



Equity financing in a Myers–Majluf framework with private benefits of control

Xueping Wu^{a,*}, Zheng Wang^{b,1}

^a*Department of Economics and Finance, City University of Hong Kong, 83 Tat Chee Avenue, Kowloon, Hong Kong, China*

^b*CITIC Fund Management, 8/F, Tower A, CISTCC, 12 Yumin Road, Chaoyang District, Beijing, PR China*

Received 11 July 2002; accepted 1 April 2004

Available online 22 July 2004

Abstract

This paper generalizes the Myers and Majluf (1984) model by introducing an agency cost structure based on private benefits of control. This new model predicts that many corporate finance variables each have opposing effects on under- and overinvestment. Private benefits exacerbate overinvestment but, interestingly, a small amount of private benefits can enhance firm value by alleviating underinvestment. Likewise, an increase in insider ownership alleviates overinvestment but aggravates underinvestment. When private benefits are small, the adverse effect of insider ownership on underinvestment tends to dominate. When there are considerable private benefits, the incentive-alignment effect of insider ownership is pronounced. Additionally, this model reconciles existing equity financing theories on announcement effects. It helps resolve the puzzle that small-growth firms do not seem to have an asymmetric information disadvantage when they issue new equity.

© 2004 Elsevier B.V. All rights reserved.

JEL classification: G14; G31; G32

Keywords: Equity financing; Private benefits of control; Underinvestment; Overinvestment; Announcement effect

* Corresponding author. Tel.: +852 2788 7577; fax: +852 2788 8806.

E-mail addresses: efxpwu@cityu.edu.hk (X. Wu), wangzheng@citicfunds.com (Z. Wang).

¹ Tel.: +86 10 82028888 316; fax: +86 10 82253396.

1. Introduction

The finance literature has long recognized that market imperfections such as information asymmetries and agency conflicts affect corporate finance and investment. For example, the classic adverse-selection model of Myers and Majluf (1984) predicts that asymmetric information between informed managers and the public market causes underinvestment. On the other hand, Jensen and Meckling (1976) suggest that managers have an incentive to make their firms grow beyond an optimal size and predict that agency conflicts due to managers' selfishness give rise to overinvestment. Both under- and overinvestment cause a loss in firm value.

However, these two lines of literature imply that many corporate finance variables exercise opposite value effects. For example, Jensen (1986) argues that free cash flows are likely to be wasted by managers on bad projects, in sharp contrast to the prediction of the Myers–Majluf model that financial slack plays a value-enhancing role in mitigating the underinvestment problem. While more recent literature has shown how corporate cash positions have opposing effects on under- and overinvestment (e.g., Stulz, 1990), an important issue that needs addressing is how a wide range of corporate finance and governance variables affect under- and overinvestment in a coherent theoretical framework.

This paper attempts to examine how market concerns on both under- and overinvestment *jointly* affect firm value through a range of corporate finance and governance variables. To this end, we extend the Myers and Majluf (1984) model by introducing an agency cost structure based on private benefits of control. More precisely, we assume that managers maximize the managers'/controlling shareholders' self-interested wealth, which includes both security benefits according to their entitled equity claims (i.e., insider ownership) and private benefits derived from undertaking new projects (e.g., self-dealing). Private benefits of control arise when cash flow rights do not really coincide with control rights, a situation that occurs even in "one-share-one-vote" structures (see Grossman and Hart, 1988; Harris and Raviv, 1988).

One of the key assumptions in the original Myers and Majluf (1984) model is that managers only undertake positive NPV projects, a behavior that is consistent with the maximization of existing shareholders' wealth. This assumption automatically rules out any possibility of overinvestment in the Myers–Majluf model's predictions. But the recognition of managers' self-interest has recently gained importance in the corporate finance literature. As Myers (2000) put it: "Sooner or later the theory of corporate finance must deal generally with the self-interest of corporate managers. . ."

Corporate decision makers' pursuit of private benefits of control reflects their selfishness and is an important reason for agency conflicts.² In the Anglo-American corporate governance culture, albeit often with small managerial ownership but possibly allied with friendly blockholders, managers have far more power than usually diffuse

² There is another kind of agency problem: managers may avoid good but risky projects, as suggested by the principal–agent theory. The Myers–Majluf tradition uses information asymmetries rather than managerial shirking due to a project's high risk to explain underinvestment. The question of how to incorporate managers' shirking is beyond the scope of this paper.

shareholders do. In contrast, in many other countries, either developed or developing, listed firms are controlled by a small group of large shareholders or families (Shleifer and Vishny, 1997). In the Anglo-American setting, managers' consumption of perquisites and empire-building highlight the agency problem (Jensen and Meckling, 1976; Jensen, 1986), while in the corporate governance structures with controlling shareholders, the focus of the agency problem is expropriation from outside shareholders (La Porta et al., 1999). Large-scale private benefits can be gained in countries where there is weak legal protection for minority shareholders (see Zingales, 1994 for an example in Italy).³ While the outright transfer of corporate funds and assets is likely to be legally challenged in many countries, almost everywhere the so-called self-dealing by managers/controlling shareholders can be easily cloaked under "business decision rules". Sweet deals with friends and other firms that the managers/controlling shareholders own are only too common. In short, private benefits are prevalent.

With an explicit agency cost structure based on private benefits of control, our generalized model substantially enriches the economic environment of Myers and Majluf (1984) and is able to offer new and important insights into corporate finance and governance. The model predicts that the ex ante loss of firm value comes from the concerns over overinvestment as well as underinvestment. This is unlike the case in Myers and Majluf (1984) or in Jensen (1986) where either over- or underinvestment is completely ignored. Yet in our framework, the probability of managers/controlling shareholders undertaking bad projects will not be rampant, because a poor choice of project may cause a detrimental effect on their entitled equity claims—potentially severe enough to outweigh the private benefits they would obtain from undertaking the project. Thus, the existence of private benefits of control in our setting does not always lead managers to overinvest.

The model shows how a range of factors affect under- as well as overinvestment. For example, more asymmetric information about assets-in-place aggravates underinvestment but mitigates overinvestment. More financial slack tends to facilitate overinvestment but mitigate underinvestment. The opposing effects of financial slack can lead to interior firm valuation optimality, consistent with the static tradeoff views of cash holdings supported in the literature (see Stulz, 1990; Kim et al., 1998; Opler et al., 1999). Our analysis also shows that an increase in issue/investment scale aggravates underinvestment but only a moderate scale aggravates overinvestment. One factor that does help cure both the under- and overinvestment problems is growth prospects.

Our model is able to offer new insights into the corporate governance literature. In particular, we show how corporate governance variables such as the amount of private benefits and the level of insider ownership affect firm value through their underlying effects on both under- and overinvestment. We find that an increase in private benefits exacerbates overinvestment but alleviates underinvestment. In the presence of severe underinvestment, a small amount of private benefits can add value to the firm, just as a dose of corruption may help facilitate economic development when very inefficient

³ The existence of private benefits of control appears evident even in the U.S. in terms of premiums paid for blocks of shares and shares with superior voting power (see Barclay and Holderness, 1989; Barclay et al., 2001; DeAngelo and DeAngelo, 1985; Lease et al., 1983).

bureaucracies are in the way (Leff, 1964). Likewise, insider ownership also has opposing effects on under- and overinvestment. When private benefits are small, an increase in insider ownership alleviates overinvestment but aggravates underinvestment. While an optimal ownership structure like that in Morck et al. (1988) is theoretically possible, the incentive-alignment effect of insider ownership is likely to be confounded by the adverse effect of insider ownership on underinvestment. In contrast, when private benefits are large, the alignment effect of insider ownership becomes pronounced because large private benefits alone are able to dispel market concerns over underinvestment.

Additionally, the model reconciles major existing seasoned equity offerings (SEOs) models in explaining announcement effects. It produces a non-monotonic pattern of announcement returns in relation to the expected NPV of new projects (or growth). More precisely, when expected growth is negative, the announcement returns are more likely to be negative, consistent with the overinvestment-driven agency problem argument proposed by Jung et al. (1996). Yet when a major concern is asymmetric information about assets-in-place, negative announcement returns also occur and become worse with an increase in this asymmetric information, consistent with the adverse-selection argument of Myers and Majluf (1984). In general, we find that announcement returns increase with expected growth. When asymmetric information arises from growth more than from assets-in-place, announcement returns are more likely to be positive. This is consistent with the insights from Ambarish et al. (1987) and Cooney and Kalay (1993). When growth is expected to be highly positive but less fraught with uncertainties, the announcement returns descend to zero, much like the extreme case (the best announcement return) in Myers and Majluf (1984) where the new issues have no information content.

The theoretical finding of a non-linear relationship between announcement returns and growth prospects seems to be consistent with some unexplained evidence in the empirical literature. Previous studies on the U.S. market find a strong positive relationship between announcement effects and investment opportunities but fail to uncover significantly positive announcement effects for issuing firms with obviously high investment opportunities (see, e.g., Pilotte, 1992; Denis, 1994; Jung et al., 1996, among others).

In Myers and Majluf (1984), the adverse selection effect always dominates. In our generalized model, because of the possible acceptance of bad projects by managers, the pre-announcement stock prices are lower than in Myers and Majluf (1984). This is the main reason for positive announcement effects, which occur when asymmetric information about growth opportunities overwhelms asymmetric information about assets-in-place—the source of the adverse selection effect. This insight provides a resolution to the puzzle that less levered small-growth firms favor new equity issues, as documented recently by Fama and French (2002). Small-growth firms have little collateral value and can rarely take on debt if monitored (inside) debt is not available. According to Myers and Majluf (1984), such firms should face serious asymmetric information problems in issuing new equity and hence have high equity issuance costs. Fama and French (2002) conclude that this perplexing phenomenon is not consistent with the pecking order model given in Myers (1984). Our model suggests that asymmetric information about firm value that comes mainly from growth rather than assets-in-place may not necessarily be a disadvantage in new issues.

The remainder of the paper is organized as follows. Section 2 reviews the related literature. Section 3 develops our new model and discusses the model's various theoretical predictions. In Section 4, numerical experiments examine how firm characteristics jointly affect under- and overinvestment. Simulations produce the expected firm value, which helps address not only some corporate governance issues in terms of private benefits and insider ownership but also the determinants of the announcement effects. Section 5 concludes the paper.

2. Related literature

In this section, we review previous studies that either attempt to extend the Myers and Majluf (1984) model or take a different approach to addressing related issues. This review helps clarify the contributions of our paper.

Dybvig and Zender (1991) argue that optimal managerial compensation can be chosen such that managers maximize both old and new shareholders' wealth in new equity financing. As a result, there will be no agency conflicts and the Myers–Majluf investment inefficiency (underinvestment) will disappear. Our managerial objective function is free from this criticism because the analysis in Dybvig and Zender (1991) explicitly require that “financial claims and control rights be assigned equally well to different claimants”.⁴

Early studies tend to emphasize either overinvestment (Jensen and Meckling, 1976; Jensen, 1986) or underinvestment (Myers, 1977; Myers and Majluf, 1984). The Stulz (1990) study on how over- and underinvestment *jointly* affect firm value is a marked exception. Stulz (1990) assumes that managers prefer expanding firm assets to maximizing firm value, but with strings attached. If managers maximize investment only to undertake negative NPV projects after exhausting good projects, shareholders can curtail this by either refusing to provide more funds or forcing managers to pay out free cash flows (using outstanding debt that is due at the time when the investment decision is made). However, due to asymmetric information, shareholders are not able to know precisely when free cash flows and overinvestment occur. Consequently, when internal cash flows (unobservable to outside investors) are high, managers are likely to overinvest, and when the cash flows are low, managers are likely to underinvest because they cannot truthfully convince the market that they need the new equity required for good projects.

Stulz (1990) concludes that managerial discretion brings about two kinds of costs—one from underinvestment and the other from overinvestment—and suggests that financing policies can affect firm value. For example, debt has a disciplinary effect, forcing managers to disgorge cash flows and hence mitigating the overinvestment problem recognized by Jensen (1986) while at the same time aggravating the underinvestment problem. The tradeoff between the positive and negative effects of debt financing, which is

⁴ Rights issues, a special form of new equity financing, do not cause investment inefficiency and announcement effects in the Myers–Majluf framework. Nevertheless, when private benefits of control exist and are under asymmetric information, rights issues can have significant announcement effects (see Wu and Wang, 2004).

later empirically supported by [McConnell and Servaes \(1995\)](#), gives rise to an optimal capital structure.

Our joint analysis of under- and overinvestment is close to that in [Stulz \(1990\)](#). However, there are at least two notable differences. First, the reason for giving up positive NPV projects (causing the underinvestment problem) in [Stulz \(1990\)](#) is the shortage of internal funds, because equity investors are always suspicious about the use of funds and make outside funding costly. In our analysis, the reason is the Myers–Majluf type of manager concern on the adverse-selection effect of the new issue/investment decision. Second, [Stulz \(1990\)](#) assumes away managers' incentives for self-discipline. Our analysis includes managers'/controlling shareholders' equity ownership. Insider ownership in our model affects both under- and overinvestment. Thus, our model is able to address some corporate governance issues in relation to insider ownership.

Previous research has also shown the value effects of insider ownership to be far from straightforward. [Morck et al. \(1988\)](#) find that an increase in insider ownership of U.S. firms up to some point (less than 5%) increases firm value; but for a higher level of insider ownership (from 5% to 25%)—which means more managerial voting power but still insufficient in alignment with the interests of outside shareholders—an increase erodes firm value. They interpret managerial entrenchment as an important counter factor to the incentive-alignment effect of insider ownership in a certain range. These two opposing effects may produce an optimal ownership structure. As managerial entrenchment is a problem in corporate takeovers, the view in [Morck et al. \(1988\)](#) is supported by [Stulz' \(1988\)](#) model. However, the incentive-enhancing role of insider ownership suggested by [Jensen and Meckling \(1976\)](#) is absent in [Stulz \(1988\)](#). In other words, it is not clear to what extent the incentive-alignment effect may counter the managerial entrenchment. Unlike the previous research, our analysis in the generalized Myers and Majluf framework considers two corporate governance variables, private benefits and insider ownership, simultaneously; each of the two variables has opposing effects on under- and overinvestment. Thus, our analysis is able to show how an optimal ownership structure is achieved through these variables' effects on under- and overinvestment and hence on firm value.

While the adverse selection effect of [Myers and Majluf \(1984\)](#) is well received in the literature as a major explanation for (negative) announcement effects of SEOs, there are other compelling theories. Based on the insight from [Stulz \(1990\)](#), [Jung et al. \(1996\)](#) suggest an agency model for new equity financing. They argue that the drop in stock price at the announcement of a new issue is largely because of the overinvestment-related agency problem rather than the Myers–Majluf adverse selection effect.⁵ On the other hand, the multiple-signal model of [Ambarish et al. \(1987\)](#) supports the possibility of positive announcement effects of new equity issues.⁶ Empirically, positive announcement effects,

⁵ SEOs in the U.S. market usually show negative announcement effects (e.g. [Asquith and Mullins, 1986](#); [Masulis and Korwar, 1986](#), among others). In survey papers, both [Smith \(1986\)](#) and [Eckbo and Masulis \(1995\)](#) document an average abnormal return of about -3.0% for U.S. industrial firms.

⁶ The [Myers and Majluf \(1984\)](#) model is also a signaling model (see [Daniel and Titman, 1995](#)). The model focuses only on the new issue as a signal to the market. In contrast, [Ambarish et al. \(1987\)](#) allow dividends as an additional signal (for firm type) prior to the new issue. See also related work of [Miller and Rock \(1985\)](#) and [John and Williams \(1985\)](#).

completely absent in the prediction of Myers and Majluf (1984), are indeed evident.⁷ Cooney and Kalay (1993) point out that the prediction of non-positive announcement effects by the Myers and Majluf (1984) model is a direct result of that model's key assumption that managers only undertake positive NPV projects.⁸ Consistent with the intuition of Cooney and Kalay (1993), our extension of the Myers–Majluf model also predicts positive as well as negative SEO announcement effects. However, unlike Cooney and Kalay (1993), our model imposes a well-defined agency cost structure and is able to show how corporate finance variables explicitly affect both under- and overinvestment and hence firm value, and how to decompose the sources of announcement effects of SEOs. Unlike Ambarish et al. (1987), our model does not simply attribute the negative announcement effects to underinvestment and positive effects to overinvestment.

3. The model

In this section, we develop our new model that extends Myers and Majluf (1984). We begin with some assumptions (Section 3.1), build the model (Section 3.2), and highlight the model's potential ability to tackle some intricate corporate governance issues (Section 3.3).

3.1. Assumptions

Assumption 1

Managers maximize insiders' wealth, which includes both the market value of insider equity holdings (cash flow rights)—i.e., insider share ownership as percentage of all shares outstanding (before the new issue), w , times firm value—and private benefits, c , which arise in new investments. c is the dollar amount of the project's present value that is obtained by the insiders. Unlike outside investors, managers/controllers/shareholders or insiders are able to pursue their self-interested goals (at the expense of outside shareholders). Note that insiders are treated in this paper as a single party that exclusively obtains the value of c ; how insiders share in private benefits is not a concern in our model. The assumption we introduce at the beginning is fundamentally different from the original assumption in Myers and Majluf (1984), where the managers maximize existing (passive) shareholders' wealth. The remaining assumptions are either the same as in Myers and Majluf (1984) or slightly revised to keep compatible with Assumption 1.

Assumption 2

It is public knowledge that the firm has both assets-in-place and an investment opportunity that requires investment, I . In general, the firm has financial slack, S . Thus,

⁷ The literature has documented positive announcement effects for SEOs in international markets like in Japan, the UK and Hong Kong, as well as for private placement everywhere (see a review in Wu and Wang, 2003).

⁸ Myers and Majluf (1984) also acknowledge this restriction in their footnote 12.

the firm needs to issue equity, $E=I-S$, to finance the new investment when $S<I$. The new issue targets only new investors. The firm is entirely equity-financed. Debt financing is not considered.

Assumption 3

There are three dates: $t=-1$, 0 and +1. At time $t=-1$, both the insiders and the market know the joint distribution of the assets-in-place, A , and the NPV of the investment opportunity, B (characterized by their means, \bar{A} and \bar{B} , and standard deviations, σ_A and σ_B). At time $t=0$, the insiders receive private information about the realizations of A and B (a and b , respectively) while the market does not receive this information until $t=+1$. At time $t=0$, the firm makes and discloses the decision: either issue new equity to invest or do nothing. However, the information asymmetries about A and B still take effect.

Assumption 4

Negative values for A are ruled out. The market anticipates that the insiders may accept a project with a negative NPV because the new project gives rise to an opportunity for private benefits. As a result, B may take a negative value. There is no correlation between A and B .

Assumption 5

There are no taxes and transaction costs. Explicit agency costs in the form of private benefits of control are allowed (as mentioned in Assumption 1). Both the insiders and the market know the size of private benefits of control.

Assumption 6

The risk-free rate of return is equal to zero. All agents are risk-neutral. The firm's stock price is efficiently determined (conditional on all public information available).

3.2. The model

At time $t=0$, if managers/control shareholders tell the market that the firm will issue equity to invest, the expected value to the insiders is $[wP_{is}/(P_{is}+E)](a+b+E+S-c)+c$, where P_{is} is the market value of the firm at the time of the announcement. The first part of the expected value is the fraction of the firm's value (conditional on the equity issue) that the insiders are entitled to; the second part is their private benefits. Note that the private benefits appear in the first part as costs to the firm borne by all shareholders, but outside shareholders will have no share in the private benefits. This is a direct result of Assumption 1.

The managers/controlling shareholders may pass up the new investment. In this case, their wealth is $w(a+S)$. The managers/controlling shareholders will prefer to issue equity and invest if

$$w(a+S) \leq \frac{wP_{is}}{P_{is}+E}(a+b+E+S-c)+c. \quad (1)$$

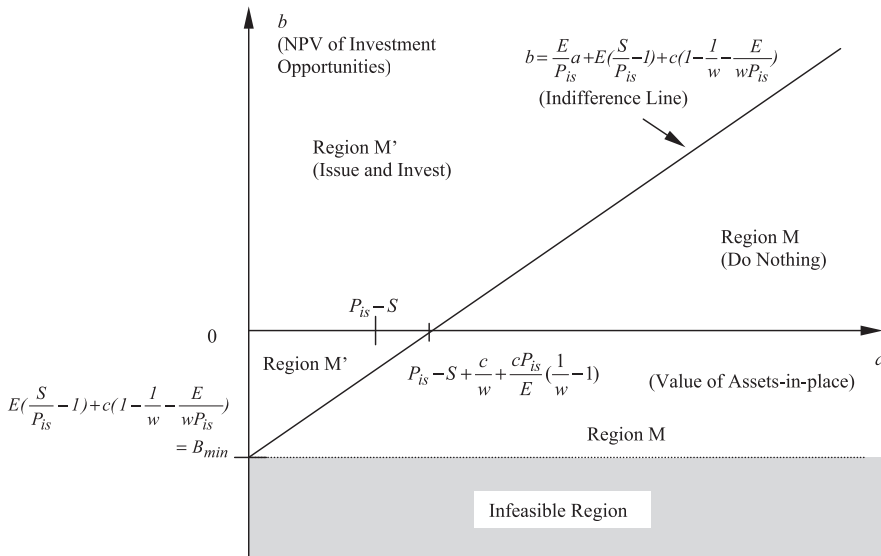


Fig. 1. A firm’s issue-invest decisions under asymmetric information between the market and the firm’s informed insiders who have insider ownership (in percentage), w , and obtain private benefits ($c > 0$) from new investments.

The decision of whether to issue/invest or not depends on the insiders’ private information (a, b) . Condition (1) has the borderline (indifference line),

$$b = \frac{E}{P_{is}}a + E\left(\frac{S}{P_{is}} - 1\right) + c\left(1 - \frac{1}{w} - \frac{E}{wP_{is}}\right). \tag{2}$$

Fig. 1 depicts all the decision-making scenarios for the managers/controllers shareholders. When (a, b) lies in region M' , condition (1) is met and the firm issues to invest. Note that, in our model, even for some negative NPV projects (i.e., negative values for b), the firm may still issue to invest. This is more likely to happen when a is lower. On the other hand, when (a, b) falls in region M , the firm will do nothing. Note that region M is truncated somewhere near the bottom. Because A is truncated at zero, the minimal value for a non-trivial value for B , according to the indifference line (2), is $B_{min} = E(S/P_{is} - 1) + c(1 - 1/w - E/(wP_{is}))$. Below this a project can be treated as unlikely. The firm is definitely not interested in such a project and consideration of it does not help disclose any new information at time $t=0$.

Unlike the original underinvestment model of Myers and Majluf (1984), our model predicts that the firm will overinvest as well as underinvest.⁹ As shown in Fig. 2, when $(a,$

⁹ Cooney and Kalay (1993) also modified the Myers and Majluf (1984) framework to consider overinvestment. Because of a lack of clear agency cost structure in their analysis, the region of issuing to invest when $b < 0$ (the case of overinvestment) is not clearly defined in their analysis. See Appendix A for a more detailed discussion.

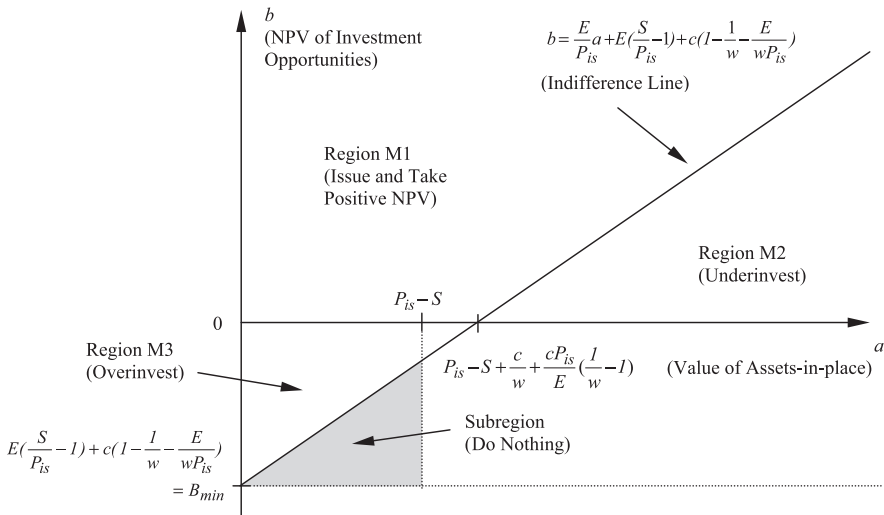


Fig. 2. Expected under- and overinvestment for a firm’s issue-invest decisions under asymmetric information between the market and the firm’s informed insiders who have insider ownership (in percentage), w , and obtain private benefits ($c > 0$) from new investments.

b) lies in region $M2$, the firm underinvests. In contrast, when (a, b) falls in region $M3$, the firm overinvests. Thus, due to asymmetric information, the expected loss of firm value comes from market concerns on both under- and overinvestment, not just on one or the other. Note that our model can still generate rich predictions when either asymmetric information about growth or asymmetric information about assets-in-place is assumed away (see Appendix A).

Another interesting implication of allowing the acceptable NPV of the new investment, B , to be negative is that the stock price will not always drop at the announcement of the new issue, as pointed out by Myers and Majluf (1984) in their 12th footnote and emphasized by Cooney and Kalay (1993). To understand this, we have to show (backwards) the equilibrium prices at $t = -1$ and 0.

At time $t = 0$, the market will update its estimate of the firm’s value conditional on new information. If the firm issues to invest, the equilibrium firm value is

$$P_{is} = \bar{A}(M') + \bar{B}(M') + S - c, \tag{3}$$

where $\bar{A}(M')$ and $\bar{B}(M')$ are the expected values of A and B conditional on region M' , as shown in Fig. 1. In contrast, if the firm does nothing, the firm value becomes

$$P_{no} = \bar{A}(M) + S, \tag{4}$$

where $\bar{A}(M)$ is the expected value of A conditional on region M . Note that in this case there is no new investment.

At time $t=-1$, the market will evaluate all the scenarios for time $t=0$ and reach the equilibrium firm value

$$P_b = \bar{A}(M' + M) + [\bar{B}(M') - c]\pi + S, \tag{5}$$

where $\bar{A}(M'+M)$ is the expected value of A conditional on both regions M' and M , and π is the probability that (a, b) is in region M' (issue and invest). In effect, we have $P_b = \pi P_{is} + (1-\pi)P_{no}$ and $\bar{A}(M'+M) = \pi \bar{A}(M') + (1-\pi)\bar{A}(M)$.

As P_b is the weighted average between P_{is} and P_{no} with a positive weight of π , it is clear that $P_{is} > P_b$ if and only if $P_{is} > P_{no}$. Thus, from Eqs. (3) and (4), the firm value jumps upon the announcement of the firm’s decision to issue and invest when

$$P_{is} - S > \bar{A}(M), \tag{6}$$

and drops when

$$P_{is} - S < \bar{A}(M). \tag{7}$$

Note that, in Myers and Majluf (1984), condition (6) is ruled out because any (a, b) that falls in region M (do nothing) has an assets-in-place value a that is higher than $P_{is} - S$ (since b cannot be negative). In our setting, condition (6) holds if the joint distribution of (A, B) conditional on M (do nothing) concentrates sufficiently on the subregion as indicated by the shaded right triangle below the indifference line in Fig. 2. This suggests that issuers that have a low, less noisy assets-in-place value but whose new project’s NPV has a large standard deviation are likely to produce positive announcement effects.

To understand further why issuing firms’ stock prices can jump as well as drop at the time new issues are announced, we decompose announcement effects as follows. Let $P_{is} - P_b$ be any SEO announcement effect, which can be viewed as consisting of the information effect from existing assets and the information effect from new projects (net private benefits), that is,

$$P_{is} - P_b = \left\{ \bar{A}(M') - \bar{A}(M' + M) \right\} \quad (\text{information about } A) \\ + \left\{ [\bar{B}(M') - c] - [\bar{B}(M') - c]\pi \right\} \quad (\text{information about } B - c). \tag{8}$$

Upon the announcement of new issues, the new information about the assets-in-place reflects the revision in the market’s estimate of the assets-in-place from $\bar{A}(M'+M)$ to $\bar{A}(M')$ while the new information about investment opportunities reflects the revision in the market’s estimate of the NPV of new projects subtracting private benefits from $[\bar{B}(M') - c]\pi$ to $[\bar{B}(M') - c]$. Note that the joint probability distribution of A and B (even if A and B are not correlated) influences both the estimates of assets-in-place and investment opportunities, so that these estimates are not really independent.

In Myers and Majluf (1984), because B is assumed to be truncated at zero, we have the conditions $\bar{A}(M') \leq \bar{A}(M'+M) \leq \bar{A}(M)$, meaning that the expected value of assets-in-place conditional on a decision to issue cannot be higher than the expected value of assets-in-

Table 1
Decomposition of announcement effect of an SEO

Scenario	(A) Information effect about A	(B) Information effect about $B-c$	(A)+(B)	Announcement effect
(1)	+	+	+	+
(2)	+	–	+	+
(3)	+	–	–	–
(4)	–	+	–	–
(5)	–	+	+	+
(6)	–	–	–	–

This table shows six scenarios where the announcement effect (A)+(B) of equity financing is decomposed into two underlying information effects, from assets-in-place (A) and from new investment (B).

place conditional on a decision to do nothing. In other words, the issuers are expected to be firms with lower rather than higher values of assets-in-place. Thus, given this unique separation, the information effect from the assets-in-place cannot be positive. Further more, although the information effect from investment opportunities (where $c=0$) is always positive, the negative information about assets-in-place always overwhelms the positive information about the new investment because condition (7) is always satisfied in Myers and Majluf (1984).

Our generalized model, however, produces richer predictions. The model also accommodates negative values of b . Thus, $\bar{B}(M')$ can be negative. Even if $\bar{B}(M')>0$, $\bar{B}(M')-c$ can still be negative since $c>0$. Also, $\bar{A}(M')\leq\bar{A}(M'+M)\leq\bar{A}(M)$ may not always hold. Thus, the announcement effect is open to all possible scenarios, as shown in Table 1. For negative announcement effects, scenario (4) in Table 1 is consistent with the prediction by Myers and Majluf (1984) and scenario (6) (but not scenario (3) for the reason that the information effect about A is positive) is consistent with the prediction by Jung et al. (1996). We can even observe positive information about assets-in-place and negative information about new projects (subtracting private benefits). For an issuing firm's stock price to jump, one positive information effect must outweigh a negative information effect, or both information effects must be positive. These are cases that satisfy condition (6), where the expected value of the assets-in-place conditional on doing nothing, $\bar{A}(M)$, is low. Thus, a positive announcement effect reflects either an undervaluation of existing assets, good news about investment opportunities, or both.¹⁰

All in all, the two information effects jointly produce an announcement effect. In our model, if both information effects are positive or if the positive one overwhelms the negative one, an issuing firm's stock price jumps. Otherwise the stock price drops. This happens also in a scenario (i.e., a negative information effect from new investment) not predicted by the original Myers and Majluf model. In the next subsection, we discuss our model's ability to address some corporate governance issues.

¹⁰ A positive announcement effect reflects an undervaluation of existing assets only when A and B are highly positively correlated (with a high volatility of B at the same time). Otherwise, a pair of, say, big a and not very big b is likely to occur and falls in region M . This makes $\bar{A}(M)$ become bigger, easily violating condition (6).

3.3. Corporate governance in terms of private benefits and insider ownership

Private benefits of control give rise to corporate governance concerns. In our model, because of SEO share dilutions, the misalignment of insiders' interests versus outside investors' interests always occurs in the presence of private benefits of control.

Even when the fraction of the exiting shares held by the managers/controlling shareholders, w , approaches unity, there is still a possibility of overinvestment and our model does not converge to the original Myers and Majluf model. Graphically, our indifference line shifts from the original one by c (i.e., setting $w=1$ in Eq. (2)) and region $M3$ in Fig. 2 will not disappear. The expected loss of value here due to overinvestment comes from the fact that the private benefits are the costs to the firm that have to be borne by all shareholders, but outside shareholders take no part of the private benefits obtained by the insiders. The market rationally incorporates this inauspicious situation into the firm value.

On the other hand, when w becomes small enough, condition (1) may always hold. This means that the firm may always issue to invest, being unable to disclose any new information at $t=0$. Likewise, if c is very large, condition (1) may always hold as well. Of course, each of the two extreme scenarios may be unlikely: a small w is hardly compatible with controlling power while it is not easy for managers to conceal a large c without facing a legal challenge. Non-extreme cases are possibly more realistic. In order to address in depth related corporate governance issues, using the model we developed above we can explicitly show how private benefits and insider ownership affect both under- and overinvestment and hence firm value.

In the next section, we turn to simulations of various equilibrium predictions that cannot be explained easily in terms of Figs. 1 and 2.

4. Numerical experiments for equilibrium predictions

In this section, we discuss the expected loss in firm value due to under- and overinvestment (Section 4.1), the firm valuation effects of the two corporate governance variables (private benefits and insider ownership) (Section 4.2), and the determinants of announcement returns of new equity issues (Section 4.3). We start by describing how to implement the simulation procedure.

The firm value, P_{is} , which is conditional on the firm's decision to issue and invest at $t=0$, is determined in equilibrium. P_{is} depends on the joint probability distribution of (A, B) and is a crucial variable of the indifference line in Eq. (2). Although no analytical solution is available, we can resort to a simulation procedure as suggested by Myers and Majluf (1984) as follows.¹¹

¹¹ In our simulations that follow in this section, we encounter few multiple solutions or convergence problems in the iterations. The Myers–Majluf simulation procedure turns out to be very effective. There are 10,000 runs in each simulation.

Given E , S , c , w and a joint probability distribution of (A, B) —assumed to be normally distributed in the simulations that follow—set the initial value to be $P_{is} = \bar{A} + \bar{B} + S - c$:

- (1) solve for regions M' and M using the indifference line (2);
- (2) calculate a new trial value according to Eq. (3), $P_{is} = \bar{A}(M') + \bar{B}(M') + S - c$;
- (3) continue steps (2) and (3) until P_{is} converges. Note that regions $M2$ (underinvestment) and $M3$ (overinvestment) in Fig. 2 are also jointly determined in equilibrium.

4.1. Expected loss in firm value due to under- and overinvestment

The Myers–Majluf adverse-selection model predicts that the firm may pass up good investment opportunities by doing nothing. This happens with probability $F(M2)$. Thus, the ex ante loss of firm value is $LU = F(M2)\bar{B}(M2)$. Our model predicts not only underinvestment but also overinvestment. In our model, overinvestment occurs with probability $F(M3)$. Thus, the ensuing ex ante loss of firm value is $LO = F(M3)\bar{B}(M3)$, which is negative.

Table 2 illustrates, under various scenarios, the magnitudes and probabilities (Prob.) of the ex ante losses of firm value, LU and LO, due to the firm's under- and overinvestment respectively. For ease of comparison, LU and LO are scaled by $F(M1+M2)\bar{B}(M1+M2)$, which is the expected value added when the firm is to issue and invest whenever good investment opportunities come by. Thus, LU and LO are expressed as percentages. We keep parameter values the same in each panel, unless a particular parameter is under investigation. In the simulations, we assume $E=50$, $\bar{A}=100$, $\bar{B}=10$, $\sigma_A=50$, $\sigma_B=10$ (standard deviations of A and B , respectively, truncated accordingly as indicated in Fig. 1), $c=5$ (half the unconditionally expected NPV of the new project as given) and insider ownership, $w=0.51$ (a majority controlling voting power), and $S=0$ (so $I=50$) except in Panel D.

As a Myers–Majluf framework emphasizes information asymmetries, Panel A of Table 2 reports how the uncertainties about assets-in-place influence under- and overinvestment. We let σ_A vary from 10 to 100 while keeping other parameter values constant. It turns out that increasing σ_A aggravates the underinvestment problem but alleviates the overinvestment problem. As the experiment shows, when $\sigma_A=10$, we have $LU=0.00\%$ and $LO=-5.35\%$, when $\sigma_A=100$, LU reaches 74.0% but LO drops (in absolute size) to -1.2% . Thus, more uncertainties about assets-in-place deter the firm from undertaking even a good project because the adverse information effect of overvaluation is too costly for the not very overvalued firm. This is one of the main insights in Myers and Majluf (1984). Conversely, smaller information asymmetry about assets-in-place mitigates the Myers–Majluf underinvestment problem but invites a new adverse effect, overinvestment.

In Panel B of Table 2, we examine how the expected NPV of investment opportunities influences under- and overinvestment. Though we leave out the details here for space reasons, we find that high (low) NPVs of investment opportunities in terms of high (low) \bar{B} tend to mitigate (aggravate) both under- and overinvestment. This means that if there are two opposing agency costs from under- and overinvestment (such as the two costs of managerial discretion in Stulz (1990)), the counter effects will be highly pronounced for

Table 2
Expected loss in firm value due to under- and overinvestment

		LU	Prob.	LO	Prob.
<i>Panel A: under/overinvestment and uncertainty over assets-in-place</i>					
<i>($\bar{A}=100, E=50, \bar{B}=10, \sigma_B=10, c=5, w=0.51, S=0$)</i>					
σ_A	10	0.00	0.02	-5.35	14.01
	25	2.40	4.14	-4.30	11.00
	50	32.09	31.47	-2.70	6.31
	75	65.91	57.30	-1.64	3.54
	100	74.01	63.30	-1.17	2.69
<i>Panel B: under/overinvestment and expected NPV of new project</i>					
<i>($\bar{A}=100, \sigma_A=50, E=50, \sigma_B=10, c=5, w=0.51, S=0$)</i>					
\bar{B}	5	73.83	53.31	-3.27	4.31
	10	29.50	30.11	-2.56	6.39
	25	2.31	3.52	-0.05	0.38
	50	0.01	0.01	0.00	0.00
	75	0.00	0.00	0.00	0.00
<i>Panel C: under/overinvestment and new issue/investment scale</i>					
<i>($\bar{A}=100, \sigma_A=50, \bar{B}=10, \sigma_B=10, c=5, w=0.51, S=0$)</i>					
$E=I$	5	0.01	0.01	-2.29	9.40
	10	0.10	0.53	-2.72	9.34
	25	4.83	7.81	-3.10	8.48
	50	31.12	31.03	-2.53	6.12
	75	63.15	55.50	-1.55	3.61
100	73.04	63.01	-1.17	2.67	
<i>Panel D: under/overinvestment and financial slack</i>					
<i>($\bar{A}=100, \sigma_A=50, I=50, \bar{B}=10, \sigma_B=10, c=5, w=0.51$)</i>					
S	1	26.17	27.06	-3.01	6.77
	5	19.18	21.17	-3.17	7.34
	15	6.94	9.99	-3.40	8.23
	25	1.83	3.91	-3.22	8.82
	35	0.22	0.87	-2.77	9.11
	45	0.00	0.00	-2.02	9.47

This table reports simulated expected losses of firm value at $t=-1$ due to under- (LU) and overinvestment (LO), along with their occurring probabilities (Prob.). Underinvestment happens with probability $F(M2)$. The ensuing ex ante loss of firm value is $LU=F(M2)\bar{B}(M2)$. Overinvestment occurs with probability $F(M3)$. The ex ante loss of firm value is $LO=F(M3)\bar{B}(M3)$, which is shown as being negative (see Fig. 2). For ease of comparison, LU and LO are scaled by $F(M1+M2)\bar{B}(M1+M2)$, which is the expected value added as if the firm were to issue and invest whenever there are good investments; hence, these are given as percentages. The value of assets-in-place A and the NPV of investment opportunities B are jointly normally distributed with zero correlation. Parameters when fixed are shown right below the title of each panel. \bar{A} , \bar{B} , σ_A and σ_B are means and standard deviations of assets-in-place and the NPV of investment opportunities respectively. Other parameter values include new issue size, $E (=I-S)$, investment scale, I , financial slack, S , private benefit, c , and insider ownership, w (in percentage). We let σ_A , \bar{B} , E (or I) and S vary in Panels A, B, C and D, respectively, to examine their effects on under- and overinvestment. The number of simulation runs is 10,000. The simulated probability distributions are truncated at $A>0$ and $B>B_{\min}$ (i.e., the critical value of NPV, below which the firm will never launch a new project). This information is available to the market before the firm reveals whether or not it will issue to invest at $t=0$.

low growth firms but weak for high growth firms. Our theoretical analysis here lends direct support to the view by [McConnell and Servaes \(1995\)](#).

In Panel C, we let the issue/investment size, E or I (since $S=0$ here), vary from 5 to 100. The results show that the underinvestment problem significantly worsens when E increases. For example, LU and the corresponding probability remain very small when $E=5$ but reach 73.04% and 63.01% respectively when $E=100$. On the other hand, there seems to be a small hump in the pattern for LO despite the monotonic decrease in the probability from 9.40 to 2.67 when E increases from 5 to 100 (the negative sign for the value of LO means that overinvestment destroys value).

The hump means that the overinvestment problem is alleviated only when E is either small or large. When E is small, the expected profitability (or \bar{B}/E) of the new project is high so that both under- and overinvestment problems remain small. When E is large, the expected profitability becomes so low that the firm is most likely to forego the new project—a situation in which the overinvestment problem seems to be contained due to the outweighing dilution effect on insiders' equity interest. The main message here is that the issue/investment size affects overinvestment in a non-linear way.

Another insight from the Myers–Majluf model is that financial slack, S , is valuable because it can help alleviate the underinvestment problem. Panel D of [Table 2](#) shows that this is just one phenomenon. When S increases from 1 to 45 (or equivalently with E decreasing from 49 to 5, given $I=50$), LU falls from 26.17% to 0, and the probability falls from 27.06% to 0. At the same time, with increasing probability, LO becomes more negative, falling from -3.01% to -3.40% , when LU is reduced from 26.17% to 6.94%. Thus, more financial slack can aggravate overinvestment, leading to a negative effect. When S increases, however, LO has a hump in the middle of the S range. When financial slack is very large, increasing towards 45, in absolute terms LO actually decreases to -2.02 . Nevertheless, while S is very large, over- rather than underinvestment is the factor that reduces firm value. The message here is that while more financial slack alleviates underinvestment, it invites overinvestment.

[Table 3](#) shows that the opposing effects of financial slack on under- and overinvestment can produce an optimal firm value for an interior amount of financial slack. For example, as shown in Panel A of [Table 3](#) ($c=5$), with insider ownership of 25%, a moderate amount of financial slack equal to 15 (and 25—by chance) gives the optimal firm value of 107.79, a bordered number. Likewise, as shown in Panel B ($c=10$), an interior optimality occurs for $S=5$ and $w=0.5$. Note that the values of firms with smaller private benefits (Panel A) are always higher than those with larger private benefits (Panel B). This shows that the value effects of private benefits are direct and drastic. Nevertheless, controlling for c and w , our analytical results on S are consistent with the static tradeoff views on cash holdings in [Kim et al. \(1998\)](#) and [Opler et al. \(1999\)](#). Our results are also consistent with the prediction by [Stulz \(1990\)](#), who argues that when cash flows are high, managers tend to overinvest, and when cash flows are low, managers tend to underinvest. Unlike [Stulz \(1990\)](#), however, our model is able to accommodate [Myers and Majluf's \(1984\)](#) insight of the positive effect of financial slack, and [Jensen's \(1986\)](#) adverse effect of free cash flow on investment in an explicit asymmetric information framework in which the managerial self-discipline is to some extent imposed by insider ownership (see the literature review in [Section 2](#)).

Table 3
Effects of financial slack on under- and overinvestment, and firm value

S	w=0.1			w=0.25			w=0.5			w=0.75		
	LU	LO	P_b-S	LU	LO	P_b-S	LU	LO	P_b-S	LU	LO	P_b-S
<i>Panel A: under/overinvestment and firm value (c=5)</i>												
1	0.00	-7.75	107.52	5.35	-5.66	107.66	27.69	-2.85	106.92	48.51	-1.70	105.80
5	0.00	-7.77	107.51	3.26	-5.79	107.75	21.04	-3.04	107.31	37.00	-1.94	106.55
10	0.00	-7.77	107.51	1.67	-5.98	107.79	13.99	-3.20	107.73	25.37	-2.15	107.29
15	0.00	-7.77	107.51	0.69	-6.17	107.79	8.25	-3.28	108.05	17.25	-2.22	107.79
25	0.00	-7.77	107.51	0.05	-6.46	107.74	2.02	-3.36	108.32	5.39	-2.17	108.49
45	0.00	-7.77	107.51	0.00	-6.78	107.67	0.00	-2.40	108.43	0.01	-0.53	109.25
<i>Panel B: under/overinvestment and firm value (c=10)</i>												
1	0.00	-7.60	102.06	0.38	-7.25	102.16	13.99	-4.42	102.97	44.18	-2.23	103.13
5	0.00	-7.60	102.06	0.21	-7.34	102.13	9.76	-4.57	102.99	34.05	-2.44	103.33
10	0.00	-7.60	102.06	0.06	-7.40	102.11	5.73	-4.77	102.95	22.38	-2.70	103.55
15	0.00	-7.60	102.06	0.01	-7.45	102.09	2.83	-4.94	102.88	13.63	-2.86	103.63
25	0.00	-7.60	102.06	0.00	-7.57	102.07	0.54	-5.21	102.70	3.70	-2.80	103.63
45	0.00	-7.60	102.06	0.00	-7.60	102.06	0.00	-5.25	102.48	0.00	-1.37	103.60

This table reports simulated expected losses of firm value due to under- (LU) and overinvestment (LO) as well as firm value (P_b) at $t=-1$ in relation to financial slack (S). To adjust for initial endowments of financial slack, we use P_b-S for comparable firm valuations. Constant parameter values are $\bar{A}=100$, $\bar{B}=10$, $\sigma_A=50$, $\sigma_B=10$, $I=50$. Others vary as shown in the table, with $c=5$ in Panel A and with $c=10$ in Panel B. Also w takes a value of 0.1, 0.25, 0.50 and 0.75, respectively. The bordered numbers highlight the highest firm values for a range of S in various scenarios. The simulations are run in the same way as in Table 2. See also the notes there for the description of probability distributions and the definitions of parameters.

Taken together, the results of this section show how exactly under- and overinvestment jointly affect firm value under the influence of a range of corporate finance variables. Factors such as the uncertainties about assets-in-place, investment/issue size, and financial slack each have opposing effects on under- and overinvestment, whereas corporate growth opportunities help alleviate and solve both the under- and overinvestment problems simultaneously.¹²

4.2. The valuation effects of corporate governance in terms of c and w

Private benefits of control and insider ownership are two important variables considered in corporate governance research. In this section, we examine how private benefits of control, c , and the fraction of existing shares held by the insiders, w , affect corporate investment decisions as characterized by under- and overinvestment, and hence impact on the expected firm value. First, we look at the effects of one variable given the

¹² We also consider positive (0.25) and negative (-0.25) correlations of A and B in the simulations for this section as well as in Sections 4.2–4.3 below. The results (available on request) are not qualitatively changed.

other. Then, we analyze the overall firm valuation optimality with respect to various sets of (c, w) combinations.

Table 4 reports the results of numerical experiments. For consistency, parameter values in each panel of Table 4, unless varying under investigation, are the same as those in Table 2. Panel A shows the results for various levels of c given $w=0.51$. Private benefits, deemed to be a control variable to the insiders, remain largely unverifiable. However, this

Table 4
Effects of c and w on under- and overinvestment, and firm value

Panel A: Under/overinvestment and firm value in relation to private benefits
 $\bar{A} = 100, \sigma_A = 50, \bar{B} = 10, \sigma_B = 10, E = 50, w = 0.51$

c	LU	Prob.	LO	Prob.	Firm value
0.1	54.59	51.15	-1.45	3.31	108.10
1	49.78	47.17	-1.70	3.82	108.22
5	31.72	31.88	-2.85	6.32	107.53
10	15.82	16.91	-4.10	9.17	104.39
15	8.16	9.13	-5.33	11.52	99.73
25	2.20	2.65	-6.78	14.08	89.27

Panel B: Under/overinvestment and firm value in relation to insider ownership
 $\bar{A} = 100, \sigma_A = 50, \bar{B} = 10, \sigma_B = 10, E = 50, c = 5$

w	LU	Prob.	LO	Prob.	Firm value
0.05	0.00	0.00	-7.79	15.92	108.20
0.1	0.00	0.02	-7.77	15.86	108.21
0.25	5.19	6.67	-5.64	12.37	108.39
0.35	14.57	15.94	-3.96	9.14	108.18
0.51	33.90	33.23	-2.44	5.78	107.31
0.75	50.39	46.90	-1.59	3.76	106.41

Panel C: Firm valuation optimality under various c and w combinations
 $\bar{A} = 100, \sigma_A = 50, \bar{B} = 10, \sigma_B = 10, E = 50, E = 50$

c	$w=0.05$	$w=0.1$	$w=0.25$	$w=0.35$	$w=0.50$	$w=0.75$	Max	Min	Max-Min	
Strong law	0.1	108.48	107.61	107.11	107.08	107.00	107.00	108.48	107.00	1.49
	1	112.08	111.26	108.66	108.00	107.26	106.79	112.08	106.79	5.29
	5	108.14	108.15	108.27	108.05	107.34	105.86	108.27	105.86	2.41
Weak law	10	103.14	103.14	103.27	103.57	104.10	104.14	104.14	103.14	1.00
	15	98.14	98.14	98.16	98.41	99.44	101.73	101.73	98.14	3.58
	25	88.14	88.14	88.14	88.17	89.03	94.98	94.98	88.14	6.84
Max	112.08	111.26	108.66	108.05	107.34	107.00	112.08	107.00		
Min	88.14	88.14	88.14	88.17	89.03	94.98	94.98	88.14		
Max-Min	23.94	23.12	20.52	19.87	18.30	12.02				

This table reports effects of private benefits, c , (Panel A) and insider ownership, w , (Panel B) on simulated expected losses of firm value due to under- and overinvestment, and the firm value at $t=-1$, as well as the firm valuation under various c and w combinations (Panel C). Financial slack, S , is set at zero. Other constant parameter values are shown below individual panel titles. The bordered numbers highlight the highest firm values for the range of c or w shown in the table. In Panel C, smaller c values (0.1, 1 and 5) correspond to strong law enforcement while larger c values (10, 15 and 25) reflect weak law enforcement. The dash-line bordered numbers highlight the value optimality for various c and w combinations: all combinations, under strong law enforcement, under weak law enforcement, and under the assumption that c and w are highly negatively correlated (the group of shaded numbers). The simulations are run in the same way as in Table 2. See also the notes there for the description of probability distributions and the definitions of parameters.

uncertainty over private benefits is less important in our analyses as long as one accepts that the market anticipates private benefits but outside shareholders cannot do anything about them. On the other hand, private benefits should be subject to some exogenous restrictions due to managerial reputation as well as the degree of law enforcement. For one thing, large losses in firm value due to the adverse effects of large private benefits inevitably tarnish insiders' reputations. As a result, insiders may restrain themselves from taking large private benefits. In this sense, private benefits have endogenous consequences. Interestingly, as our experiments in Panel A show, increasing c from 0.1 to 25 reduces LU from 54.59% to 2.20% but aggravates LO from -1.45% to -6.78% . While it is understandable that the overinvestment problem is worsened with an increase in private benefits, the favorable impact of the increase in private benefits on underinvestment is rather striking.

The fact that this positive effect on underinvestment can offset part of the overinvestment problem suggests that the managers/controllers' choice of a particular amount of private benefits may lead to an optimal firm value. Indeed, Panel A also unveils the existence of such an interior optimum. When $c=1$, which is a non-extreme (or interior) number, the expected firm value reaches its highest value at 108.22.

The other popular corporate governance variable we examine, insider ownership w , like c also shows the opposing effects on under- and overinvestment. In Panel B of Table 4, given $c=5$, when w increases from 0.05 to 0.75 (or 75%), LU increases from nil to 50.39%, but LO improves from -7.79% to -1.59% . Thus, a closer incentive-alignment between insiders and outside shareholders aggravates the underinvestment problem but does ameliorate the overinvestment problem. The two opposing effects can give rise to an optimal ownership structure. As shown in Panel B, when $w=0.25$, the expected firm value peaks at 108.39 in our example.

Panel C of Table 4 reports results from a whole set of (c, w) combinations. To start, the results show that given w , an optimal firm value, as indicated by a bordered number in row Max, occurs for an interior amount of private benefits at almost all levels of w . This reconfirms one of the main insights of our model: some amounts of private benefits are better than no private benefits because private benefits help alleviate underinvestment. In contrast, while an optimal firm value of 108.27 does occur for an interior level of insider ownership $w=0.35$ with $c=5$, optimal firm values given c are in many cases reached at the two extreme levels of insider ownership we show—reflecting either its incentive-alignment effect or its adverse effect on underinvestment dominates.

It is notable that the firm value effects of w demonstrate a clear reversal for small versus large private benefits, as shown in Panel C of Table 4. When c is small, a lower level of insider ownership tends to produce higher firm value. But when c is large, the reverse is observed (for example, for $c=0.1$, 108.48 at $w=0.05$ versus 107.00 at $w=0.75$, whereas for $c=15$, 98.14 at $w=0.05$ versus 101.73 at $w=0.75$). The reason is that when c is small, the private-benefit-induced overinvestment becomes contained. As a result, a lower level of insider ownership tends to substantially alleviate underinvestment, since the adverse effect of w on underinvestment (which tends to overwhelm the alignment effect when w is higher) is a major concern in this situation. In contrast, when private benefits become larger, the market's concern over underinvestment tends to diminish. As a result, the incentive-alignment effect of insider ownership is more likely to dominate.

The analyses above focus on a partial optimality of firm value (conditional on c or w). What about an overall optimality? In all (c , w) combinations shown in Panel C of Table 4, the overall optimal firm value, as indicated by one of the dash-line bordered numbers, is reached at $c=1$ and $w=0.05$. This means that if firm-value-conscious insiders can freely choose c and w , they should choose a relatively small amount of private benefits and a lower level of insider ownership in order to maximize the firm value. This seems to be a corner solution in terms of insider ownership.

In reality, however, the insiders may not be able to choose c and w freely. In many countries around the world, weak law enforcement facilitates insiders' expropriation from outside investors but controlling shareholders have to keep a lock on control by keeping large share holdings, as suggested by the rent-protection theory of Bebchuk (1999). On the other hand, strong law enforcement with reputable legal infrastructure, such as in the Anglo-American economies, prevents insiders from expropriating from outside investors to the extent possible in an economy operating under a weak legal system (Bebchuk, 1999; La Porta et al., 1999).

Considering these constraints, our results can shed further light on the overall optimality issue. As shown in Panel C of Table 4, assuming that a strong legal system caps c at 5, the finding that the optimal firm value is reached at the low end of insider ownership (i.e., 112.08 at $w=0.05$) is in line with the observation that a typical listed U.S. firm has a dispersed ownership structure. Yet this does not invalidate the alignment effect of insider ownership in principle. The finding that a higher level of insider ownership given capped c leads to a lower firm value simply reflects the market's primary concern over the deteriorating underinvestment problem with an increase in insider ownership, as already explicitly shown in Panel B. In other words, with expropriation constrained (or c capped), while the self-interest of insiders has a limited impact on firm value, a decrease in insider ownership can substantially alleviate the underinvestment problem, as we have already argued above. The resulting value improvement, as shown in column Max–Min, occurs by 5.29 at maximum (from $w=0.75$ to $w=0.05$) for c 's capped at 5. The main point here is that the adverse effect of insider ownership on underinvestment is so pronounced as to confound the incentive-alignment effect when private benefits are small.

Of course, when private benefits are large, the market's concern over both the direct erosion of firm value and the induced-overinvestment tends to dominate. As shown in the bottom half of Panel C, under a weak legal system (i.e., c reaching 10 and above), an increase in c always reduces firm value but an increase in w improves firm value. As a result, in contrast with the strong legal system scenario, we observe the opposite corner solution—namely, the optimal firm value of 104.14, dash-line bordered, is reached at $w=0.75$, the highest level of insider ownership we show. This is consistent with the view in the literature that in countries with weak law enforcement where controlling shareholders are able to obtain large private benefits, firms usually have concentrated ownership structures. Our results, however, emphasize that expropriation may not be rampant because insider ownership does have a strong alignment effect here.

One would argue that even under a weak legal system, the firm-value-conscious insiders who keep large share holdings can maximize firm value by taking as small private benefits as possible, as shown in Panel C (for example at $w=0.75$, 107.00 for $c=0.1$ instead of 104.14 for $c=10$). We have two lines of defense against this argument. First, as

suggested by the rent-protection theory, the more private-benefits-oriented controlling shareholders are willing to pay a premium to takeover the firm, crowding out the more firm-value-conscious controlling shareholders.

Second, it is difficult to know how firm-value-conscious the insiders can be, or how much firm value the insiders are willing to trade against private benefits for their reputation. We take c as given in the model because c is a complicated function of insiders' reputation and conscience (these vary widely between individuals and hence are less tractable in modeling).

Yet c has endogenous implications in our model. Denote the c -induced variation in firm value (controlling for w) to be the max–min difference in firm value given w . As shown in Panel C of Table 4, the c -induced value variation is the largest at the lowest insider ownership and the smallest at the highest level of insider ownership (i.e. 23.94 at $w=0.05$ and 12.02 at $w=0.75$, as shown in row Max–Min). This suggests that firm value at a high level of insider ownership is less sensitive to considerable variations in private benefits due to the strong alignment effect for self discipline. Given that a lower level of insider ownership is not sustainable under a weak legal system, it seems that controlling shareholders in concentrated ownership structures can reap considerable private benefits with a relatively muted adverse effect on firm value. This means that insiders tend to choose considerable private benefits anyway in concentrated ownership structures.

The above analyses ignore any correlation between c and w . Private benefits in different firms that have the same level of insider ownership are deemed to vary due to various insiders' reputations and conscience as well as complex contracting environments. But it is generally true that a higher level of insider ownership tends to correspond to a smaller amount of private benefits because the incentive for the insiders to obtain private benefits is reduced when gaps between the cash flow rights and the control rights become smaller. As shown in Panel C of Table 4, this negative correlation between c and w can be considered to limit the feasibility of (c, w) combinations, as represented by the shaded numbers (from the bottom left corner to the top right corner). As a result, the optimal firm value of 108.05, dash-line bordered, is reached at $c=5$ and $w=0.35$ —an interior solution.¹³

The results in this section provide clear evidence that both private benefits and ownership structures matter in corporate governance. Albeit constrained in various scenarios, as the market expects, they are deemed to be decision variables for insiders in determining the firm's optimal value. The existing literature about the effects of corporate ownership structure on firm value especially emphasizes the tradeoff between good and bad elements of corporate governance practices. For example, Morck et al. (1988), Stulz (1988) and McConnell and Servaes (1990) distinguish between positive incentive effects and negative control (entrenchment) effects of higher managerial ownership; La Porta et al. (2000) model the direct tradeoff between private benefits and costs (penalties for obtaining private benefits). Our analysis, however, shows that the good elements of corporate governance alone, such as higher incentives (insider ownership) or lower private

¹³ Some well-known companies in markets with concentrated ownership structures happen to have controlling ownership around 35%. For example, the Hong Kong tycoon, Mr. Li Ka Shing, owns 37% of Cheung Kong, the parent holding company of Li's corporate empire.

benefits, can even aggravate the underinvestment problem, an important adverse effect under asymmetric information.

In our model, the insight into the effects of these corporate governance variables on valuation stems from the fundamental tradeoff between the under- and overinvestment problems caused by market imperfections. Aggarwal and Samwick (1999) also consider such a tradeoff but they have to assume private benefits for overinvestment and private costs for underinvestment. In contrast, although underinvestment in our setting is caused by asymmetric information rather than managerial shirking, only (positive) private benefits alone are needed in a Myers–Majluf framework as described in this paper to tell the two stories. More importantly, our prediction is unambiguous: as long as private benefits exist, corporate governance in terms of private benefits and insider ownership has valuation effects and can lead to an optimal ownership structure.

Our results also shed new light on the recent debate regarding the optimal insider ownership structure. A recent paper by Demsetz and Villalonga (2001), among others, emphasizes an endogenous variable approach to insider ownership structures that predicts no systematic relationship between the level of insider ownership and firm value. As a result, the once well-received literature in support of a non-linear relationship between insider ownership and firm performance such as in Morck et al. (1988) has become controversial. This very relationship has also been challenged by Himmelberg et al. (1999), who argue that the unobservable heterogeneity in the firms' contracting environments must plague the finding of an optimal ownership structure. Unlike previous studies in the literature, our analytical results are directly based on corporate governance effects on investment inefficiencies to reveal the outcomes of corporate governance in relation to firm value, and hence are largely free from this line of criticism.

Another unsolved issue in the literature is about the different conclusions based on empirical evidence on the alignment effects of insider ownership in dispersed versus concentrated ownership structures. In their recent survey of international corporate governance, one of the main findings of Denis and McConnell (2003) is that while the existing literature about the alignment effects of insider ownership in concentrated ownership structures is largely in agreement, a larger body of research in the context of dispersed ownership structures, typically in the U.S., is inconclusive on this simple alignment effect, as many believe due to the endogeneity problem (see Demsetz and Villalonga, 2001). Although previous studies in the context of concentrated ownership structures may also be subject to the endogeneity problem, our analyses provide a ready explanation: the incentive-alignment effect of insider ownership is largely confounded by the adverse effect of insider ownership on underinvestment in dispersed ownership structures, but it becomes pronounced in concentrated ownership structures where large private benefits substantially diminish the market's concern over underinvestment so that the overinvestment becomes a major problem.

4.3. Determinants of announcement returns of equity financing

In the original Myers–Majluf logic, a firm's decision to issue will predominately convey an overvaluation of the firm's assets-in-place because the NPV of new projects is assumed to be non-negative. If rational managers are expected to accept bad projects as

well, it is possible that the decision to issue and invest may signal good news as well as bad news. The predominant good news, as shown in Table 1, is either an undervaluation of assets-in-place, positive information about new investments, or both. As a result, issuing firms' stock prices may jump in some cases, in contrast with the classic prediction by Myers and Majluf (1984).

What are the factors that influence the announcement returns? Similar to suggestions by Ambarish et al. (1987), Cooney and Kalay (1993) find in their simulations that positive announcement returns are more likely when managers' inside information is derived more from investment opportunities than from assets-in-place. In this section, we provide a further investigation into the underlying effects on the announcement returns.

Table 5 reports the results for firms with a lower expected assets-in-place value, $\bar{A}=5$ (left-hand side of the table), and with a higher such value, $\bar{A}=10$ (right-hand side), respectively. Throughout the table, we set as constant the controlling shareholder's ownership, $w=0.51$ (or 51%) and financial slack, $S=0$, but we allow the issue/investment scale, E , and private benefits, $c=E/10$ (which is tied to E) to vary to some extent. In Panel A, we set as constant the expected NPV of investment opportunities or growth, $\bar{B}=1$, the standard deviation of B , $\sigma_B=1$, but allow standard deviations of A , σ_A , to vary. The relative uncertainties over growth opportunities are measured by $\sigma_B/\sigma_A=1/\sigma_A$ (not explicitly shown in the table).¹⁴ As the table shows, when σ_A increases from 0.50 to 2.25 (so $1/\sigma_A$ decreases), the stock return for $t=-1$ to 0 falls from 1.41% to -0.73% (for $\bar{A}=5$ and $E=1$); when E increases from 1 to 3, the announcement returns decrease but the cross- σ_A return patterns are always preserved. Thus, our numerical experiments confirm the prediction of Cooney and Kalay (1993) that the announcement returns can be positive and in positive relation to σ_B/σ_A within reasonable ranges of issue/investment scales and assets-in-place values.

As shown in our theoretical analysis earlier, according to condition (6), given P_{is} , a small value of $\bar{A}(M)$ is likely to produce a positive announcement return. What is the empirical implication of this? Imagine the following simple case. If the expected value of assets-in-place, both conditional on issuing and on doing nothing (i.e., M' or M), remains low, a positive announcement return is likely when the standard variation of B tends to be high. Note that, as shown in Eq. (3), P_{is} increases with $\bar{B}(M')$ which is positively related to the standard deviation of B when a is likely to fall in the low value range—a scenario where the Myers and Majluf adverse-selection effect remains minimal. This suggests that positive announcement effects are likely to happen to small issuers.

The smaller a firm, the asymmetric information about the firm is more likely to arise from its investment opportunities than from its assets-in-place. Thus, firm size should be a good proxy for σ_B/σ_A . Yet small firm size is only a necessary condition for positive announcement returns. Small firms' good growth prospects with a lot of uncertainty are the key determinant. Indeed, small-growth firms are more likely to issue new equity than value firms are. Thus, it may not be strange at all that small issuers are more likely to have positive announcement returns as already documented in the literature. For example, Kang and Stulz (1996) in Japan and Wu and Wang (2003) in Hong Kong document that SEOs'

¹⁴ For ease of comparison, we follow Cooney and Kalay (1993) to represent the various relative uncertainties about growth by varying only the uncertainties about assets-in-place.

Table 5
Underlying effects on announcement returns

	$\bar{A}=5$			$\bar{A}=10$			
	$E=1.00$	$E=2.00$	$E=3.00$	$E=1.00$	$E=2.00$	$E=3.00$	
<i>Panel A: announcement return (%) and relative uncertainty over growth ($\bar{B}=1.00, \sigma_B=1.00, c=E/10, w=0.51$)</i>							
σ_A	0.50	1.41	0.73	0.23	0.96	0.64	0.33
	0.75	1.26	0.54	0.07	0.92	0.58	0.26
	1.00	1.06	0.29	-0.21	0.83	0.48	0.17
	1.25	0.83	-0.08	-0.66	0.74	0.35	0.00
	1.50	0.49	-0.59	-1.33	0.62	0.16	-0.22
	1.75	0.15	-1.15	-2.23	0.49	-0.07	-0.45
	2.00	-0.28	-1.93	-3.38	0.31	-0.35	-0.78
	2.25	-0.73	-2.80	-4.57	0.15	-0.63	-1.19
<i>Panel B: announcement return (%) and expected growth ($\sigma_A=1.00, \sigma_B=1.00, c=E/10, w=0.51$)</i>							
\bar{B}	-2.00	-7.24	-27.82	-45.25	-1.05	-5.65	-10.10
	-1.00	-1.37	-10.08	-19.63	0.60	-1.84	-4.85
	0.00	1.22	-1.59	-4.60	1.42	0.27	-0.86
	1.00	1.10	0.24	-0.19	0.93	0.41	0.12
	2.00	0.16	0.05	0.00	0.17	0.06	0.02
	3.00	0.00	0.00	0.00	0.01	0.01	0.00
	4.00	0.00	0.00	0.00	0.00	0.00	0.00
	5.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Panel C: announcement return (%) and expected growth with uncertainty in tandem ($\sigma_A=1.00, c=E/10, w=0.51$)</i>							
$\bar{B}=\sigma_B$	0.50	-0.28	-1.17	-1.33	0.12	-0.20	-0.34
	1.25	1.41	0.73	0.21	1.02	0.79	0.37
	2.00	1.63	1.59	0.99	1.28	1.34	1.02
	2.75	1.51	1.97	1.44	1.24	1.58	1.45
	3.50	1.21	1.96	1.62	1.18	1.66	1.68
	4.25	1.67	1.82	1.73	1.15	1.72	1.74
	5.00	0.97	1.73	1.77	1.06	1.65	1.80
	5.75	0.92	1.63	1.69	0.92	1.63	1.76

This table reports simulated SEO announcement returns in relation to relative uncertainty over the expected NPV of new investment or growth (Panel A), to the expected growth (Panel B) and to the expected growth opportunities and uncertainties varying in tandem (Panel C). Throughout the table, we also use two different expected assets-in-place values, $\bar{A}=5$, (in the left half of the table), or $\bar{A}=10$, (right half), each under various issue/investment scales. We also keep insider ownership, $w=0.51$ (or 51 percent), constant but allow the private benefits, $c=E/10$ (which is tied to E), to vary. The announcement return is measured as the percentage change in firm values from $t=-1$ to 0. In Panel A, with expected growth $\bar{B}=1$ and growth uncertainties $\sigma_B=1$, we let the standard deviation of A , σ_A to vary. The relative uncertainty over growth opportunities is actually $\sigma_B/\sigma_A=1/\sigma_A$ (not explicitly shown). In Panel B, we let the expected growth vary. In Panel C, we impose the restriction of $\bar{B}=\sigma_B$ so as to allow the expected growth and uncertainty to vary in tandem. The relative expected growth is actually \bar{B}/\bar{A} (not explicitly shown, with the growth uncertainty being constant in Panel B and with the uncertainty changing in tandem in Panel C). Financial slack, S , is set at zero. The simulation is run exactly the same way as in Table 2.

average announcement returns are significantly positive and the announcement returns are significantly *negatively* related to firm size.

Since smaller issuers are seemingly fraught with more asymmetric information such that their stock prices should drop more at the announcement of new issues according to the Myers–Majluf model, Kang and Stulz (1996) view their evidence as puzzling.

Similarly, Fama and French (2002) document that less levered small-growth firms favor new equity and conclude that this perplexing phenomenon is not consistent with the pecking order model of Myers (1984). Our generalized Myers–Majluf framework, however, provides a resolution to this puzzle. Small-growth firms can anticipate and enjoy the positive announcement effects of new issues, as severely asymmetric information about these firms is likely to arise from investment opportunities rather than from assets-in-place. Thus, asymmetric information in general may not necessarily be a disadvantage in issuing new equity.

There are also other widely used proxies, such as market value over book value, commonly measured by the level of expected NPV of investment opportunities or growth (relative to book value). In Panel B of Table 5, in order to measure the expected growth relative to the value of assets-in-place by \bar{B}/\bar{A} (not explicitly shown in the table), we let the expected growth, \bar{B} , vary from -2 to 5 , while keeping constant the standard deviation of B , $\sigma_B=1$, and the parameters of assets-in-place as in Panel A. It turns out that when the expected growth is negative (i.e., expected overinvestment), the announcement returns are most likely to be negative; also they are worse for lower assets-in-place values (left-hand side of the table) and for larger issue/investment scales ($E=1-3$). For example, when $\bar{B}=-2$, the announcement returns with $E=1$ and 2 , respectively, are -7.24% and -27.82% for $\bar{A}=5$ but are -1.05% and -5.65% for $\bar{A}=10$. Clearly, the realization of bad investment makes new issues convey predominantly bad news (the issuing probability, π , changes from less than one at $t=-1$ to unity at $t=0$). In contrast, when the expected growth turns out to be positive, we observe announcement returns increasing and even becoming positive. The reason for this is that when the expected growth is higher, the good news about the new investment tends to overwhelm the adverse information effect from the assets-in-place, if any. Interestingly, when the expected growth becomes highly positive, for example, when \bar{B} reaches 4 and 5 , the announcement returns descend to zero. In our example, the information content of the new issue approaches zero because the market has already expected that the new investment's NPV is so high that no firm is likely to pass up such a good investment. As a result, the positive information about the very good investment becomes much weaker and hence can be easily offset by any adverse information effect from the assets-in-place.¹⁵

The pattern of announcement returns is not in monotonic relation to the expected growth as shown in Panel B of Table 5. This non-monotonic pattern is the manifestation of all possible scenarios. First, the negative returns can reflect the confirmation of an agency problem that managers/controlling shareholders may make a decision that can destroy the firm's value for the sake of their own private benefits. Jung et al. (1996) find evidence in support of the overinvestment-driven agency problem argument. They show that firms with poor investment opportunities that should otherwise issue debt experience an extremely significant drop in stock prices in response to their new equity issues. However, this does not necessarily contradict the adverse selection argument of Myers and Majluf

¹⁵ In the corner solution case of no asymmetric information about assets-in-place as discussed in Appendix A, even if the expected growth is very high, the condition in Eq. (9) may not be satisfied, or the decision to issue and invest remains slightly uncertain. However, the positive announcement effect diminishes if the information effect from growth becomes weaker, which is a situation with very high expected growth.

(1984). As we have shown, when asymmetric information about assets-in-place predominates, negative announcement returns also occur and become worse with an increase in this asymmetric information. Second, the zero announcement returns coincide with the extreme case in Myers and Majluf (1984) where the positive information effect about good investments disappears along with the adverse information effect from assets-in-place. However, the mechanism to reach the possibly zero announcement returns in our setting is different. Here, both adverse information from assets-in-place and the positive information effect from good investments tend to remain, but one is offset by the other. Finally, our model can accommodate positive announcement returns depending on how the two information effects about assets-in-place and investment opportunities jointly influence the announcement returns of the new issues.

One would argue that fixing the growth uncertainties in Panel B of Table 5 might not be practical. In reality, great growth opportunities tend to be linked to high uncertainties. To capture this, we impose the restriction, $\bar{B} = \sigma_B$, while measuring the expected growth relative to expected assets-in-place by \bar{B}/\bar{A} (not explicitly shown in the table). In Panel C of Table 5, when both the growth opportunities and uncertainties increase in tandem, the announcement returns first increase, peak and then start to decrease. Thus, the non-monotonic pattern of the announcement returns in relation to the expected growth is still evident. Compared with the results in Panel B, however, the announcement returns here are higher. The marginal positive effects on announcement returns stem from the increasing growth uncertainties as seen in Panel A. Strikingly, the marginal positive effects of the growth uncertainties are so powerful that the information content of the new investment in the new issue can still be substantial for the issuing firms with very high expected growth.

In a nutshell, our model in an explicit asymmetric information framework with an agency cost structure imposed reconciles major SEO models in predicting announcement effects.¹⁶ We demonstrate that there is a non-monotonic pattern of the announcement returns in relation to expected growth, and that asymmetric information about growth (relative to assets-in-place) rather than expected growth per se critically determines the signs of an announcement effect. We also show that small-growth firms are likely to enjoy the positive announcement effects of new equity issues.¹⁷ The new insight from our model helps rationally explain the puzzle regarding the pecking order in financing for small-growth firms documented in the literature.

¹⁶ Our results here are based on $w=0.51$ as an example for firms with concentrated ownership structures. A lower insider ownership, however, is common in firms with dispersed ownership structures such as in the U.S. We hence recomputed all the results in this section using $w=0.10$ instead of $w=0.51$. It turns out that there is no qualitative change in the new results (available on request).

¹⁷ There is a concern over cheating in the market when small-growth firms have an advantage in issuing new equity. We argue that this advantage cannot come by repeatedly for a particular issuer. When the firm initially issues new equity, both its assets-in-place value and the uncertainties over it increase—a situation that makes the adverse selection effect stronger and hence positive announcement returns less likely. As a result, it will endogenously diminish the firm's new issue advantage in subsequent new issues. Thus, growth firms can anticipate and enjoy the new issue advantage mainly in the early stage of their life cycle. The model of Ambarish et al. (1987) can also produce positive announcement returns. For a viable market to accommodate firms with the new issue advantage in equilibrium, they rule out cheating based on issuers' reputations using a repeated game argument.

5. Conclusions

We introduce an agency cost structure based on private benefits of control to extend the original asymmetric information framework of Myers and Majluf (1984). The managers/controlling shareholders in our generalized model maximize their own wealth, which includes the value of insider equity holdings and private benefits of control. The model generates many interesting new predictions. The major results are as follows.

(1) Under information asymmetries and agency conflicts as specified in this paper, the model shows how some important firm characteristics each affect under- and overinvestment simultaneously. A decrease in uncertainty over assets-in-place (the source of adverse selection) ameliorates the underinvestment problem but aggravates the overinvestment problem; an increase in firm growth opportunity tends to mitigate both the under- and overinvestment problems; an increase in issue/investment size (given NPV) makes the issuing decision less likely and aggravates underinvestment but non-linearly affects overinvestment which becomes worst only for a medium-sized issue/investment; more financial slack helps overcome the underinvestment problem but gives rise to market concerns on overinvestment, possibly producing an optimal firm value for an interior amount of financial slack.

(2) Like most corporate finance variables, both private benefits and insider ownership have opposing effects on under- and overinvestment. An increase in private benefits is more likely to prod managers to undertake negative NPV projects but tends to dispel market concerns on underinvestment. Likewise, an increase in insider ownership mitigates overinvestment—the incentive-alignment effect—but aggravates underinvestment—the Myers–Majluf adverse-selection effect. These opposing effects may produce an interior optimal firm value.

(3) If one accepts that a strong legal system caps private benefits, the incentive-alignment effect of insider ownership tends to be overwhelmed by the adverse effect of insider ownership on underinvestment, producing an optimal firm value at a low level of insider ownership. If one accepts that a weak legal system allows large private benefits, the alignment effect of insider ownership becomes pronounced because large private benefits alone diminish concerns over underinvestment. As a result, a high level of insider ownership unambiguously leads to an optimal firm value. The value effect reversal of insider ownership under small versus large private benefits is consistent with the empirically documented relationships between firm value and insider ownership in dispersed versus concentrated ownership structures around the world (Denis and McConnell, 2003).

(4) Our model predicts positive as well as negative announcement effects of SEOs. If assets-in-place are likely to have a low value—diminishing the adverse selection effect—and if the market expects growth prospects but with many uncertainties, new equity issues are likely to convey good news. This prediction, however, is ruled out in the original Myers and Majluf (1984) framework, because their pre-announcement stock price is too high due to their truncation of negative NPVs of new investments. While this prediction is similar to that reached by Cooney and Kalay (1993), our analysis not only resolves the incentive compatibility problem but also explicitly decomposes the sources of announcement returns, producing a non-monotonic relationship between announcement returns and expected growth.

(5) The justification for possibly positive announcement effects of equity issues produces a generalized version of the Myers' (1984) pecking order in financing. When uncertainties over firm value come primarily from assets-in-place—the source of adverse selection as reaffirmed by Myers (2002)—the adverse selection effect dominates and the classic Myers pecking order holds; conversely, when asymmetric information comes mainly from growth rather than assets-in-place, the adverse selection discount in equity issues tends to disappear and even to be reversed. This suggests that stock price volatilities may not necessarily discourage new equity issues. Recent corporate finance literature has drawn a lot of attention to the popular argument of managerial timing in response to the market mispricing in new equity issues (Baker and Wurgler, 2002). In contrast, this research suggests that some of new equity issues that are well-received by the market can be rationally explained.

In conclusion, this paper substantially enriches the Myers–Majluf asymmetric information framework in explaining many important issues in corporate finance and governance.

Acknowledgements

The authors wish to thank Chun Chang, David Denis (the Editor), Stephen Ching, Narasimhan Jegadeesh, Lawrence Khoo, Jay Ritter, Piet Sercu, Sheridan Titman, John Wei and an anonymous referee for helpful comments and suggestions. Wu gratefully acknowledges financial support from the City University of Hong Kong (DAG project no. 7100242).

Appendix A. Some peripheral issues about the model

In this appendix, we discuss some corner solutions (Section A.1) and show how an agency cost based on private benefits of control makes more economic sense than transaction costs in enriching the original Myers and Majluf framework (Section A.2).

A.1. No asymmetric information about assets-in-place or about growth opportunities

In general, asymmetric information arises from assets-in-place as well as from investment opportunities. If there is no asymmetric information about the assets-in-place, the equilibrium firm value at $t=0$ becomes $P_{is}=S+a+\bar{B}(M')-c$, and condition (1) becomes

$$E \frac{a + S - \frac{c}{w}}{a + \bar{B}(M') + S - c} \leq E + b + c \left(\frac{1}{w} - 1 \right). \quad (9)$$

Note that when b as well as $\bar{B}(M')$ are non-negative and $c=0$, condition (9) is always satisfied. This is exactly the situation in Myers and Majluf (1984) where firms always issue to invest. In our setting, however, since b and hence $\bar{B}(M')$ may take negative values,

the decision to issue is not a sure thing. Thus, the announcement effect in this extreme case is driven purely by information about the investment opportunities, and whether the effect is positive or negative depends on condition (6) or (7).

On the other hand, if there is no asymmetric information about investment opportunities, the equilibrium firm value becomes $P_{is}=S+a+\bar{A}(M')+b-c$, and condition (1) takes the form

$$E \frac{a + S - \frac{c}{w}}{\bar{A}(M') + b + S - c} \leq E + b + c \left(\frac{1}{w} - 1 \right). \quad (10)$$

When $b+c(1/w-1)=0$, condition (10) is reduced to $a \leq \bar{A}(M')$. This is a typical situation of Akerlof's (1970) market breakdown, as discussed by Myers and Majluf (1984), that firms will not issue except when $a=a_{\min}$, which is the minimum value of A (known to the market). Otherwise, the decision to issue always has information content. Thus, if there is no asymmetric information about either assets-in-place or investment opportunities, in our setting new issues do not as easily degenerate into the no-information-content situation as those in Myers and Majluf (1984).

A.2. Private benefits versus transaction costs

In Myers and Majluf (1984) and in Cooney and Kalay (1993), the indifference line that separates the issue-and-invest region from the do-nothing region intercepts at $P_{is}-S$ on the a -axis. In contrast, our indifference line shifts to the right by $c/w+(cP_{is}/E)(1/w-1)$, which is positive, due to positive private benefits, c , as shown in Figs. 1 and 2. If c falls to zero, our indifference line converges to theirs as a special case of Eq. (2). Note that because managers/controlling shareholders have no incentives to undertake any negative NPV projects when $c=0$, consistent with incentive compatibility as argued by Myers and Majluf, the distribution of B should be truncated at zero.

Myers and Majluf (1984) suggest that issuing costs can, indeed, turn a slightly positive NPV project into an acceptable negative one. Cooney and Kalay (1993) recapture this idea as one of their arguments to produce the prediction of possible positive announcement effects. Myers and Majluf show that the indifference line in this case takes the form

$$b + E = \frac{E + T}{P_{is}} (S + a), \quad (11)$$

where T is the issuing costs. Note that the issuing costs cannot be easily assumed away by treating b as an after-cost NPV (as in the case of ordinary project expenses) because there is an additional dilution effect so that more shares have to be issued to build up enough before-cost proceeds. However, the after-cost NPV of the new investment is $b-T$, which can be negative and is truncated at $-T$, because b always remains non-negative in Myers and Majluf (1984).

What does the overinvestment region look like in this case? Without loss of insight, ignore the effects of T on the slope and the intercept of Eq. (11) and consider the after-cost

b. It turns out that the region is not the whole region of *M3* as in Fig. 2, but it is limited to the top part of region *M3* truncated at a horizontal line parallel to the *a*-axis at $-T$ on the after-cost *b*-axis. Clearly, this overinvestment region depends very much on the magnitude of the transaction costs. In contrast, our model just needs to assume a small value for *c* to make valid the whole overinvestment region as shown by region *M3* in Fig. 2 (by considering even the original *b*). Thus, private benefits have a greater say than transaction costs in explaining overinvestment.

References

- Aggarwal, R.K., Samwick, A.A., 1999. Empire-builders and shirkers: investment, firm performance, and managerial incentives. NBER Working Paper, No. 7335.
- Akerlof, G.A., 1970. The market for 'lemons': quality and the market mechanism. *Quarterly Journal of Economics* 84, 488–500.
- Ambarish, R., John, K., Williams, J., 1987. Efficient signaling with dividends and investments. *Journal of Finance* 42, 321–344.
- Asquith, P., Mullins, D., 1986. Equity issues and stock price dilution. *Journal of Financial Economics* 15, 61–90.
- Baker, M., Wurgler, J., 2002. Market timing and capital structure. *Journal of Finance* 57, 1–32.
- Barclay, M., Holderness, C., 1989. Private benefits from control of public corporations. *Journal of Financial Economics* 25, 371–395.
- Barclay, M., Holderness, C., Sheehan, D., 2001. The block pricing puzzle. Working Paper, No. FR 01-05, Simon Graduate School of Business Administration, University of Rochester.
- Bebchuk, L., 1999. A rent-protection theory of corporate ownership and control. NBER Working Paper, No. 7203.
- Cooney, J., Kalay, A., 1993. Positive information from equity issue announcements. *Journal of Financial Economics* 33, 149–172.
- Daniel, K., Titman, S., 1995. Financing investment under asymmetric information. In: Jarrow, R.A., Ziemba, W.T., Maksimovic, V. (Eds.), *Finance, Handbooks in Operational Research and Management Science*, vol. 9. North-Holland, Amsterdam, pp. 721–766.
- DeAngelo, H., DeAngelo, L., 1985. Managerial ownership of voting rights. *Journal of Financial Economics* 14, 33–69.
- Demsetz, H., Villalonga, B., 2001. Ownership structure and corporate performance. *Journal of Corporate Finance* 7, 209–233.
- Denis, D., 1994. Investment opportunities and the market reaction to equity offerings. *Journal of Financial and Quantitative Analysis* 29, 159–177.
- Denis, D.K., McConnell, J., 2003. International corporate governance. *Journal of Financial and Quantitative Analysis* 38, 1–36.
- Dybvig, P., Zender, J., 1991. Capital structure and dividend irrelevance with asymmetric information. *Review of Financial Studies* 4 (1), 201–221.
- Eckbo, B., Masulis, R., 1995. Seasoned equity offerings: a survey. In: Jarrow, R.A., Ziemba, W.T., Maksimovic, V. (Eds.), *The Finance Handbook*, vol. 9. North-Holland, Amsterdam, pp. 1017–1072.
- Fama, E., French, K., 2002. Testing trade-off and pecking order predictions about dividends and debt. *Review of Financial Studies* 15 (1), 1–33.
- Grossman, S., Hart, O., 1988. One share-one vote and the market for corporate control. *Journal of Financial Economics* 20, 175–202.
- Harris, M., Raviv, A., 1988. Corporate governance: voting rights and majority rules. *Journal of Financial Economics* 20, 203–235.
- Himmelberg, C.P., Hubbard, R.G., Palia, D., 1999. Understanding the determinants of managerial ownership and the link between ownership and performance. *Journal of Financial Economics* 53, 353–383.
- Jensen, M., 1986. Agency costs of free-cash-flow, corporate finance, and takeovers. *American Economic Review* 76, 323–329.

- Jensen, M., Meckling, W.H., 1976. Theory of the firm: managerial behavior, agency costs and ownership structure. *Journal of Financial Economics* 3, 305–360.
- John, K., Williams, J., 1985. Dividends, dilution and taxes: a signaling equilibrium. *Journal of Finance* 40, 1053–1070.
- Jung, K., Kim, Y., Stulz, R., 1996. Timing, investment opportunities, managerial discretion, and the security issue decision. *Journal of Financial Economics* 42, 159–185.
- Kang, J., Stulz, R., 1996. How different is Japanese corporate finance? An investigation of the information content of new security issues. *Review of Financial Studies* 9 (1), 109–139.
- Kim, C., Mauer, D., Sherman, A., 1998. The determinants of corporate liquidity: theory and evidence. *Journal of Financial and Quantitative Analysis* 33, 335–359.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., 1999. Corporate ownership around the world. *Journal of Finance* 55, 471–517.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R., 2000. Investor protection and corporate governance. *Journal of Financial Economics* 58, 3–28.
- Lease, R.C., McConnell, J., Mikkelsen, W.H., 1983. The market value of control in publicly-traded corporations. *Journal of Financial Economics* 11, 439–471.
- Leff, N., 1964. Economic development through bureaucratic corruption. *American Behavioral Scientist* 8, 8–14.
- Masulis, R., Korwar, A., 1986. Seasoned equity offerings: an empirical investigation. *Journal of Financial Economics* 15, 91–118.
- McConnell, J., Servaes, H., 1990. Additional evidence on equity ownership and corporate value. *Journal of Financial Economics* 27, 595–612.
- McConnell, J., Servaes, H., 1995. Equity ownership and the two faces of debt. *Journal of Financial Economics* 39, 131–157.
- Miller, M., Rock, K., 1985. Dividend policy under asymmetric information. *Journal of Finance* 40, 1031–1052.
- Morck, R., Shleifer, A., Vishny, R., 1988. Management ownership and market valuation: an empirical analysis. *Journal of Financial Economics* 20, 293–315.
- Myers, S., 1977. Determinants of corporate borrowing. *Journal of Financial Economics* 5, 147–175.
- Myers, S., 1984. The capital structure puzzle. *Journal of Finance* 39, 575–592.
- Myers, S., 2000. Outside equity. *Journal of Finance* 55, 1005–1037.
- Myers, S., 2002. Financing of corporations. In: Stulz, R. (Ed.), *Handbook of the Economics of Finance*. In press.
- Myers, S., Majluf, N., 1984. Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics* 13, 187–221.
- Opler, T., Pinkowitz, L., Stulz, R., Williamson, R., 1999. The determinants and implications of corporate cash holdings. *Journal of Financial Economics* 52, 3–46.
- Pilote, E., 1992. Growth opportunities and the stock price response to new financing. *Journal of Business* 65, 371–394.
- Shleifer, A., Vishny, R.W., 1997. A survey of corporate governance. *Journal of Finance* 52, 737–783.
- Smith, C., 1986. Investment banking and the capital acquisition process. *Journal of Financial Economics* 15, 3–29.
- Stulz, R., 1988. Managerial control of voting rights: financing policies and the market for corporate control. *Journal of Financial Economics* 20, 25–54.
- Stulz, R., 1990. Managerial discretion and optimal financing policies. *Journal of Financial Economics* 26, 3–27.
- Wu, X., Wang, Z., 2003. Understanding the positive announcement effects of private equity placement: new insights from Hong Kong data. Working Paper. Department of Economics and Finance, City University of Hong Kong.
- Wu, X., Wang, Z., 2004. Private benefits of control and the choice of seasoned equity flotation methods. Working Paper. Department of Economics and Finance, City University of Hong Kong.
- Zingales, L., 1994. The value of the voting right: a study of the Milan Stock Exchange experience. *Review of Financial Studies* 7 (1), 125–148.