



## Is corporate control effective when managers face investment timing decisions in incomplete markets?

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### ABSTRACT

This paper presents a model of investment timing by risk averse managers facing incomplete markets and corporate control. Managers are exposed to idiosyncratic risks due to the dependence of their compensation on investment payoffs which are not spanned by other assets. We show that risk averse managers invest earlier than well-diversified shareholders would prefer, leading to significant agency costs. This effect can be mitigated if the manager is subject to corporate control. Our main finding is that the interaction of idiosyncratic risk and control results in two regimes. When the market is sufficiently close to being complete, control has a strong disciplinary effect and agency costs can be virtually eliminated. However, when idiosyncratic risk is too large, shareholders suffer agency costs and control is ineffective. An implication is that we would expect to see different investment behavior across industries or specific investments as the degree of idiosyncratic risk varied. It would also suggest that both the standard complete-markets real options model and the npv framework can proxy in describing investment timing.

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Agency conflicts arise when managers make decisions on behalf of shareholders. In this paper we consider the impact of idiosyncratic risk inherent in an investment decision faced by a risk averse manager and show it leads to investment timing decisions which are inefficient for well-diversified shareholders. We question whether the market for corporate control provides a remedy. We find in some situations, strong shareholder rights will indeed lead to a significant reduction in agency costs, however, when idiosyncratic risk is too large, corporate control is not a sufficient deterrent to inefficient investment, and agency costs remain high.

We consider a risk averse manager who faces a single decision of when to make an irreversible investment which has a fixed cost, and which pays off in a lump-sum. The manager's reward depends on the firm's activities, and as such, he is compensated with a fraction of the option to invest. In our model, investment payoffs cannot be perfectly spanned by existing assets and so idiosyncratic or unhedgeable risks remain. The risk averse manager makes his investment timing decision based on his own preferences, taking into account his exposure to idiosyncratic risk. Shareholders, on the other hand, are well-diversified and do not require compensating for idiosyncratic risk. Agency conflicts arise because the risk averse manager maximizes the value of the investment timing option based on his own preferences, whilst shareholders want to maximize firm value.<sup>1</sup> As is usual in real options, exercise or investment occurs when the project value reaches a certain threshold. Here, the thresholds chosen by the risk averse manager and well-diversified shareholders will be different.

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<sup>1</sup> We abstract from capital structure issues and consider a firm with no debt.

The manager can offset some of the risk of the investment payoff by trading in the market, however, there is some idiosyncratic or unhedgeable risk remaining. This idiosyncratic risk causes the manager to invest earlier than the shareholder's prefer, resulting in large agency costs. He does this in order to reduce exposure to idiosyncratic risk, since the act of exercising (since he has a real option) or investing gives a one-off payment. The manager's investment threshold decreases away from the shareholder's threshold as risk aversion increases, and in the limit, approaches the zero npv threshold. Correspondingly, agency costs rise with managerial risk aversion.

We note that if the manager's reward does not depend on the investment option itself, then (in the absence of control) the manager should not have any preference for the timing of investment, and certainly does not time investment such that firm value is maximized. In this sense, the compensation is partially aligning the interests of the manager with the shareholders, since the option causes the manager to have a preference for investment timing, albeit different from that of the shareholders. Options also act as a corporate governance mechanism (see [Becht et al., 2003](#)). Once markets are incomplete, however, options are not sufficient to discipline managers, and corporate control is needed as a disciplinary device in our model. In this paper we ask whether corporate control is effective in reducing agency costs to shareholders which arise from the manager's timing of investment.

When the investment timing choice of the manager reduces firm or shareholder value, the manager faces the threat of a control challenge. Corporate control is the right to determine the management of corporate resources; to hire, fire and set compensation ([Jensen and Ruback, 1983](#); [Fama and Jensen, 1983a, b](#)). In our framework, control challenges result in the possibility that the manager is dismissed if he deviates too much from the shareholder's firm value maximization policy. This dismissal could arise from either internal or external mechanisms. Internal mechanisms involve control by the board of directors and external control is exerted by the takeover market. Takeovers are thought to occur for disciplinary reasons to correct for bad management practice ([Jensen, 1986](#); [Scharfstein, 1988](#); [Morck et al., 1989](#)). Implicit in our model is the assumption that takeovers result in the manager's dismissal, consistent with evidence of [Martin and McConnell \(1991\)](#).

Although the model of corporate control described above is prevalent in the US, in most countries large firms are not widely held, but have controlling shareholders, who are often active in management ([La Porta et al., 1999](#); [Shleifer and Vishny, 1997](#)).<sup>2</sup> [La Porta et al. \(1999\)](#) find "family control of firms appears to be common, significant, and typically unchallenged by other equity holders". In firms with a large shareholder (or family member) who is also a manager, monitoring and disciplining the manager becomes difficult. We can additionally proxy for this situation in our model by taking the strength of control challenges to be (very small or) zero.

When the manager facing idiosyncratic risks is also subject to corporate control, the risk of a control challenge always reduces agency costs to shareholders, in that the manager always chooses to invest at a threshold closer to the shareholder's preferred threshold. In fact, we show the manager subject to control invests at a threshold somewhere between the threshold of the shareholders and the threshold of an equivalent manager who is not subject to control.

Finally, we investigate the interaction between incompleteness and corporate control and ask "is corporate control effective when risk averse managers make investment timing decisions in incomplete markets?". Our main contribution is the finding that the effectiveness of control depends on the degree of idiosyncratic risk present. We find there are two regimes based on the correlation between the investment and the market or hedging opportunities, provided risk aversion is not too low. When the correlation is sufficiently high, there is little idiosyncratic risk and so the risk of dismissal dominates. Shareholders counteract the impact of managerial risk aversion in order to capture much of the value of the option, as the manager invests very close to the shareholders' threshold. In this case, control is effective as agency costs to shareholders can be virtually eliminated. The other regime is for sufficiently low correlation. In this case, idiosyncratic risk is significant and the risk of a control challenge never dominates. Shareholders lose a larger part of the option value, suffering agency costs, and control is ineffective.

Our model also allows us to answer the question of whether the fact that managers face idiosyncratic risks should be an important issue to shareholders. This depends greatly on whether there is a well-functioning market for corporate control. If there is not, the manager will make investment timing decisions which markedly differ from firm value maximizing ones, and shareholders suffer large agency costs. This is consistent with the broad evidence cited in [Shleifer and Vishny \(1997\)](#) on agency costs resulting from poor corporate control. It is also consistent with evidence of [Gompers et al. \(2003\)](#) that firms with weaker shareholder rights have lower firm value. In this case, idiosyncratic risk is a further source of agency costs to shareholders in countries with weak corporate control. Conversely, if there is a well-functioning market for control, then control can have a significant impact on agency costs when idiosyncratic risk is not too large. However, when idiosyncratic risks are large, control has less of an impact, and such risks do have a detrimental effect on shareholder wealth.

Whilst we study agency conflicts arising from managerial risk aversion and incompleteness, there are many forms of agency conflicts between managers and shareholders, including empire building, short-termism and overconfidence, see [Stein \(2003\)](#) for a review. Such studies usually concentrate on the impact of these agency issues on capital budgeting (under or overinvestment) as distinct from investment timing. Exceptions to this include the recent paper of [Grenadier and](#)

<sup>2</sup> [La Porta et al. \(1999\)](#) examine data on ownership structure of large companies in 27 countries and find that almost half of these firms are controlled by large shareholders. In total about 30% of companies are controlled by families and in 69% of family controlled firms, the family also participates in management. A US example is Microsoft, where Bill Gates owned 23.7% of the company in the mid 1990's.

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