the dispersion or standard deviation of raw analyst forecasts in the period quarter prior to the issuance divided by the book value of equity. Post-Issue EPS Change is the change in EPS from the quarter prior to the quarter after the issue. The price variable is indicated at the top of each column. All control variables are measured as of the year prior to the issue and described in Table I. *p*-values are in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

	(1) 3-Month Return	(2) 12-Month Return	(3) MB	(4) 3-Month Return	(5) 12-Month Return	(6) MB
Dispersion/book equity $(1 - \rho)$	−75.74***	−82.27***	−90.87***	−86.15***	−103.25**	−97.64***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.02)	(0.00)
Price variable	2.80***	1.57***	0.29***	2.98***	1.66***	0.27***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Post-Issue EPS change				0.00	−0.01	0.01
				(0.81)	(0.44)	(0.63)
lnSales	−1.03***	−0.96***	−1.04***	−1.05***	−0.98***	−1.06***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Return on assets	3.05***	3.08***	1.55***	4.04***	3.58***	2.05***
	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)	(0.00)
Cash to assets	3.31***	3.15***	2.79***	3.10***	3.02***	2.69***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
R&D to sales	7.94***	7.76***	6.80***	8.15***	8.08***	7.20***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Fixed assets to assets	−0.61***	−0.40**	−0.62***	−0.77***	−0.52***	−0.75***
	(0.00)	(0.04)	(0.00)	(0.00)	(0.01)	(0.00)
Debt to assets	0.56**	0.75***	0.75***	0.65**	0.88***	0.84***
	(0.03)	(0.01)	(0.00)	(0.02)	(0.00)	(0.00)
Intercept	6.01***	5.16***	6.09***	6.02***	5.20***	6.21***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Pseudo R^2	0.48	0.48	0.46	0.49	0.50	0.46
No. of observations	4,019	3,764	4,051	3,892	3,643	3,919

This table shows that firms with high agreement parameter are more likely to issue equity using the dispersion in analyst forecasts as a measure of agreement. Note this measure has the opposite predictions compared to ρ and is thus labeled $(1 - \rho)$.

three hypotheses. The change in EPS is insignificant, thus lending no additional support to market timing.

B.2. One-Sided and Two-Sided Tests of Agreement versus Market Timing

Because forecast dispersion is interpreted by Chen et al. (2002) and others differently from the way we interpret it, we conduct further tests to distinguish our theory from market timing and assure ourselves that the support we find for our theory is not merely interpretation dependent. We do this in three ways. First, we employ several measures of agreement between managers and investors that are clearly divorced from disagreement among investors or overvaluation. The variables in this "one-sided" test include *Actual − Forecast EPS* (ρ), number of *Qtrs Beat Forecast EPS* (ρ), and *CAR from M&A* (ρ). The results using *Actual − Forecast EPS* (ρ) are presented in Table V, discussed above, and show that high agreement increases the likelihood of an equity issue as predicted by our model. These findings are corroborated in the first three columns of Table VII using the number of *Qtrs Beat Forecast EPS* (ρ) and *CAR from M&A* (ρ). In this analysis, we include the control variables used in Tables V and VI, but do not present results to conserve space. The results show that the longer the firm beats the EPS forecast, the more likely it is to issue equity, which is strong support for our theory. We also examine the *CAR from M&A* (ρ) as a measure of agreement, which is the cumulative abnormal return in response to a cash acquisition announcement in the 12 months prior to the equity issue, with a higher return signifying greater agreement.[28] In columns 4 through 6, we present our results using this proxy. The coefficient on *CAR from M&A* (ρ) is consistently positive but only significant in two of the three specifications. The lack of significance is due in part to the significant correlation between this variable and the control variable, firm size. When we exclude firm size, the coefficient is positive and significant at the 1% level in all specifications.

The second set of "one-sided" tests we perform uses measures of agreement that may capture overvaluation but are clearly divorced from manager–investor agreement. We use two such measures, employed in other studies, Δ*Breadth* and *Turnover*, although our focus is on Δ*Breadth* because of the issues with *Turnover* that we discuss earlier. Table VIII presents the results using these two measures. In this analysis, we include the control variables used in Tables V and VI, but do not present results to conserve space. The first three columns include Δ*Breadth* alone and columns 4 and 5 each include this and an additional measure of agreement. In all specifications except column 5, Δ*Breadth* is insignificant; in column 5, it is positive and significant. Since the overvaluation hypothesis predicts that a decrease in breadth means overvaluation and hence a greater likelihood of equity issuance (Chen et al. (2002)), these

[28] We focus on cash (rather than stock) acquisitions since firm valuation may impact the CAR from a stock acquisition.

Table VII

Logit Analyst of Effect of Agreement on Issuance Decision: Alternative Agreement Measures

Table VII presents the results from a logit analysis where the dependent variable equals one if the firm issues equity and zero if it issues debt. p-values are in parentheses. The agreement parameter, ρ or $(1 - \rho)$, is defined in three alternative ways: No. of Quarter Beat Forecast EPS, the number of consecutive quarters prior to the issuance that EPS beat the forecast; CAR from M&A, the CAR for an acquisition announcement in which the firm was the acquirer during the 12 months preceding the issue; and Dual-Class Premium, the dual-class control premium, which is defined as the difference between the price of the class of stock with superior voting rights less the price of the inferior voting rights stock divided by the inferior voting class stock price for those firms with two classes of stock. The price variable is indicated at the top of each column. Post-Issue EPS Change is the change in EPS from the quarter prior to the quarter after the issue. Control variables not presented here for the sake of brevity include the natural log of Sales, Return on Assets, Cash to Assets, R&D to Sales, Fixed Assets to Assets, and Debt to Assets. p-values are in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

	(1) 3-Month Return	(2) 12-Month Return	(3) MB	(4) 3-Month Return	(5) 12-Month Return	(6) MB	(7) 3-Month Return	(8) 12-Month Return	(9) MB
No. of Quarters beat Forecast EPS (ρ)	0.19***	0.11***	0.23***						
	(0.00)	(0.00)	(0.00)						
CAR from M&A (ρ)				3.66*	2.94	4.35**			
				(0.10)	(0.19)	(0.04)			
Dual-class premium $-$ $(1 - \rho)$							−7.72*	−5.21*	−5.40**
							(0.06)	(0.06)	(0.04)
Price variable	2.65***	1.48***	0.30***	2.65***	1.58***	0.29**	6.35**	1.82**	−0.61
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.05)	(0.03)	(0.00)	(0.23)
Post-Issue EPS change	0.00	0.00	0.00	−0.03	−0.04	−0.01	0.17	0.17	0.02
	(0.91)	(0.72)	(0.75)	(0.34)	(0.30)	(0.74)	(0.41)	(0.43)	(0.89)
Intercept	5.54***	4.87***	5.46***	6.56***	5.55***	6.28***	13.18*	11.00**	12.22**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.06)	(0.05)	(0.03)
Pseudo R^2	0.48	0.49	0.46	0.46	0.48	0.44	0.53	0.50	0.45
No. of observations	4,486	4,182	4,519	568	547	568	51	49	52

This table shows that firms with high agreement parameter are more likely to issue equity using various measures of agreement.

Table VIII

Logit Analyst of Effect of Agreement on Issuance Decision: Short Sale Constraint Controls

Table VIII presents the results from a logit analysis where the dependent variable equals one if the firm issues equity and zero if it issues debt. The agreement parameter is defined as either (Actual EPS − Mean Analyst)/Actual EPS prior quarter (ρ), or the dispersion or standard deviation of raw analyst forecasts in the period quarter prior to the issuance divided by the book value of equity ($1 - \rho$). ΔBreadth is the change in the number of mutual funds holding a stock from two to one quarters prior to the issue divided by the number of mutual funds holding any stock in both of these two quarters. Turnover is the number of shares traded in the 3 months prior to the issue less the average turnover for all stock over the same period on the same exchange. Control variables not presented here for the sake of brevity include the natural log of Sales, Return on Assets, Cash to Assets, R&D to Sales, Fixed Assets to Assets, and Debt to Assets. *p*-values are in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

	(1) 3-Month Return	(2) 12-Month Return	(3) MB	(4) MB	(5) MB	(6) 3-Month Return	(7) 12-Month Return	(8) MB	(9) MB	(10) MB
Actual − forecast EPS (ρ)				0.14***					0.13***	
				(0.00)					(0.01)	
Dispersion/book equity ($1 - \rho$)					−98.34***					−99.14***
					(0.00)					(0.01)
ΔBreadth	4.68	−8.60	12.93	12.94	19.22**					
	(0.62)	(0.44)	(0.16)	(0.16)	(0.05)					
Turnover						0.12***	0.11***	0.14***	0.14***	0.13***
						(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Price variable	2.82***	1.59***	0.25***	0.25***	0.24***	2.68***	1.49***	0.28***	0.28***	0.28***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Post-Issue	0.00	0.00	0.00	0.01	0.01	0.00	−0.01	0.00	0.01	0.00
EPS change	(0.81)	(0.69)	(0.69)	(0.46)	(0.62)	(0.68)	(0.60)	(0.89)	(0.61)	(0.79)
Intercept	5.74***	4.89***	5.92***	5.92***	6.35***	5.87***	5.13***	5.93***	5.93***	6.18***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Pseudo R^2	0.47	0.48	0.45	0.45	0.46	0.48	0.49	0.46	0.47	0.48
No. of Observations	4,398	4,118	4,405	4,405	3,805	4,479	4,175	4,483	4,483	3,888

This table shows that firms a with high agreement parameter are more likely to issue equity, controlling for other measures of difference of opinion that have been shown to lead to overpricing.

results provide no support for overvaluation-based market timing. Further, in columns 4 and 5, we include $\Delta Breadth$ with two measures of agreement and show that our previous results hold even after controlling for $\Delta Breadth$. The last five columns present results using *Turnover*. These results indicate that when *Turnover* is high, firms are more likely to issue equity. If it is overvaluation that leads to high *Turnover*, then this evidence supports market timing. However, as discussed earlier, high turnover may simply be driven intertemporally by a sequence of high returns (Nagel (2004)) or cross-sectionally by liquidity differences. Thus, the inference from high turnover is unclear. Nonetheless, columns 9 and 10 show that support for our predictions persists despite the inclusion of *Turnover*.

Finally, we test our theory against overvaluation and timing using "two-sided" tests that employ two measures of agreement that relate to our theory and this alternative interpretation, with diametrically opposite predictions; thus, these measures are an excellent way to differentiate. The first measure is *Dispersion* $(1 - \rho)$. As we show in Table VI, lower dispersion (high agreement) increases the likelihood of an equity issuance, which supports our theory and contradicts the predictions of the optimistic-valuation interpretation of agreement. The second measure we use is *Dual-Class Premium* $(1 - \rho)$. Our theory predicts that higher agreement means a lower premium and a higher likelihood of equity issuance. However, if disagreement among investors leads to more overpricing, then market timing implies that a larger premium leads to a higher likelihood of equity issuance. We present results using this measure in the last three columns of Table VII. Despite the low power of this test (we have only approximately 50 observations), the results support our predictions.

Despite the strong support for of our theory, one could argue that our agreement proxies may be correlated with information asymmetry. To more convincingly distinguish our theory and time-varying adverse selection, we first examine how the business cycle and stock market run-ups impact the issuance decision. This test is motivated by Choe et al. (1993), who document that more firms issue equity after an economic expansion, because adverse selection costs are likely to be lower then, and also after a stock market run-up that may be indicative of momentum effects. To see if agreement has incremental explanatory power after accounting for these effects, we introduce as control variables three measures of the business cycle and a momentum variable that measures the market run-up during the 6 months prior to the issuance in addition to our agreement measure.[29] We present the results including these variables in Table IX. Following Choe et al., we first (columns 1 and 6) present results with one of our measures of agreement and only these time-series variables and do not include accounting controls. In this specification, we do not scale *Dispersion* $(1 - \rho)$ by book equity since there is no control for firm size and book equity is highly correlated with firm size, which means that scaling would cloud the effect of *Dispersion*. The results show that even after the business

[29] Following Choe, Masulis, and Nanda (1993), we focus on the impact of these time-series variables and thus do not include accounting control variables.

Table IX

Logit Analyst of Effect of Agreement on Issuance Decision with Business Cycle Controls

Table IX presents the results from a logit analysis where the dependent variable equals one if the firm issues equity and zero if it issue debt. The agreement parameter is defined as either (Actual EPS − Mean Analyst)/Actual EPS prior quarter (ρ) or, the dispersion or standard deviation of raw analyst forecasts in the period quarter prior to the issuance ($1 - \rho$). We present evidence with the deviation in raw (unscaled) form (column 6) and divided by the book value of equity (columns 7 and 8). Momentum is the value-weighted market return for the 6 months prior to the issue. Three business cycle variables are included; these are the growth in Industrial Production, the Leading Economic Indicator, and the Coincident Economic Indicator for the 3 months prior to the issue. The price variable is the raw return the 12 months prior the issue. Control variables include the natural log of Sales, Return on Assets, Cash to Assets, R&D to Sales, Fixed Assets to Assets, and Debt to Assets. *p*-values are in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Actual − forecast EPS (ρ)	0.05**	0.09**	0.08*	0.09**	0.09**					
	(0.03)	(0.05)	(0.06)	(0.05)	(0.05)					
Dispersion ($1 - \rho$)						−2.26***				
						(0.00)				
Dispersion ($1 - \rho$)/book equity							−80.9***	−80.1***	−80.2***	−80.9***
							(0.00)	(0.00)	(0.00)	(0.00)
Momentum	0.67***	−1.84***	−2.02***	−1.87***	−1.84***	0.47***	−1.98***	−2.12***	−2.02***	−1.98***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Industrial production growth			6.14***					5.15**		
			(0.00)					(0.03)		
Leading indicator growth				4.59					7.86	
				(0.57)					(0.37)	
Coincident indicator growth					0.27					2.39
					(0.97)					(0.78)

Price variable: 12-month return		1.65***	1.67***	1.66***	1.65***		1.71***	1.73***	1.72***	1.71***
		(0.00)	(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.00)	(0.00)
lnSales		−0.93***	−0.93***	−0.93***	−0.93***		−0.98***	−0.98***	−0.98***	−0.98***
		(0.00)	(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.00)	(0.00)
Return on assets		3.33***	3.29***	3.32***	3.33***		3.25***	3.19***	3.24***	3.25***
		(0.00)	(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.00)	(0.00)
Cash to assets		2.66***	2.66***	2.65***	2.66***		3.07***	3.08***	3.06***	3.07***
		(0.00)	(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.00)	(0.00)
R&D to sales		7.87***	7.86***	7.85***	7.88***		7.43***	7.44***	7.38***	7.43***
		(0.00)	(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.00)	(0.00)
Fixed assets to assets		−0.22	−0.25	−0.22	−0.22		−0.34*	−0.36*	−0.34*	−0.34*
		(0.23)	(0.18)	(0.23)	(0.23)		(0.09)	(0.07)	(0.09)	(0.09)
Debt to assets		0.58**	0.58**	0.57**	0.58**		0.66**	0.67**	0.65**	0.66**
		(0.03)	(0.02)	(0.03)	(0.03)		(0.02)	(0.02)	(0.02)	(0.02)
Intercept	−0.05	5.13***	5.10***	5.12***	5.12***	−0.08*	5.50***	5.47***	5.49***	5.50***
	(0.20)	(0.00)	(0.00)	(0.00)	(0.00)	(0.09)	(0.00)	(0.00)	(0.00)	(0.00)
Pseudo R^2	0.01	0.48	0.48	0.48	0.48	0.01	0.49	0.49	0.49	0.49
No. of observations	4,887	4,270	4,270	4,270	4,270	4,264	3,763	3,763	3,763	3,763

This table shows that firms with high agreement parameter are more likely to issue equity, controlling for changes in the business cycle.

cycle and momentum effects are taken into account, our agreement proxy remains statistically significant, testifying to its incremental explanatory power. Further, the time-series specification results support the findings of Choe et al. (1993) and show that firms are more likely to issue equity after a period of expansion, as measured by *Industrial Production Growth*, and after a stock market run-up, as measured by *Momentum*. We also present results including the cross-sectional accounting controls used in the previous tables and scaling *Dispersion* $(1 - \rho)$ by book equity. These results are presented in columns 2–5 (using *Acutal − Forecast EPS* (ρ) to measure agreement) and in columns 7–10 (using *Dispersion* $(1 - \rho)$ scaled by book equity to measure agreement). We find that the firm's stock return dominates the impact of *Momentum*; thus, consistent with previous findings, firms are more likely to issue equity after a stock price run-up relative to the return on the market.

We further control for information asymmetry in Table X by including measures of variation in information asymmetry around equity issues.[30] The first two measures are in Panel A. The first measure is from Korajczyk et al. (1991), who argue that equity issues are more likely after a credible information announcement because these are periods of less information asymmetry. In the first three columns, we include a dummy variable that is equal to one if the issuance occurs within 30 days following an EPS announcement. The results show that the coefficient on agreement using either measure of agreement is significant even after controlling for this variable. However, surprisingly, we find that firms are less likely to issue equity immediately following an EPS announcement. In untabulated tests, we repeat the analysis with a 7-day, 14-day, and 45-day dummy and find similar results. At first blush, this appears to conflict with Korajczyk et al. (1991). However, one should be cautious in one's interpretation. Korajczyk et al. (1991) show that there are more equity issues following an EPS announcement than there are later in the quarter and focus only on equity issuances. By contrast, our analysis compares equity and debt issuances. Thus, our finding should be interpreted as showing that firms are more likely to issue debt than equity following an EPS announcement, rather than as showing that no equity issuance follows an EPS announcement. Additionally, our sample period begins in 1993, whereas Korajczyk et al.'s (1991) sample period is 1978–1983.

As we discuss earlier, the literature has documented that there is often an EPS run-up prior to an equity issue, and this may be associated with the resolution of information asymmetry, which potentially confounds the interpretation of our results using the *Actual − Forecast EPS* (ρ) as a proxy for agreement. To deal with this possibility, we include the increase in EPS in the quarter prior to when our agreement parameters are measured (so the change is from quarter -2 to -1 relative to the issuance) in the last six columns of Table X. We find that the coefficient on agreement is unaffected by this. The coefficient on the run-up is positive and significant in some specifications, indicating that firms

[30] In both panels of Table X, we include the control but do not present results with variables used in Tables V and VI.

Table X

Logit Analyst of Effect of Agreement on Issuance Decision with Information Asymmetry Controls

Table X presents the results from a logit analysis where the dependent variable equals one if the firm issues equity and zero if it issues debt. The agreement parameter is defined as either (Actual EPS − Mean Analyst)/Actual EPS prior quarter (ρ) or, the dispersion or standard deviation of raw analyst forecasts divided by book equity in the period prior to the issuance ($1 - \rho$). The price variable is indicated at the top of each column. Post-Issue EPS Change is the change in EPS from the quarter prior to the quarter after the issue. In Panel A, we include two information asymmetry variables: 30-Day Post EPS Dummy, a dummy variable equal to 1 if the issuance is within 30 days of the prior quarter EPS announcement; EPS Run-Up, the change in EPS from two quarters prior to the quarter just before the issue. In Panel B, we include two additional information asymmetry variables: *Psi*, the firm-specific variation in stock returns shown to be inversely related to information asymmetry, Durnev, Morck, and Yeung (2004); and, Insider Trading, the net purchases (+) or sales (−) by insiders in the 12 months preceding the issue divided by the number of shares outstanding. Control variables not presented here include an intercept, the natural log of Sales, Return on Assets, Cash to Assets, R&D to Sales, Fixed Assets to Assets, and Debt to Assets. *p*-values are in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

	(1) 3-Month Return	(2) 12-Month Return	(3) MB	(4) 3-Month Return	(5) 12-Month Return	(6) MB	(7) 3-Month Return	(8) 12-Month Return	(9) MB	(10) 3-Month Return	(11) 12-Month Return	(12) MB
Panel A: Post-EPS Dummy and EPS Run-Up as Measures of Information Asymmetry												
Actual − forecast EPS (ρ)	0.09*	0.09**	0.16***				0.08*	0.09*	0.15***			
	(0.06)	(0.05)	(0.00)				(0.10)	(0.06)	(0.00)			
Dispersion/book equity ($1 - \rho$)				−88.5***	−105**	−100***				−93.4***	−110**	−105***
				(0.01)	(0.02)	(0.00)				(0.00)	(0.02)	(0.00)
Price variable	2.78***	1.58***	0.28***	2.98***	1.67***	0.28***	2.79***	1.63***	0.28***	2.96***	1.65***	0.28***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Post-Issue EPS change	0.00	0.00	0.01	0.00	−0.01	0.01	−0.01	0.00	0.00	−0.01	−0.01	0.00
	(0.96)	(0.81)	(0.64)	(0.83)	(0.47)	(0.60)	(0.62)	(0.82)	(0.99)	(0.52)	(0.55)	(0.93)
30-Day Post EPS dummy	−0.28***	−0.35***	−0.30***	−0.26***	−0.33***	−0.29***	−0.26***	−0.34***	−0.28***	−0.27***	−0.34***	−0.29***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.01)	(0.00)	(0.01)
EPS Run Up							0.01	0.01	0.01	0.02	0.01	0.02
							(0.19)	(0.35)	(0.15)	(0.16)	(0.26)	(0.13)
Pseudo R^2	0.48	0.49	0.45	0.49	0.50	0.47	0.48	0.49	0.46	0.49	0.50	0.41
No. of observations	4,482	4,178	4,515	3,849	3,643	3,919	4,286	4,054	4,314	3,796	3,597	3,818

(*continued*)

Table X—*Continued*

	(1) 3-Month Return	(2) 12-Month Return	(3) MB	(4) 3-Month Return	(5) 12-Month Return	(6) MB	(7) 3-Month Return	(8) 12-Month Return	(9) MB	(10) 3-Month Return	(11) 12-Month Return	(12) MB
Panel B: *Psi* and Insider Trading as Measures of Information Asymmetry												
Actual − forecast EPS (ρ)	0.09*	0.09**	0.14***				0.25***	0.22***	0.33***			
	(0.07)	(0.05)	(0.00)				(0.00)	(0.01)	(0.00)			
Dispersion/Book equity ($1-\rho$)				−101***	−116**	−112***				−99.6**	−274*	−124**
				(0.00)	(0.02)	(0.00)				(0.02)	(0.06)	(0.04)
Price variable	2.77***	1.51***	0.27***	2.97***	1.60***	0.27***	3.02***	1.69***	0.32***	3.41***	1.89***	0.29***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Post-Issue EPS change	0.00	0.00	0.01	0.00	−0.01	0.01	0.03	0.01	0.05	0.01	0.00	0.05
	(0.98)	(0.93)	(0.63)	(0.99)	(0.67)	(0.42)	(0.24)	(0.66)	(0.04)	(0.62)	(0.92)	(0.05)
30-Day Post EPS Dummy	−0.29***	−0.33***	−0.31***	−0.29***	−0.32***	−0.32***	−0.38**	−0.48***	−0.40***	−0.42**	−0.51***	−0.46***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.03)	(0.01)	(0.01)	(0.03)	(0.01)	(0.01)
Psi	1.18***	0.95***	1.17***	1.13***	0.85***	1.12***						
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)						
Insider trading							−13.5***	−10.4**	−16.1***	−14.0***	−11.3**	−17.0***
							(0.00)	(0.02)	(0.00)	(0.00)	(0.02)	(0.00)
Pseudo R^2	0.48	0.48	0.45	0.49	0.50	0.47	0.47	0.50	0.44	0.50	0.50	0.46
No. of observations	4,089	3,854	4,103	3,538	3,346	3,551	1,596	1,556	1,599	1,345	1,191	1,347

This table shows that firms with a high agreement parameter are more likely to issue equity, controlling for information asymmetry.

are more likely to issue equity after an EPS run-up. In untabulated results, we confirm these results using *EPS Run-Up* for the two, three, and four quarters prior to the issuance.

In addition to these variables, we also include two measures of information asymmetry that seem distinctly unrelated to agreement. First, we use *Psi* (ψ), defined earlier, where a higher *Psi* means lower information asymmetry. Time-varying adverse selection predicts that firms are more likely to issue equity when *Psi* is higher. We present these results in the first six columns of Panel B of Table X and again include but do not present the control variables related to the tradeoff and pecking order hypotheses. We see that including *Psi* does not alter the economic or statistical significance of agreement. Moreover, as predicted by time-varying adverse selection, firms with low information asymmetry (high *Psi*) are more likely to issue equity. Thus, both information asymmetry and agreement appear to be determinants of the equity issuance decision.

The second asymmetric information control variable unrelated to agreement that we use is insider trading, which may indicate overvaluation and can thus permit a test of market timing.[31] The last six columns of Table X present results including net insider trading during the 12 months preceding the issue. The results show that the coefficient on agreement remains significant after controlling for *Insider Trading*. Moreover, the coefficient on *Insider Trading* is negative and significant, indicating a higher likelihood of equity issuance after insiders sell stock, consistent with Karpoff and Lee (1991), Kahle (2000), and Jenter (2004), and providing support for time-varying adverse selection and market timing. We also run this analysis using insider trading during the 3 months preceding the issue and obtain similar results, but the coefficient on insider trades is only marginally significant.

Since equity issuance is part of a larger capital structure decision, we also investigate if agreement affects capital structure. In particular, do firms with high agreement decrease their leverage ratios during the year of the security issuance? To address this, we replicate the results in Baker and Wurgler's (2002) Table II, in which they regress the change in leverage on market-to-book and other control variables. We repeat this analysis using market-to-book and other price variables and including our two primary measures of agreement, *Actual − Forecast EPS* (ρ) and *Dispersion* ($1 - \rho$). All regressions are run with clustered standard errors by the issue year. Table XI presents the results. The sign of the coefficient on agreement is consistent with our model's predictions: Firms with high agreement have a decrease in leverage in the year of the security issuance. Further, the coefficient on either measure of agreement is significant in all specifications using the market leverage ratio except in the last column, in which it is marginally significant at the 14% level. These results complement those presented earlier in support of our theory. We also show that, similar to Baker and Wurgler (2002), the price variables have a negative impact on the change in a firm's leverage ratio. However, as noted earlier, it is unclear

[31] The data for this test are available only for a portion of our sample.

Table XI

Change in Leverage Regressions

Table XI presents the results from a regression in which the dependent variable is the change in the debt to value ratio from the year prior to the year following the issuance over the 1993–2002 sample period. Debt to book (market) value is defined as short- and long-term debt divided by total assets (market value of equity plus the book value of debt). The agreement parameter, ρ, is defined in two ways: (Actual EPS − Mean Analyst)/Actual EPS prior quarter and the dispersion of analyst forecast divided by book equity. The price variable is indicated at the top of each column. All control variables are measured as of the year prior to the issue and described in Table I. The debt to value ratio used as an explanatory variable measures the ratio relative to book (market) value when the dependent variable is book (market) leverage. All regressions are control for the clustering by the year of issuance. *p*-values are in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

	Book Leverage Ratio						Market Leverage Ratio					
Dependent Variable	3-Month Return	12-Month Return	MB	3-Month Return	12-Month Return	MB	3-Month Return	12-Month Return	MB	3-Month Return	12-Month Return	MB
Actual − forecast EPS (ρ)	−0.002	−0.002	−0.002				−0.002*	−0.002*	−0.002**			
	(0.19)	(0.17)	(0.14)				(0.10)	(0.06)	(0.04)			
Dispersion/Book equity ($1-\rho$)				0.35	0.27	0.20				0.33**	0.26*	0.22
				(0.13)	(0.21)	(0.39)				(0.03)	(0.06)	(0.14)
Price variable	−0.03***	−0.01***	−0.01**	−0.03***	−0.01**	−0.01*	−0.02**	−0.01*	−0.01**	−0.03***	−0.01	0.00
	(0.00)	(0.01)	(0.03)	(0.00)	(0.03)	(0.06)	(0.02)	(0.10)	(0.04)	(0.01)	(0.12)	(0.61)
lnSales	0.01***	0.01***	0.01***	0.01***	0.01***	0.01***	0.00***	0.00***	0.01***	0.00***	0.00***	0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Return on assets	−0.05*	−0.04	−0.03	−0.04	−0.04	−0.03	−0.03	−0.02	−0.02	−0.04*	−0.04*	−0.03
	(0.10)	(0.15)	(0.18)	(0.16)	(0.25)	(0.33)	(0.11)	(0.15)	(0.17)	(0.07)	(0.09)	(0.12)
R&D to sales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.26)	(0.13)	(0.04)	(0.35)	(0.44)	(0.20)	(0.99)	(0.26)	(0.42)	(0.62)	(0.55)	(0.80)
Fixed assets to assets	0.05***	0.05***	0.05***	0.05***	0.05***	0.05***	0.02**	0.02**	0.02***	0.03***	0.03***	0.03***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.02)	(0.03)	(0.01)	(0.00)	(0.01)	(0.00)
Debt to value	−0.22***	−0.22***	−0.23***	−0.20***	−0.20***	−0.21***	−0.11***	−0.11***	−0.10***	−0.15***	−0.15***	−0.15***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Intercept	−0.03***	−0.03***	−0.03***	−0.02**	−0.02**	−0.02**	0.00	−0.01	−0.02**	0.01	0.00	−0.01
	(0.00)	(0.00)	(0.01)	(0.03)	(0.04)	(0.02)	(0.92)	(0.34)	(0.03)	(0.46)	(0.89)	(0.43)
Adjusted R^2	0.18	0.18	0.16	0.14	0.14	0.12	0.11	0.10	0.09	0.08	0.07	0.07
No. of observations	4,415	4,123	4,429	3,890	3,648	3,903	4,406	4,114	4,420	3,879	3,638	3,892

This table replicates the results from Table 2 of Baker and Wurgler (2002) and shows agreement significantly decreases the market leverage ratio.

whether this is due to market timing, time-varying adverse selection, or the implications of our model.

PREDICTION 4: *On average, firms that issue equity will have higher capital expenditures after the issue than firms that either issue debt or do not issue any security and this effect is stronger for higher agreement.*

The pecking order hypothesis says nothing about this relation, so this test does not address that hypothesis. This prediction is inconsistent with timing and time-varying adverse selection, which predict that firms issue equity when they are overvalued or when information asymmetry is low, regardless of a need for financing. While the part of the prediction dealing with higher post-equity-issue capital expenditures may be consistent with the tradeoff theory, in that an over-levered firm that needs financing for a project would raise it through equity, the tradeoff theory says nothing about how agreement affects this relationship. Table XII presents the median capital expenditure to sales ratio for equity and debt issuers from 3 years prior to 3 years after the issuance, and the change in capital expenditures from the year prior to the issuance to the year of and 2 years following the issuance, and the p-value from tests to determine if this change is significantly different from zero. Panel A compares the capital expenditures of equity and debt issuers for the full sample. These results provide support for Prediction 4: Equity issuers experience a significant increase in their capital expenditures to sales ratios following the issue, whereas nonissuers (debt issuers) do not.

In Panels B and C, we ask if the increase in capital expenditures for equity issuers is greater for firms with higher agreement. Thus, we divide equity issuers at the median of the agreement parameter into high-agreement and low-agreement groups. These results show that firms in both high-agreement and low-agreement groups experience capital expenditures increases, with high-agreement firms exhibiting a significantly greater increase than low-agreement firms. These results further support our theory.

Next, we examine capital expenditure changes in a regression analysis. Our goal is to examine whether agreement has incremental explanatory power after controlling for other factors known to influence capital expenditures. This analysis is related to the literature on the determinants of firms' investment choices, which begins with Fazzari, Hubbard, and Petersen (1988), who regress the level of investment on the market-to-book ratio and cash flow. They examine how the coefficient on the market-to-book ratio varies across subgroups. Interpreting these results is often difficult due to the imprecise measurement of market-to-book as a proxy for investment opportunities (Erickson and Whited (2000, 2002)). This is less of an issue for us, however, since we are interested in determining if the *increase* in investment after an equity issuance is explained in part by *agreement*. We therefore focus on the coefficient on agreement and examine the change in (not level of) investment. Specifically, we regress the change in capital expenditure to sales in the year of the issuance on market-to-book, cash flow, and a dummy variable equal to one if the agreement parameter

Table XII
Change in Investment after Issuance

Table XII presents median capital expenditures to sales ratios relative to the year of equity issue ($t = 0$) and the change in this ratio from the year prior to the issue to the years 1, 2, and 3 years following the issue. p-values (not in italics) indicate if this change is significantly different from zero. The ratios are presented for the full sample of equity and debt issuers as well as breaking the sample into high and low agreement, ρ. High ρ is defined as either the difference between the actual and forecast EPS prior to the issuance being greater than the median or the dispersion of forecasts divided by book equity being below the median. p-values in italics indicate if the change in capital expenditure between the high and low groups differs using a nonparametric Wilcoxon Rank-sum test.

Year Relative to Issue	−3	−2	−1	0	1	2
Panel A: All Equity Issuers						
Capital expenditures	0.052	0.049	0.052	0.058	0.057	0.052
Changes from T − 1				0.065	0.050	−0.035
p-Value changes = 0				0.00	0.00	0.00
All Debt Issuers						
Capital Expenditures	0.062	0.061	0.062	0.061	0.059	0.057
Changes from T − 1				−0.005	−0.059	−0.100
p-Value Changes = 0				0.05	0.01	0.00
Panel B: ρ = Actual versus Forecast High ρ Equity Issuers						
Capital expenditures	0.059	0.052	0.053	0.060	0.063	0.057
Changes from T − 1				0.088	0.102	−0.005
p-Value Changes = 0				0.00	0.00	0.00
Low ρ Equity Issuers						
Capital Expenditures	0.060	0.061	0.064	0.072	0.062	0.054
Changes from T − 1				0.040	−0.024	−0.079
p-Value Changes = 0				0.00	0.00	0.85
p-Value High ρ = Low ρ				*0.08*	*0.00*	*0.00*
Panel C: 1 − ρ = Dispersion High ρ Equity Issuers						
Capital expenditures	0.052	0.050	0.055	0.058	0.059	0.055
Changes from T − 1				0.081	0.078	−0.008
p-Value Changes = 0				0.00	0.00	0.00
Low ρ Equity Issuers						
Capital Expenditures	0.088	0.073	0.081	0.086	0.079	0.068
Changes from T − 1				0.029	−0.056	−0.164
p-Value Changes = 0				0.00	0.03	0.19
p-Value High ρ = Low ρ				*0.01*	*0.00*	*0.00*

This table shows that firms increase investment following an equity issuance but not following a debt issuance. This table also shows that firms with high agreement parameter have a greater increase in capital expenditures.

indicates high agreement (*Actual* − *Forecast EPS* (ρ) above the median or low *Dispersion* (1 − ρ)/Book equity below the median) and the firm issued equity and zero otherwise.[32] We use a dummy variable because our model only

[32] We repeat this analysis with the change in capital expenditures over 2 years and obtain similar results.

predicts that firms that issue equity due to high agreement will invest, and not that those with higher agreement will invest more.

The first six columns of Table XIII show that after controlling for market-to-book and the change in cash flow to assets, high-agreement firms that issue equity have a greater increase in investment than do low-agreement firms or firms that do not issue equity. In columns 7 through 10, we confirm this result when firm and year fixed effects are included. These results are also consistent with our prediction.

Table XIII also has implications for the relation between investment and the price variables. Baker, Stein, and Wurgler (2003) show that corporate investments are more sensitive to stock price movements for more "equity-dependent" firms. Polk and Sapienza (2004) show that the relation between investment and prices is partly because overpricing, as measured by *Turnover*, leads to overinvestment. Our results in Tables XII and XIII provide another explanation for this relation: A high stock price will also occur when there is high agreement between the manager and investors, and agreement is a significant independent determinant of equity issuance. Our results on the firm's investment decision have a similar flavor. Firms invest more when their prices are high because it is optimal for managers to finance good investment opportunities with equity and subsequently increase capital expenditures when agreement with investors is high.[33]

To test if our results represent an independent effect of agreement on equity issuance and investment or are simply picking up either the "equity channel" of Baker et al. (2003) or the "catering channel" of Polk and Sapienza (2004), we repeat our analysis controlling for their variables. In columns 11 and 13, we include *Turnover* and show that, consistent with Polk and Sapienza (2004), high-turnover firms invest more. However, our results are robust to including this measure. Baker et al. (2003) show that the relation between market-to-book and investment is strongest for firms that are equity dependent. They measure equity dependence using an adapted model of constraint developed in Kaplan and Zingales (1997). We replicate this measure for our sample and repeat our analysis excluding those firms with equity dependence less than 0.28, the median in Baker et al. (2003), that is we focus on those firms that are most likely to be equity dependent. We use the median from their paper rather than our sample because our sample is conditional on a firm issuing debt or equity, which may bias the measure of equity dependence. These results are presented in columns 12 and 14 and show that agreement has an *independent* effect on equity issuance.

VI. Conclusion

We set out in this paper to investigate why firms issue equity. Given the empirical failures of both the standard tradeoff and pecking order theories, we

[33] We can also think of R&D and advertising expenses as capital expenditures. We have run tests using these variables, but the results are insignificant. We suspect that this may be because these are budgeted expense items that firms generally do not fund by raising external capital.

Table XIII

Change in Investment Regressions

Table XIII presents results from regressing the change in capital expenditures to sales from the year prior to the issuance to the year following the issuance. The explanatory variables are: a dummy variable equal to one if the firm has high agreement, where high agreement is defined as either the difference between the actual and forecast EPS prior to the issuance being greater than the median or the dispersion of forecasts divided by book equity being below the median; equity, a dummy variable equal to one if the firm issued equity rather than debt; the market-to-book ratio prior to the issuance; the change in operating income to assets from before the issuance to 1 year following the issuance; and, turnover, the number of shares traded in the 3 months prior to the issue less the average turnover for all stock over the same period on the same exchange. High KZ indicates that a firm has a calculated Kaplan–Zingales index for constraint above the median. Firm and Year fixed effects are included in columns as noted. *p*-values are in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
High Actual − Forecast	0.34***	0.27***	0.28***				0.14**	0.12**			0.27***	0.25***		
EPS (ρ) × Equity Dummy	(0.00)	(0.00)	(0.00)				(0.02)	(0.04)			(0.00)	(0.00)		
Low Dispersion				0.19***	0.12**	0.12**			0.19***	0.17***			0.12*	0.20***
$(1-\rho)$ × Equity Dummy				(0.00)	(0.04)	(0.04)			(0.00)	(0.00)			(0.06)	(0.00)
Market-to-book		0.10***	0.10***		0.07***	0.06***	0.09***	0.10***	0.04**	0.05***	0.09***	0.08***	0.06***	0.05***
		(0.00)	(0.00)		(0.00)	(0.00)	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Change in CF to assets			0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			(0.52)			(0.44)	(0.62)	(0.55)	(0.43)	(0.43)	(0.51)	(0.44)	(0.43)	(0.38)
Turnover											0.01*		0.01**	
											(0.10)		(0.05)	
Intercept	0.19	−0.01	0.00	0.21	0.08	0.08	0.14	0.00	0.19	0.29	0.01	0.03	0.09	0.08
	(0.00)	(0.91)	(0.94)	(0.00)	(0.03)	(0.03)	(0.06)	.	(0.00)	(0.00)	(0.90)	(0.53)	(0.02)	(0.06)
Firm fixed							Yes	Yes	Yes	Yes				
Year fixed								Yes		Yes				
High KZ sample only												Yes		Yes
Adjusted R^2	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
No. of observations	4,039	4,039	3,985	3,547	3,547	3,502	3,985	3,985	3,502	3,502	3,959	2,583	3,478	2,241

This table shows that firms increase investment following an equity issuance if they have high agreement.

appear to be left with only a conjecture that firms issue equity when their stock prices are high either because this permits exploiting overvaluation (the timing hypothesis) or because information asymmetry is lower when the firm's stock price is higher (time-varying adverse selection). We provide an alternative view by developing a "managerial investment autonomy" theory that predicts that a firm will issue equity when its stock price is high because that is when investors have a high propensity to agree with managerial decisions. Such anticipated shareholder endorsement of corporate decisions is thus an important driver of equity issuance timing.

In a sense, our work is similar to Schultz's (2003) in that it provides a rational explanation for what has previously been attributed *exclusively* to market timing. While neither Schultz's paper nor ours eliminates timing as a possible motivation, both call into question whether it is the sole predictor of equity issues. However, our work also differs from Schultz's (2003), which provides an empirical explanation that decomposes expected returns.

In addition to providing a theory that is consistent with documented empirical anomalies about equity issuance, we also extract additional predictions that we test. We find empirical support for these predictions. In particular, our theory has incremental explanatory power over other hypotheses, including timing and time-varying adverse selection, in explaining which firms issue equity. We show that after controlling for the stock price and the potential to time the market, managers issue equity when investors are more likely to agree with them. Our conclusion is based on the following findings about equity issuers relative to debt issuers: (1) Equity issuers have higher stock prices; (2) regardless of their stock prices, these firms have higher values of the "agreement parameter;" (3) this agreement parameter has incremental power over stock price levels, timing, and information asymmetry to explain firms' security issuance decisions; and (4) after equity issues, firms experience larger increases in investments and this effect is stronger for high-agreement firms.

The theory and the evidence here primarily relate to a firm's security issuance decision. However, in testing our theory, we also provide insight into firms' capital structure and investment decisions. Thus, we provide preliminary evidence that manager–investor agreement impacts many corporate decisions.

Appendix

Proof of Lemma 1: The proof follows immediately from (6), which implies that the manager prefers the lemon project to the innovative project even if $x = H$. Since $H > M$, this also implies that he will prefer the lemon project to the mundane project. Q.E.D.

Proof of Lemma 2: Consider first the case in which the manager issues equity at $t = 1$ and observed $x = H$ on the innovative project at $t = 2$. Then, given $\rho \in [0, 1]$

$$P_2^x = [V + H][1 - T][1 - \alpha], \tag{A1}$$

$$P_2^y = [V + \rho H + [1 - \rho]L][1 - T][1 - \alpha], \tag{A2}$$

and α satisfies

$$I = \alpha[V + q\{\rho H + [1 - \rho]L\} + \{1 - q\}M][1 - T], \tag{A3}$$

where we note that α is determined at $t = 1$ before the signal S is observed. The manager's utility from investing in the innovative project, conditional on $x = H$ and ρ, is

$$W(inn \mid H, \rho) = \{V + [\rho H + \{1 - \rho\}L] + \delta[V + H]\}[1 - T][1 - \alpha]. \tag{A4}$$

If the manager invests in the mundane project, his utility is

$$W(mund) = [V + M][1 - T][1 - \alpha][1 + \delta]. \tag{A5}$$

For the manager to (at least weakly) prefer the innovative project to the mundane project, we must have $W(inn \mid I, \rho) \geq W(mund)$. Comparing (A4) and (A5), we see that this requires

$$V[1 + \delta] + \rho H + [1 - \rho]L + \delta H \geq [V + M][1 + \delta]. \tag{A6}$$

Given (4), we know that (A6) *fails* to hold at $\rho = 0$. Moreover, it is clear that (A6) holds at $\rho = 1$. By continuity, it follows that there exists $\rho^* \in (0, 1)$ such that (A6) holds as an equality for $\rho = \rho^*$. For all $\rho < \rho^*$, (A6) will fail to hold, and for all $\rho > \rho^*$, (A6) will hold as a strict inequality. Thus, we have shown that the manager will unconditionally invest in the mundane project for $\rho < \rho^*$, and will prefer the innovative project when $\rho \geq \rho^*$ and $x = H$.

Now, when $x = L$, we want to show that the manager prefers the mundane project regardless of his signal interpretation. Conditional on $x = L$, he prefers the mundane project if:

$$[V + M][1 + \delta] > \{V + \rho L + [1 - \rho]H + \delta[V + L]\}\{1 - T\}. \tag{A7}$$

Since the right-hand side of (A7) is strictly decreasing in ρ, its maximum value is attained at $\rho = 9$. Thus, if (A7) holds at $\rho = 0$, it will hold for all $\rho \in [0, 1]$. We can see now that (A7) will hold at $\rho = 0$ if $[1 + \delta]M > \delta L + H$, which is obviously true given (4). Q.E.D.

Proof of Lemma 3: The proof is straightforward. Given (6), it is impossible for the manager to raise debt financing if he has unrestricted project choice. With a covenant giving bondholders control over project choice, the choice of the mundane project is guaranteed. Since $M > I$, bondholders will provide the necessary financing at a zero interest rate (riskless rate). Q.E.D.

Proof of Proposition 1: If the manager invests in the mundane project with equity, we know that his utility is given by $W(mund)$ in (A5). If shareholders were sure that the mundane project would be chosen, they would demand α_{mund} to satisfy:

$$I = \alpha_{mund}[1 - T][V + M]. \tag{A8}$$

Substituting (A8) in (A5) and simplifying yields

$$W(mund) = [1 + \delta][V + M][1 - T] - I[1 + \delta]. \tag{A9}$$

If the firm issues debt, then the manager's expected utility becomes

$$W(debt) = [1 + \delta][V + M - I][1 - T]. \tag{A10}$$

Comparing (A8) and (A10), we see that $W(debt) > W(mund)$. Since the manager unconditionally invests in the mundane project with equity for all $\rho < \rho^*$, we have established that equity will never be issued when $\rho < \rho^*$.

Now, for $\rho \geq \rho^*$, the following holds:

$$P_2^x = [1 - \alpha][1 - T][V + qH + [1 - q]M], \tag{A11}$$

$$P_2^y = [1 - \alpha][1 - T][V + q\{\rho H + [1 - \rho]L\} + [1 - q]M]. \tag{A12}$$

The manager will prefer equity to debt at $t = 1$ if

$$P_2^y + \delta \mathrm{P}_2^x \geq \mathrm{W}(debt) \tag{A13}$$

where P_2^x and P_2^y are given by (A11) and (A12), respectively, and $W(debt)$ is given by (A10). Note first that (A3) implies $\partial\alpha/\partial\rho < 0$. Thus, from (A11) and (A12), we can see that $\partial[P_2^y + \delta P_2^x]/\partial\rho > 0$. Moreover, given (7), (A13) holds as a strict inequality for $\rho = 1$. We also know it does not hold for $\rho = \rho^*$. Thus, there exists $\rho^{**} \in (\rho^*,1]$ such that (A13) holds as an equality for $\rho = \rho^{**}$, as a strict inequality for $\rho > \rho^{**}$, and fails to hold for $\rho < \rho^{**}$. Q.E.D.

Proof of Proposition 2: The firm's stock price at $t = 1$ is given by (A2), with α satisfying (A3) for all $\rho \geq \rho^{**}$. It is easy to see that $\partial P_2^y/\partial\rho > 0\ \forall\rho > \rho^{**}$. For $\rho < \rho^{**}$, the firm invests in the mundane project and the firm's stock price at $t = 1$ is given by $P_2^y(\rho < \rho^{**}) = [V + M][1 - \mathrm{T}][1 - \alpha_{mund}]$, where α_{mund} satisfies (A8). Clearly, $\partial P_2^y(\rho < \rho^{**})/\partial\rho = 0$. The stock price at $t = 0$ is merely the stock price at $t = 1$ multiplied by θ (which is independent of ρ), so the comparative statics with respect to ρ remain unchanged. Q.E.D.

Proof of Proposition 3: It is obvious, given our earlier proofs, that the manager will never issue equity if it does not have a project, since the value of the firm declines by $(1 - \lambda)I$ as a result of doing so. But issuing debt increases the value of the firm by $[T + \lambda - 1]I$ due to the debt tax shield. Thus, debt will be issued even without a project if $T + \lambda > 1$. Q.E.D.

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