Ehrhardt, Olaf; Lahr, Henry

Working Paper

Uncertain private benefits and the decision to go public

CEFS working paper series, No. 2008-02

Provided in cooperation with:
Technische Universität München

Working Paper No. 2008-02

Uncertain Private Benefits and the Decision to Go Public

OLAF EHRHARDT
HENRY LAHR

WORKING PAPER SERIES

Center for Entrepreneurial and Financial Studies

TECHNISCHE UNIVERSITÄT MÜNCHEN

Uncertain Private Benefits and the Decision to Go Public

Olaf Ehrhardt*, Henry Lahr†

First draft: Feb 15, 2006
This draft: December 19, 2007

Abstract: This paper focuses on the decision to go public when both seller and potential buyers have private benefits of control. The basic model by Zingales (1995) is extended to account for uncertainty of private benefits. This leads to new implications for the sales process, ownership structure, measurement of private benefits and the efficiency of takeover regimes. The optimal way to sell the company differs from the model with perfect information in that the incumbent always choses to go public instead of selling directly to a potential rival whenever the rival is expected to increase cash flow but not necessarily total firm value. IPO price and volume are lower than under perfect information which induces a socially non-optimal solution in takeover transactions. Imperfect information also explains post-IPO underperformance of firms which are not subject to control transfers. To compensate shareholders for potential losses during the sales process, the offering price has to be lower than under perfect information. This provides the basis for a differential stock price performance depending on the buyer taking over or not. Furthermore, an overestimation bias exists in prior estimates of control premiums, because some firms going public are never sold but nevertheless provide private benefits. Finally, mandatory tender offers in the form of a fair price rule and an equal opportunity rule are discussed, which indicate that the social superiority of either rule is strongly dependent on the empirical distribution characteristics of private benefits.

Keywords: initial public offerings (IPOs), corporate control, private benefits, long-run performance, mandatory bid

JEL classification: G14, G32, G34

*Fachhochschule Stralsund, Germany, email: olaf.ehrhardt@fh-stralsund.de

†Center for Entrepreneurial and Financial Studies, Technische Universität München, Germany, email: henry.lahr@cefs.de

1 Introduction

The decision to list has been widely studied and several causes to go public have been identified, such as need for funding, liquidity benefits, enhanced company image and publicity, improved motivation of management and employees, cashing in or exploiting mispricings (Röell, 1996). This paper focuses on the corporate control dimension of initial public offerings (IPOs) within an extended divestiture process when both buyer and seller have private benefits of control. Several formal models have been developed to explain why IPOs might be an attractive component of initial owners' divestiture efforts. Zingales (1995) suggests that firms use two-stage sales to maximize total proceeds by relying on the capital market to auction off cash flow rights and the market for corporate control to negotiate the sale of the private benefits of control. Bebchuk (1999) argues that when private benefits of control are large, retaining a majority of votes enables initial shareholders to capture a larger fraction of the surplus from value-producing transfers of control. Therefore, the probability of controlling shareholder structures, such as dual-class stock, is likely to increase with higher private benefits. Mello and Parsons (1998) emphasize the information an owner obtains by going public regarding the value of the firm, and Ellingsen and Rydqvist (1997) develop a model focusing on the screening function of the stock market for firms undergoing divestiture. At and Morand (2000) develop a model for privatizations of government firms. They find that one share-one vote structures are optimal for allocating control rights to the most efficient buyer. However, this structure is not always optimal for maximizing the sale's revenue.

The model developed in this paper is based on the one by Zingales (1995) and extends its findings in several directions. The main contribution of this paper is relaxing the assumption that agents have perfect information about the other agents' types. While many authors concerned with ownership structure (Bebchuk, 1999), initial public offerings (Stoughton & Zechner, 1998), and the process of divesting the company (Mello & Parsons, 1998) employ uncertainty of cash flows in their models, our model is designed to shed some light on the consequences of the rival's private benefits of control being unknown at the time of the decision to sell the company. This introduces a selection process for takeovers which could harm minority shareholders and in the course of the sales process leads to a second best solution for the wealth distribution in IPOs and subsequent control transfers.

Since the seminal work by Berle and Means (1932) there has been extensive research on the separation of ownership and control and related agency problems. Diverging interests due to private information emerge between the incumbent manager of the firm who wants to divest his ownership stake and dispersed investors who want to buy shares of that firm, because some rival is able to increase cash flow. Dispersed shareholders only have knowledge about the distribution of the rival's private benefits. Therefore, they must base their decision of how many shares to buy on the incumbent's strategy for possible outcomes of these private benefits. If the shareholders' estimate is too high, the incumbent sells more shares to minority shareholders as would be possible if a subsequent control sale to the rival was to be conducted. The incumbent thus retains majority voting power and higher cash flow is not realized, which leaves shareholders with a loss. To compensate them for losses on the left tail of the distribution of private benefits, the incumbent has to offer shares at the IPO for less than she would under perfect information. Consequently, initial public offerings are priced lower than in Zingales' model, while the incumbent retains a larger fraction of the company. This result has implications for ownership structure and the allocation of cash flow claims and voting rights. The higher private benefits, the more likely are dual-class structures with differential voting rights (see also Grossman and Hart (1988), Harris and Raviv (1989)).

Another interesting feature of uncertain private benefits comes into play after the initial public offering. Conditional on the rival realizing sufficiently high private benefits and thus acquiring the controlling block, share prices increase when control sales are announced or decrease as the probability of a control transfer reaches zero. This explains post-IPO underperformance of stocks which are not subject to control transfers compared to firms that are taken over subsequent to their initial public offering.

This paper endogenously derives a measure for private benefits by estimating control premiums. Private benefits can hardly be measured directly, since otherwise they might be claimed in court by minority shareholders. However, four methods have been suggested to indirectly assess their magnitude. Inferring private benefits by estimating premiums paid in corporate control transactions (Barclay and Holderness (1989), Dyck and Zingales (2004)) and measuring price differences between shares with differential voting rights (Levy (1982), Zingales (1994), Nenova (2003)) are the most widely used methods. Atanasov (2005) employs an approach using mass privatization auction data to estimate private benefits, and Barclay, Holderness, and Pontiff (1993) measure the price paid for closed-end funds against their respective net asset value. Our model provides predictions for control block sales à la Barclay and Holderness and identifies a new bias in prior estimates. This bias results from the fact that firms with low private benefits sometimes go public but are never taken over due to adverse selection under imperfect information. Therefore, substantial private benefits might exist which are never observed, for some control blocks do not change hands.

The importance of initial public offerings within a divestiture plan is becomes more pronounced with uncertain private benefits. Under these more general assumptions, the decision to list becomes independent from private benefits. This paves the way for IPOs even if on average the firm would be less valuable under some rival taking over subsequent to the IPO. The optimal way to sell the company is to first go public with a minority or non-voting fraction of the company and then to sell the voting block to some new owner, dependent on the realisation of this owner's private benefits. An IPO is always preferable to selling directly to some new majority shareholder, if this new owner is expected to generate higher cash flows than the incumbent and the incumbent's bargaining power is not perfect. Because in some cases realised private benefits will be large enough to make a sale viable, uncertainty causes a non-zero probability that the company is sold following an IPO, which attracts minority shareholders to share in the gains from higher cash flows and a more valuable firm. The incumbent thus sells a corresponding fraction of the company to dispersed shareholders, since she can extract their full utility due to perfectly competitive markets for dispersed shares, which she could not do when bargaining directly with the rival.

To explore our model in the light of takeover regulation, mandatory tender offers by rivals acquiring control are introduced in the basic model and in the model with uncertain private benefits.

First, the rival is required to pay a fair price to minority shareholders, measured by some average past share price. Under perfect information as in the basic model, there is a set of possible combinations of IPO price and fraction of the company retained by the incumbent which maximize the incumbent's revenue by extracting the rival's entire surplus. Mandatory bids under uncertain private benefits, however, have no effect on revenues accruing to incumbent or rival compared to our model without such regulations. The incumbent is not able to exploit mandatory bids by extracting the rival's surplus because this would involve setting an IPO price higher than the equilibrium price without mandatory bids, which in turn would only be possible if shareholders receive a compensation for their risk of having paid too much. By offering a consideration that is higher than the IPO price, mandatory bids could force the rival to provide this compensation. If this consideration is measured by an average share price, however, shareholders would have to bid up the price to the optimal level. This is impossible if the market for dispersed shares is competitive, because the last buyers in the market would suffer a loss in the moment the rival makes an offer, since they would always have bid more than the average price.

Second, mandatory bids are combined with an equal opportunity which stipulates that minority shareholders receive the same per-share price as the incumbent in case of a control transfer. Results for a model with perfect information are the same as described before, since there is no difference between a fair price rule and an equal opportunity, because the IPO price is the same as the per-share price paid whenever control is transferred. Adding this same-price rule to our model with uncertain private benefits yields new insights into the social efficiency of either rule. Before deciding how to sell the company, the incumbent anticipates all wealth effects, which makes this model behave very much like a model without takeover regulation. Small differences in optimal IPO price and fraction depending on the empirical distribution of private benefits lead to a change in the probability of control transfers, which in turn determines the optimality of takeover regulation.

The paper proceeds as follows. Section 2 provides a more detailed discussion on private benefits of control, their origins, and methods to measure them. Section 3 describes Zingales' model with perfect information. The assumption of perfect information is relaxed in section 4, which outlines our general model. Implications for the allocation of voting rights, post-IPO share price performance, control premiums, the optimal way to divest the company, and takeover regimes are derived in section 4.

2 Private Benefits

Studies concerning the effects of block ownership on corporate decisions, including E. H. Fama and Jensen (1983), DeAngelo and DeAngelo (1985), Demsetz and Lehn (1985), and Stulz (1988), suggest that managers who own large blocks of stock receive corporate benefits disproportionate to their fractional ownership. Jensen and Meckling (1976) point out that

> These decisions will involve not only the benefits [the manager] derives from pecuniary returns but also the utility generated by various non-pecuniary aspects of his entrepreneurial activities such as the physical appointments of the office, the attractiveness of the secretarial staff, the level of employee discipline, the kind and amount of charitable contributions, personal relations ("love", "respect", etc.) with employees, a larger than optimal computer to play with, purchase of production inputs from friends, etc.

They stress that agency problems arise from the separation of ownership and control such that if the owner-manager sells equity claims on the corporation which are identical to his, agency costs will be generated by the divergence between his interests and those of the outside shareholders. This is because he will bear only a fraction of the costs of any non-pecuniary benefits he takes out to maximize his own utility. Coffee (2001) defines private benefits of control as "all the ways in which those in control of a corporation can siphon off benefits to themselves that are not shared by the other shareholders". Grossman and Hart (1988) distinguish private benefits and security benefits in control contests: "The private benefits of control are the benefits current management of the acquiror obtains for themselves, but that the target securityholders do not obtain" while the "security benefits refer to the *total* market value of the income streams that accrue to the corporation's securityholders." The common feature of all different kinds of private benefits is that "some value, whatever the source, is not shared among all the shareholders in proportion of the shares owned, but it is enjoyed exclusively by the party in control", as Dyck and Zingales (2004) point out. This is the case if a controlling party can appropriate value for himself only when this value is not verifiable (i.e., provable in court).

While Jensen and Meckling emphasize private benefits as being non-pecuniary, Barclay and Holderness (1989) state that "private benefits can be pecuniary, including higher salaries for individual blockholders or below-market transfer prices for corporate blockholders." Barclay et al. (1993) further distinguish direct and indirect pecuniary transfers. Direct transfers could be obtained, for example, by employing relatives or close associates of the blockholder while indirect benefits can arise from using the firms' voting power in its subsidiaries to defeat takeovers or to implement business strategies in these subsidiaries which benefit only blockholders.

Holderness and Sheehan (1988) note that most benefits of control are transferable while some by their nature are not, "in particular, an individual may value being in control of the company he founded, a benefit which obviously cannot be transferred." Transferable private benefits are sold to new blockholders, who are willing to pay a premium for them. Reputation benefits are hardly transferable and thus lead the blockholder to keep control in order to preserve them and engage in rent-seeking activities. This distinction is not drawn by Dyck and Zingales (2004) who categorize private benefits as psychic value, perquisites, and dilution.

Control does not necessarily confer benefits. As Dyck and Zingales (2004) point out, it sometimes involves costs as well. "Maintaining a controlling block, for instance, forces the largest shareholder to be not well diversified. As a result, it might value the controlling block less." The blockholder's large fraction of cash flow rights might involve significant risk-bearing costs and liquidity costs (Admati, Pfleiderer, and Zechner (1994), Bolton and Thadden (1998), Maug (1998)) and it can lead to reduced liquidity and makes the market price a less informative signal of value (Holmström & Tirole, 1993). At the same time, a financially distressed company might inflict a loss in reputation to the controlling party or even legal liabilities. (Dyck & Zingales, 2004). In all models examined in this paper agents are risk-neutral individuals without wealth restrictions as in Zingales' (1995) model. Although most of the reasons for negative private benefits thus do not apply, our model provides general solutions for negative private benefits as well.

3 Basic Model

The models developed in this paper are based on Zingales' (1995) model which focuses on the control issues when going public. The course of this chapter is as follows. First, it is instructive to review Zingales' model and outline its main contributions and predictions. Second, we extent his model, so as to include uncertainty about the buyer's characteristics and legal constraints when selling the company. Finally, policy implications and empirical predictions are derived.

The framework to analyze transfers of control is based on the ideas and nomenclature proposed by Zingales (1995) which are also present in the model by Bebchuk and Zingales (1996).

When selling the company, an incumbent manager, I, who is also owner of the company, has to decide which fraction of the company's stock she offers to dispersed shareholders, S, and which fraction she retains for a subsequent sale to some rival R. There are exactly one incumbent and one rival, while dispersed small shareholders are atomless, that is, the market for minority shares is perfectly competitive, while the market for controlling blocks is not. When the incumbent decides to sell a fraction of his shares to outside shareholders, she receives the expected value of those shares. To the contrary, if she sells a controlling block to an outside investor, she will not be able to extract the whole surplus from this trade but will receive a fraction of the surplus depending on her bargaining power ψ.

The incumbent's valuation of the company consists of two components. The verifiable amount v^i denotes the cash flow accruing to all shareholders measured using some standard metric, i.e. it can be claimed in court. A second component B^i consists of private benefits that only the controlling shareholder receives and which might be observable or not. The rival's valuation is denoted by v^r and B^r, respectively.

It is important to note that private benefits are modelled not to be related to the company's cash flows. It seems reasonable to assume a negative correlation between the extraction of private benefits and the company's bottom line results through direct diversion of funds or distortion of the manager's decisions, but this might not always be the case. We follow the literature (Harris and Raviv (1988), Zingales (1995), Bebchuk (1999) in assuming two independent variables to keep results clear and simple. All agents have perfect information about the other agent's types, behave rational, and are risk neutral. There are no costs of holding a large fraction of shares, which could be motivated either on the basis of risk-aversion costs - as do Bebchuk (1999) and (Admati et al., 1994) - or alternatively on the basis of liquidity costs (Bolton and Thadden (1998), Maug (1998)). In his basic model, Zingales (1995) allows for cash flow rights and voting rights to be freely combined. This is the most general assumption possible, which leads to several interpretations following the different combinations of rights throughout this paper. For example, an IPO might induce an ownership structure which places all of the voting stock in the hands of the incumbent but only a small fraction of the cash flow rights. This can be seen as a dual-class structure, whereas all voting power and all the cash flow rights ending up with the incumbent might be interpreted as a single-class structure.

Finally, the riskless rate is assumed to be zero. Without loss of generality and in line with the models similar to this one, the analysis is limited to those cases with all alternative investments having zero returns.

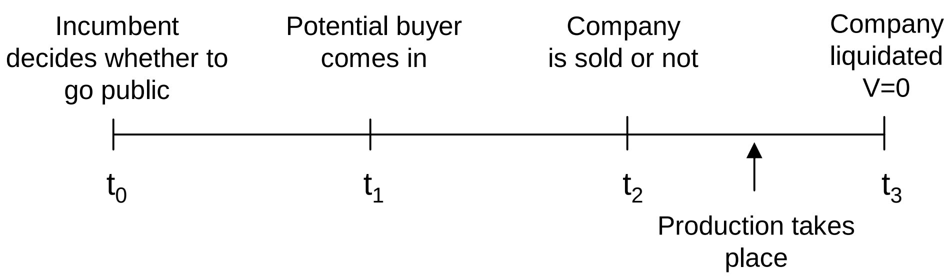

Figure 1: Sequence of events in the basic model

Zingales' model of control sales consists of four phases as depicted in figure 1. At time 0 the incumbent decides whether or not to go public. If she decides to go public, she determines a fraction ϕ of the company she wants to retain after the IPO. At time 1 a potential buyer, the "rival", with a different valuation steps in and his characteristics (i.e. his potential to improve or reduce the company's cash flow and his ability to extract private benefits) are revealed. At time 2 the bargaining between the incumbent and the rival takes place. If the incumbent retains a majority of votes at time 0, the rival can only prevail by negotiating with the incumbent. Bargaining power is modelled by ψ, which denotes the probability that the incumbent makes a take-it-or-leave-it offer which is accepted by the buyer. If the offer is successful, control is transferred to the rival. Otherwise, the negotiation game ends. If the incumbent does not retain a majority of votes, the buyer can attempt to obtain control by buying a majority of votes from dispersed shareholders. Zingales (1995) shows that it never pays for the incumbent to relinquish control, since she always could sell her cash flow rights to dispersed shareholders and could additionally trade his voting power for some positive value which is attached to the control right by the buyer. Since the model is a finite game, it is solved by backward induction.

Time 2 The incumbent sells his stake if the valuation of her stake in the company is less than the rival's valuation of that fraction. This condition yields a limiting value of the post-IPO share ϕ at which the incumbent becomes indifferent of selling the company:

$$B^i + \phi v^i \leq B^r + \phi v^r \tag{1}$$

with B^i and B^i representing the incumbent's and rival's private benefits, v^i and v^r representing the cash flows with the incumbent or rival managing the company and ϕ denoting the incumbent's fraction of the company before time 2.

In Zingales' model, $\phi \geq \frac{B^r - B^i}{v^i - v^r}$ results in the optimal fraction $\phi = 1$, if $v^r \leq v^i$ and

$$\phi = Max\left[Min\left[\frac{B^r - B^i}{v^i - v^r}, 1\right], 0\right], \quad v^r > v^i. \tag{2}$$

Time 1 Since it always pays for the incumbent to retain the majority of votes (because she does not receive any consideration when selling votes to dispersed shareholders), the incumbent's revenue from selling the company is calculated as follows:

$$V = \begin{cases} (1-\psi)(B^i + \phi v^i) + \psi(B^r + \phi v^r) + (1-\phi)v^r & , B^i + \phi v^i \leq B^r + \phi v^r \\ B^i + v^i & , B^i + \phi v^i > B^r + \phi v^r \end{cases} \tag{3}$$

with ψ referring to the bargaining power of I, which determines her share in the proceeds.

Rearranging Zingales' equation yields

$$V = \begin{cases} B^i + \phi v^i + (1-\phi)v^r + \psi(B^r + \phi v^r - B^i - \phi v^i) & , B^i + \phi v^i \leq B^r + \phi v^r \\ B^i + v^i & , B^i + \phi v^i > B^r + \phi v^r \end{cases} \quad (4)$$

which can be interpreted as the reservation utility claimed by the incumbent $(B^i + \phi v^i)$ and her share in the surplus when selling the control block to the rival.

Contingent on ϕ the incumbent carries out an IPO if $v^r > v^i$ and receives a revenue of

$$V = \begin{cases} B^i + v^i + \psi(B^r + v^r - B^i - v^i) & , v^r \leq v^i \\ (1-\psi)B^i + \psi B^r + v^r & , v^r > v^i, B^r > B^i \\ B^r + v^r & , v^r > v^i, B^r \leq B^i \end{cases} . \quad (5)$$

With all agents having perfect information in Zingales' model, it is possible for I to extract the buyer's whole private benefits if these are less than those of the incumbent[1].

4 Model with Uncertainty

All conclusions and predictions derived in the basic model assume perfect information of all agents. While many authors concerned with ownership structure (Bebchuk, 1999), initial public offerings (Stoughton & Zechner, 1998), and the process of divesting the company (Mello & Parsons, 1998) employ uncertainty of cash flows in their models, the following model is designed to shed some light on the consequences of the rival's private benefits of control being unknown at the time of an IPO. This introduction of symmetric uncertainty causes a selection process for takeovers which has a potential to harm minority shareholders and as a consequence rules out a first best solution to the wealth distribution problem during IPOs and subsequent control transfers. All other assumptions are held equal compared to the basic model.

The sequence of events is shown in figure 2. At time 0 the rival appears and reveals his characteristics, including his potential to increase cash flow and his private ben-

[1] In a model with transaction costs charged by an investment bank, the fraction retained by the incumbent after the IPO is always lower than in the basic model by Zingales. There is an optimum combination of fixed and variable cost an investment bank could charge in order to maximize its revenue from fees. This fee is the difference between the buyer's valuation of the firm and the revenue accruing to the incumbent when selling directly to the buyer. This model is not depicted here, but is available from the authors upon request.

efits from controlling the company. Neither small shareholders nor the incumbent are informed about the value of the rival's private benefits but know the distribution from which the rival is drawn. One could consider this case as facing the IPO decision without knowing which kind of rival will appear to buy the controlling block. The incumbent decides at time 1 which fraction of the company to offer to outside shareholders and she conducts an IPO if that fraction is positive. The rival generally is not interested in participating in the IPO if his private benefits are positive and cash flow rights can be separated from voting rights, which is assumed here. Instead, at time 2 he enters a bargaining game with the incumbent over the remaining fraction of the company. If the rival's valuation of that fraction is higher than the value attributed by the incumbent, he buys the controlling block. Otherwise, the game ends without change of control. At the same time shareholders observe the outcome of the bargaining game and adjust their beliefs about future cash flow depending on who is in control of the company at time 3. In the last phase, cash flows accruing to all shareholders are realised. The managing investor (i.e. the incumbent or the rival) extracts his respective private benefits, the company is liquidated and the proceeds are distributed.

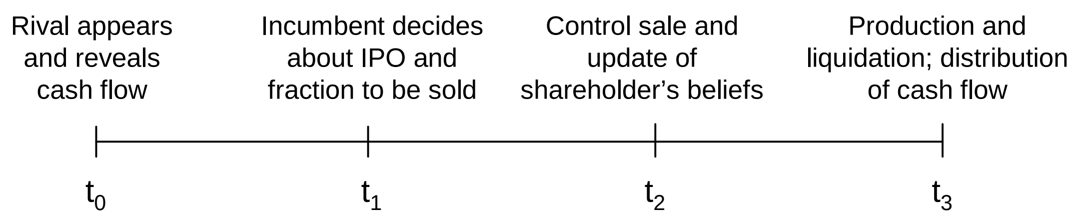

Figure 2: Sequence of events in the model with uncertainty

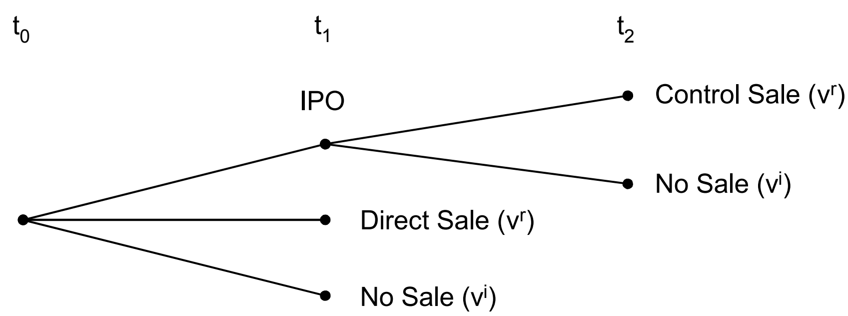

Figure 3: Decision tree for model with uncertainty

There is no need to introduce explicit secondary market phases, since all minority shareholders are assumed to be homogenous, which renders the allocative function of a secondary market unnecessary. There are exactly two points in time where prices of shares are established: first the IPO price at time 1 and the final value of shares at time 2 when it becomes clear which cash flow will be realised at time 3. For convenience, one can think of there always being a market where shares in the company could be traded after they have been offered at time 1.

Relaxing the assumption of perfect information is an attempt to bridge the gap between Zingales' (1995) model and Mello and Parsons' (1998) informational approach, although they focus on monitoring issues while this model places an emphasis on private benefits. This model is more realistic than Zingales' as private benefits of potential buyers of the company are usually not known at the time the incumbent decides whether to go public. The same is true for the rival's cash flow, but since it seems plausible that private benefits are harder to estimate than cash flow and to keep the argument simple, we assume with Zingales that the potential rival's cash flow is known a prior. Private benefits of the rival are described by the distribution $B(B_s^r)$ with mean μ and standard deviation σ (the subscript s denoting the fact that shareholders must make a good guess to decide which fraction of the company to buy at the IPO and to distinguish this parameter from the true value of private benefits in the basic model B^r). All information is symmetric, which should also exclude possible signalling mechanism.

The key element in this general model with uncertain private benefits is that despite their knowledge of the distribution of the rival's private benefits, it is not sufficient for minority shareholders to substitute the expected value for the known true value in the basic model. This is because the incumbent could expropriate minority shareholder whenever $v^r > v^i$ simply by offering shares at price v^r as in the basic model, which is the minority shareholder's valuation in case of a control transfer. If the rival's private benefits are lower than expected by shareholders, the incumbent would not sell the controlling block to the rival, thereby extracting $(1-\phi)(v^r - v^i)$ from minority shareholders. If a public offering is made, minority shareholders do not get back any value, for the incumbent always extracts their full utility in this case.

Whenever minority shareholders use the expected value of the rival's private benefits to decide how many shares to buy and which price to pay for these, the incumbent goes public at lower realizations of B_s^r if this is beneficial to him (left hand side of B^* in figure 4) but does not sell the controlling block to the rival. Only a successful transfer of control would render the higher cash flow v^r possible, which shareholders expect at the IPO. Therefore, shareholders experience a loss. On the right hand side

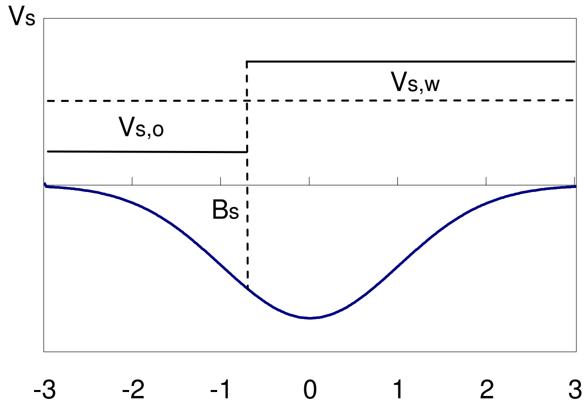

Figure 4: Sample probability density function of private benefits B_s^r
The expected value of the rival's private benefits (0) cannot be used by minority shareholders to calculate maximum price and fraction to buy from the incumbent. If shareholders overestimate private benefits (left hand side of 0), they would experience a loss ($V_{s,o}$), because the incumbent would not transfer control to some value-increasing rival. On the right hand side, shareholders receive their residual utility (v^r, upper solid line), which would leave them with an overall loss if they do not "risk"-adjust the IPO price (dashed line) to obtain some upside potential ($V_{s,w}$), which is done by setting the appropriate IPO price and amount of shares through optimising B_s.

of 0, the incumbent conducts an IPO and a subsequent control transfer with shareholders netting zero profits due to perfect competition in the market for dispersed shares. Minority shareholders thus lose money (the amount of which depending on the distribution of the rival's private benefits), which would drive them out of the market in the long run.

There is no way of reducing informational deficits among minority shareholders, since all information is assumed to be symmetric. If incumbent and minority shareholders could sign a contract that stipulates a consideration to be paid to shareholders conditional on the rival's true private benefits, adverse wealth effect for shareholders might be reduced. However, the nature of private benefits makes them hard to measure. Even if they can be measured, it is usually hard to claim them in court. Therefore, we follow the literature and assume that private benefits are not contractible.

In order to keep shareholders participating in IPOs, the incumbent has to adjust the price and fraction offered so as to increase shareholder's incentive to buy shares at the IPO. There is an optimum for both variables at which minority shareholders receive exactly zero proceeds from taking part in the IPO process while the incumbent's payoff is at a maximum. Finally, the fraction of the company sold and the price paid are lower than those predicted by the basic model.

For demonstration purposes, this model is first described in general terms and then applied to a uniform distribution of private benefits. Results will be stated for both.

Similar to the basic model, ϕ denotes the fraction of shares retained by I after the IPO. At the same time it represents the threshold from which S is willing to pay a price $v_r^s > v^i$ for the higher cash flow realised by R after acquiring the controlling block. This fraction is determined by the (yet unknown) variable B_s, which is contingent on the distribution of R's private benefits and describes the point of an average return of zero for S. The fraction ϕ is calculated by

$$\phi = Max\left[Min\left[\frac{B_s - B^i}{v^i - v^r}, 1\right], 0\right]. \tag{6}$$

If I conducts an IPO with subsequent control sale, shareholders receive proceeds which equal their share in the cash flow realised by R less than the public offering price.

$$V_{s,w} = (1-\phi)(v^r - v_s^r) \tag{7}$$

Without control sale, cash flow is the same as at time 0, thus yielding

$$V_{s,o} = (1-\phi)(v^i - v_s^r). \tag{8}$$

The condition to keep S in the market is $v^r \geq v_s^r \geq v^i$, because S loses $v^r - v_s^r$ in IPOs without control transfer at time 2 and wins $v_s^r - v^i$ if the rival takes over. If cash flow under the rival's management was lower than cash flow with I managing the company, there would be no incentive for shareholders to buy shares in an IPO. Selling directly to the rival, I receives

$$V_{DS} = B^i + v^i + \psi(B_s^r + v^r - B^i - v^i). \tag{9}$$

The incumbent gets her reservation utility and has to bargain over the surplus with the rival, thus extracting a part of his private benefits depending on her bargaining power. Conducting an IPO and divesting $1-\phi$ to minority shareholders before selling the controlling block yields

$$V_{IPOsale} = B^i + \phi v^i + (1-\phi)v_s^r + \psi(B_s^r - B^i + \phi(v^r - v^i)), \tag{10}$$

which is composed of the incumbent's reservation utility $(B^i + \phi v^i)$, the revenue gained from going public $((1-\phi)v_s^r)$ and her share from bargaining with the rival. If I does not sell to the rival after the public offering, she receives all proceeds from the IPO and retains the cash flow accruing to her at time 3 with respect to the fraction of the company retained by her.

$$V_{IPOwo} = B^i + \phi v^i + (1-\phi)v_s^r \tag{11}$$

The corresponding revenue for the rival is

$$V_{R,DS} = (1-\psi)(B_s^r + v^r - B^i - v^i) \tag{12}$$

when conducting an outright sale of the whole company. If a share $1-\phi$ is sold to minority shareholders by the incumbent first, R gets

$$V_{R,IPOsale} = (1-\psi)(B_s^r - B^i + \phi(v^r - v^i)). \tag{13}$$

Finally, if the incumbent offers shares to the public but does not transfer control to R, the rival's revenue is $V_{R,IPOwo} = 0$.

4.1 Possible cases of future cash flow

I $v^r < v^i$; $B^i + v^i \geq B_s^r + v^r$

The company is not sold in this case, since neither by selling directly to the rival nor by offering shares to the public the incumbent earns more than her reservation utility $B^i + v^i$.

II $v^r < v^i; B^i + v^i < B_s^r + v^r$

A divestiture is only conducted by direct sale to the rival. The IPO price always has to be higher than v^i to motivate shareholders to buy a fraction of the company but lower than v^r to compensate shareholders for losing money when no control sale takes place after the IPO. This condition is clearly violated, thus rendering public offerings impossible in this case.

III $v^r > v^i$

Public offerings are possible whenever $v^r > v^i$. Therefore, this condition is assumed in the following analysis of the divestiture model.

4.2 Determining the best method to sell

There are two generic processes to sell the company: The incumbent has to decide between 1) a mixed method of going public and making the decision to sell the control block dependent on the realization of R's private benefits and 2) an outright sale to the rival.

The sequence of events depicted in figure 2 implies that before deciding whether to go public, the incumbent has to estimate her revenue in both cases. In the case of an outright sale to the rival, I does nothing at time t_1 and waits for the characteristics of the rival to be realised at time t_2 whereupon she sells her controlling block or not. If the incumbent goes public at time t_1, the realisation of R's private benefits at time t_2 determine whether I sells the controlling block or keeps her stake in the company. To find the best decision for I at time t_1, it is obvious to compare the expected values for both ways of divestment.

Revenue when selling the controlling block directly

The revenue when staying private is obtained by integrating equation 9 and the incumbent's reservation utility in the case of no transaction over the distribution of private benefits.

$$V_{Direct} = B^i + v^i + \psi \int_{v^i+B^i-v^r}^{\infty} (B_s^r + v^r - B^i - v^i) B'(B_s^r) dB_s^r \tag{14}$$

The lower bound $v^i + B^i - v^r$ of this integral is due to the fact that I only sells to R, if she gains some positive amount from trade, that is $v^r + B_s^r > v^i + B^i$, and therefore $B_s^r > v^i + B^i - v^r$ (see figure 5).

Revenue when going public

Integrating revenues from IPOs without control sale (V_{IPOwo}, equation 11) and from IPOs with such a sale ($V_{IPOsale}$, equation 10) yields the overall revenue if the generic process of going public is selected.

$$V_{IPO} = B^i + \phi v^i + (1-\phi) v_s^r + \psi \int_{B_s}^{\infty} (B_s^r - B^i + \phi(v^r - v^i)) B'(B_s^r) dB_s^r \tag{15}$$

After going public at time t_1, the incumbent's decision to sell depends on the realisation of the rival's private benefits B_s^r. I is indifferent between a control sale and doing nothing, whenever $V_{IPOsale} = V_{IPOwo}$.

Therefore

$$B^i + (1-\phi) v_s^r + \phi v^i + \psi (B_s^r - B^i + \phi(v^r - v^i)) = B^i + (1-\phi) v_s^r + \phi v^i. \tag{16}$$

With the fraction ϕ from equation 6 this results in

$$B_s^r = B^s. \tag{17}$$

The incumbent is better off going public and selling the controlling block thereafter compared to going public without control sale whenever the realisation of B_s^r is greater than the parameter B_s, which determines the fraction retained (ϕ).

To calculate the total value for I, the respective values for public offerings with and without control sale have to be added, which represent the distribution of revenues along B on the left hand side of B_s (IPO without control sale) and on the right hand side (IPO and control sale).

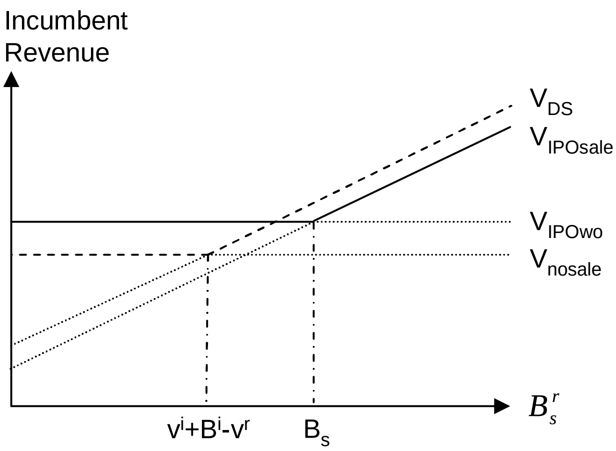

Figure 5: Incumbent's revenue for uncertain private benefits.
Different realisations of the rival's private benefits yield different revenues for two generic sales processes. IPOs with subsequent control transfer are combined with IPOs without such a sale (solid line = V_{IPO}). The company may also be sold directly to the rival (dashed line = V_{Direct}), whenever there is a positive gain from trade depending on the probability distribution of B_s^r.

4.2.1 Optimizing revenue

Since minority shareholders lose money whenever there is an IPO without control transfer while they profit whenever control is transferred to the rival, there exists an equilibrium where shareholders' return is zero.

$$0 = V_{s,o} \int_{-\infty}^{B_s} B'(B_s^r) dB_s^r + V_{s,w} \int_{B_s}^{\infty} B'(B_s^r) dB_s^r, \tag{18}$$

or expressed by the cumulative distribution function of B with $0 = V_{s,o}B(B_s) +$

$V_{s,w}(1 - B(B_s))$. This equilibrium constitutes a constraint on the optimisation of I's revenue.

Substituting equations 7 and 8 for $V_{s,w}$ and $V_{s,o}$ in equation 18 respectively yields

$$v_s^r = v^i + (v^r - v^i) \int_{B_s}^{\infty} B'(B_s^r) dB_s^r \tag{19}$$

and equally

$$v_s^r = v^i + (v^r - v^i)(1 - B(B_s)). \tag{20}$$

It follows immediately that for $B(B_s) > 0$ the IPO price is less than the price calculated by Zingales (1995) for comparable expected private benefits because of uncertain private benefits and the risk of shareholders being expropriated by the incumbent.

When substituting the constraint from equation 19 for the IPO price v_s^r in equation 15 and maximizing for B_s, the optimum fraction ϕ is then determined by equation 6.

The first order condition for optimising V_{IPO} with respect to B_s is

$$\frac{\partial V_{IPO}}{\partial B_s} = -(v^r - v^i + B_s - B^i)B'(B_s) + (1 - \psi)(1 - B(B_s)). \tag{21}$$

For a proof of equation 21 see Appendix B.1.

Setting the above to zero yields

$$\frac{1 - \psi}{v^r - v^i + B_s - B^i} = \frac{B'(B_s)}{1 - B(B_s)}. \tag{22}$$

The maximum for V_{IPO} with respect to B_s is implicitly defined by equation 22, whose solution depends on the distribution of private benefits. The behavior of V_{IPO} on the limits for a standard normal distribution is $\lim_{B_s \to \infty} V_{IPO} = B^i + v^i$ and $\lim_{B_s \to -\infty} V_{IPO} = -\infty$, whereas there is no general algebraic solution for possible maxima or minima in between. However, if the right hand part of equation 22 (which is a hazard function) is monotonic, there is exactly one solution to this optimisation problem. Considering the behaviour of V_{IPO} on the limits, this solution must be a maximum or inflexion point. It can only be an inflexion point, however, if the first and second order condition are jointly zero at some B_s. It can be shown that this is not the case for a standard normal distribution and possibly many more (see Appendix B.2). Therefore, exactly one maximum exists for the incumbent's proceeds from selling the company.

Using the solution of equation 22 to substitute for B_s in equations 6 and 20 finally yields the optimum fraction ϕ to be offered to minority shareholders and the IPO price v_s^r.

4.2.2 Going public or not?

Suppose that the incumbent has calculated the optimum revenue in the case of going public (equation 15). This provides her with a scenario what would happen, if she went public. To reach a conclusion about the best strategy to sell the company, she has to compare this value with her revenue estimate in case of an outright sale without using public capital markets.

$$\begin{aligned}\Delta V &= V_{IPO} - V_{Direct} \\ &= (v^r - v^i)(1-\phi)(1-\psi)(1-B(B_s)) \\ &\quad - \psi \int_{v^i+B^i-v^r}^{B_s} (B_s^r - B^i + v^r - v^i)B'(B_s^r)dB_s^r\end{aligned} \tag{23}$$

Whenever this difference in revenue is positive, the incumbent goes public (for a proof of equation 23 see Appendix B.3). Otherwise, she sells directly to the rival (negative difference) or becomes indifferent (if $V_{IPO} = V_{Direct}$). The key question is: What are the circumstances that I pursues an IPO strategy? It appears that this is always the case for at least a family of distributions of private benefits, if the rival's cash flow valuation is higher than the incumbent's ($v^r > v^i$) and the incumbent lacks absolute bargaining power ($\psi < 1$). It can be shown for equally distributed private benefits, that whenever $v^r > v^i$, $\psi < 1$ and uncertainty is greater than zero, the incumbent goes public (Appendix B.4). Simulations suggest, that results are the same for normally distributed private benefits (Appendix C).

These results imply that it is optimal for I to go public, even if the expected value of private benefits is below some critical B_s^r such that the company is less valuable for the rival than for I ($B_s^r + v^r < B^i + v^i$). This is contrary to Zingales (1995), where only value-increasing public offerings take place.

4.2.3 Revenues of minority shareholders and rival

The revenue accruing to shareholders is zero (constraint) while the rival receives a positive cash flow.

Rival's revenue when going public

When considering the whole distribution of private benefits, the proceeds the rival receives are

$$V_{R,Direct} = \int_{-\infty}^{\infty} V_{R,IPOsale}(B_s^r)B'(B_s^r)dB_s^r \tag{24}$$

Taking into account only those cases in which the controlling block is sold, which is essentially the same, revenue is

$$V_{R,Direct} = \int_{B_s}^{\infty} V_{R,IPOsale}(B_s^r)B'(B_s^r)dB_s^r \tag{25}$$

Rival's revenue if the controlling block is sold to him directly

$$V_{R,Direct} = \int_{-\infty}^{\infty} V_{R,DS}(B_s^r)B'(B_s^r)dB_s^r \tag{26}$$

In this case, the rival's payoff is the same as in Zingales' model under perfect information if the expected value of private benefits is substituted for the known value of the rival's benefits in the basic model.

4.3 Numerical example

While using the same figures as Zingales (1995) in his basic model, the rival's private benefits are substituted by a normal distribution with mean 10 and standard deviation 5 to introduce uncertainty.

v^r	$= 140$	(cash flow with R managing the company)
v^i	$= 100$	(cash flow with I managing the company)
B_s^r	$\sim N[10, 25]$	(private benefits of R)
B^i	$= 40$	(private benefits of I)
B_s	= endogenous	(private benefits assumed by I and S to calculate ϕ)
v_s^r	= endogenous	(IPO price)
ϕ	= endogenous	(fraction retained by I after the IPO)
ψ	$= 0.5$	(bargaining power of I)

To demonstrate how the model works, two cases are drawn from the distribution of private benefits and revenues are calculated for these. First, it is assumed that shareholders pay the value of the cash flow realised under the rival's management (v^r) when buying shares as in the basic model. Second, the impossibility of such an outcome under uncertainty is shown. Finally, all relevant revenues, fractions and premiums are calculated for the extended model as described above.

Case 1: $B_s^r = 2$ Suppose the true private benefits of R are 2, although this is not known to the agents. The fraction to be retained by I would be 0.95 in the basic model (equation 6), but 0.75 if shareholders substitute the expected value of private benefits (10) for the unknown true value. Having no better guess than the distribution characteristics, shareholders would be willing to buy up to $0.25 = 1 - \phi$ shares from the incumbent. Selling directly to the rival, I would gain 141 (equation 9). However, I is better off selling 0.25 shares to S for 150 (equation 11: $150 = 40 + 0.25 \cdot 140 + 0.75 \cdot 100$ vs. equation 10: $141 = 40 + 0.25 \cdot 140 + 0.75 \cdot 100 + 0.5(2 - 40 + 0.5(140 - 100)))$. Since the fraction retained by I is below the optimum derived from the basic model now, I does not profit from a sale to R anymore. Consequently, she keeps her share in the company and waits for her cash flow to be realised at time 3.

S is surprised by I's move, because shareholders expected some higher cash flow v^r through R's management, which is what they paid for. Instead of this higher cash flow they receive only v^i (in relation to their share ϕ), which leaves them with a loss of 10 (equation 8: $-10 = 0.25 \cdot 100 - 0.25 \cdot 140$). In this case, the incumbent's surplus equals the loss for minority shareholders.

Case 2: $B_s^r = 16$ The realization of 16 is higher than the expected value of private benefits. ϕ would be 0.75 again, although I would sell shares unless $\phi = 0.6$ (equation 6 with $B_s^r = 16$), because she would still be able to sell to the rival afterwards. When selling directly, I could gain 148 from trade (equation 9) while she would receive 150 again if she conducted an IPO (equation 11 vs. 10). Hence, I offers $1 - \phi = 0.25$ shares to minority shareholders but does not sell the controlling block to R. Shareholders are surprised again and end up with a negative return.

Summarizing all possible cases over B shows that S regularly loses money and only gets his initial investment back in case the controlling block is sold to the rival, since the IPO price would be equal to cash flow under the rival's management then. Therefore, S does not pay v^r for shares that are worth it only in the marginal case. Consequently, some other marginal values for v_s^r and ϕ are to be found which maximize revenue for I but still keep S in the market.

When optimizing revenue for I with respect to B_s, which is used instead of the unknown true value and substitutes for the expected value of private benefits, the maximizing value is $B_s = 6.320$ (equation 22, see figure 6). Thus, the fraction of the company retained by I is $\phi = 0.842$ (equation 6). Fixing shareholder's revenue at zero results in an IPO price of $v_s^r = 130.766$ (equation 20). Finally, the

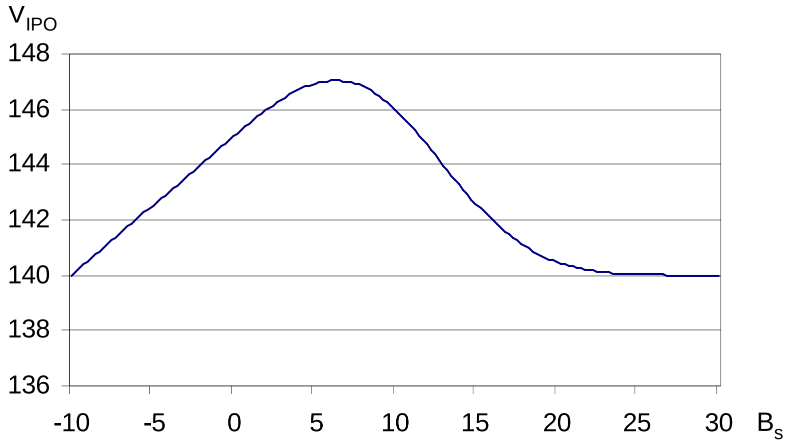

Figure 6: The incumbent's revenue dependent on the parameter B_s
This parameter substitutes for the rival's unknown true private benefits, subject to a zero-profit constraint for minority shareholders.

incumbent gains $V_{IPO} = 147.037$ from going public (equation 15), while her revenue is $V_{DS} = 145.021$ when selling directly to the rival (equation 14). Consequently, the incumbent goes public with 0.158 shares (compared to 0.3 in the basic model) at a price of 130.766 (140 in the basic model). With probability $P = 1 - B(B_s) = 0.769$, the controlling block is transferred to the rival thereafter.

I receives 147.037 and R gains 2.176 from the sale (equation 25, see figure 7). The sum of 149.213 is below the total value for R (which is 150 on average). The difference of 0.787 could be interpreted as a social loss due to adverse selection resulting from uncertain private benefits.

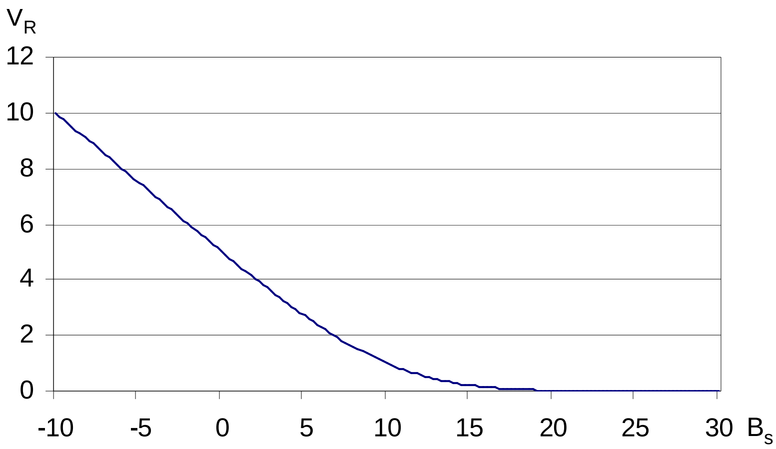

Figure 7: The rival's revenue dependent on the parameter B_s
This parameter substitutes for the rival's unknown true private benefits, subject to a zero-profit constraint for minority shareholders.

5 Implications

The predictions of this model fall into four categories: First, prices for initial public offerings are used to predict the long-run share price performance, which is differential for subsamples of IPOs in our model. Second, an overestimation bias can be identified in prior measured of private benefits using control premiums. Third, we develop new insights into the paths an owner can choose to sell the company. Finally, the optimality of takeover regimes with mandatory bids and an equal opportunity rule is discussed.

5.1 IPO price and stock performance after an IPO

The issue whether initial public offerings are priced correctly is still to be settled, and the phenomenon of long-run share price underperformance of IPOs in general might turn out to be caused by flawed methodologies. Overpricing occurs because investors are too optimistic about the prospects of IPOs (Ritter (1991), Loughran and Ritter (1995)) or because investment banks use the comparable valuation approach that does not include "busted" IPOs (Lewis, Seward, and Foster-Johnson (2000)). Another strand of literature argues in favour of efficient markets and describes abnormal returns as phenomena which are randomly distributed around zero or generated by using the wrong methodology of estimating long-term abnormal performance (E. F. Fama (1998), Mitchell and Stafford (2000)). However, there is evidence for differential performance of firms which are sold after the IPO compared to firms whose controlling shareholder does not change during the years following the IPO. These differences can persist even if on average IPOs are priced correctly.

Cusatis, Miles, and Woolridge (1993) study the stock price performance of 146 spinoffs and their parents over three years following the spinoffs in 1968-1988 and find positive abnormal returns for spinoffs as well as their parents, which are attributable to firms involved in subsequent takeover activity. The average adjusted two-year return for spinoff-parent combinations reaches 24.2 percent. Long-run returns studied by Ehrhardt and Nowak (2003) indicate a similar pattern for dual-class IPOs in Germany from 1970 to 1991. Underperformance for these firms of almost minus 20 percent is paralleled by inferior operating performance, while underperformance for non-dual-class IPOs is not statistically different from zero. Within the underperforming subsample, negative abnormal returns are especially severe for firms with the founding family still holding a supermajority ten years after the IPO.

These findings suggest that transfers of control after the IPO lead to higher post-IPO stock performance with respect to firms whose initial owner does not sell the majority of votes. While Ehrhardt and Nowak explain this pattern by ex ante unanticipated expropriation of minority shareholders due to poor investor protection, differential stock performance results directly from rational behaviour of shareholders in our model. Under uncertainty, share prices appreciate or depreciate over time as it becomes clear whether or not there will be a transfer of control.

After conducting an IPO at time 1 and selling shares to minority shareholders at price v_s^r, the incumbent has to decide whether to sell the controlling block to the rival. Transferring control leads to an appreciation of stock prices of $(v^r - v_s^r)/v_s^r$, since higher cash flow under the rival's management will now be achieved with certainty. Therefore, the initial risk discount by shareholders to protect themselves against expropriation by the incumbent is not necessary anymore. There should be an announcement effect depending on the probability of the control transfer actually being executed. This prediction is consistent with results found by Holderness and Sheehan (1988), who document an announcement effect of 12 percent for control transactions which exists independent from whether or not there is an additional tender offer to minority shareholders.

If corporate control is not transferred, share prices drop to v^i at time 2, because shareholders give up their hope of increasing security benefits through better management. The underperformance in comparison to all IPOs is $(v_s^r - v^i)/v_s^r$. If one assumes that control transfers are less likely for dual-class firms, for example, to protect private benefits, then this is the underperformance found by Ehrhardt and Nowak. Comparing IPOs without control sale to IPOs with subsequent control transfers yields an underperformance of $(v^r - v^i)/v^r$. Share price appreciation to v^r or depreciation to v^i following announcements of control transfers results from minority shareholders anticipating the cash flow at time 3. Their reservation utility either jumps to the value of their ownership stake $(1-\phi)v^r$ or decreases to $(1-\phi)v^i$ if there is no control transfer. In contrast to the models of Grossman and Hart (1980) as well as Holderness and Sheehan (1988) it is not necessary to assume marginal shareholders having knowledge about being influential or negligible for the success of transfer-of-control transactions. Control transfers happen before the rival decides to make a tender offer for shares outstanding after the transfer of the controlling block (possible between time 2 and time 3, but not modelled here), and cash flows are independent of minority shareholders tendering or not. Therefore, the final outcome does not depend on possible free riding problems and shareholder behaviour during tender offers.

5.2 Overestimation bias in control sales

Control premiums can be measured using different approaches. The one closest to this model is the method employed by Barclay and Holderness (1989). They study the relation between block trade price and closing exchange price on the announcement day of the trade and find an average premium of 20.4%.

The control premium estimated in several studies does not necessarily reflect private benefits, because it assumes that control transactions happen in competitive markets where bargaining power of buyers is perfect ($\psi = 1$). Since this is usually not the case, estimates of private benefits by measuring control premiums are downward biased as Nicodano and Sembenelli (2004) and Dyck and Zingales (2004) point out. Dyck and Zingales try to remedy this bias by estimating bargaining power, which turns out to be 0.655 under the assumption that it is the same across all countries studied. Given different objections to this method, they finally state that "overall, these results give confidence that the Barclay and Holderness method to estimate private benefits indeed measures private benefits (and not overpayment) and it does so introducing smaller biases than the alternative method."

Nevertheless, this method only captures private benefits in control sales. These benefits do not need to be the same for the whole range of companies. In our model, companies on the left tail of the distribution of private benefits are never sold. They either stay private or experience some minor fraction to be offered publicly without subsequent transfer of control.

To illustrate the way in which an estimation bias can arise, first consider the estimation model used by Barclay and Holderness (1989) and made explicit by Dyck and Zingales (2004). They first derive a per-share measure of private benefits, which equals the result of the bargaining game between I and R and the value of cash flows attached to the fraction of the company which is sold minus the post-announcement share price.

$$P = \frac{B^i + \phi v^i + \psi(B^r_s - B^i + \phi(v^r - v^i))}{\phi} \cdot -v^r \tag{27}$$

Multiplying this price difference by the size of the controlling block yields an estimator for private benefits.

$$\hat{B} = \phi B^r_s + (1-\psi)B^i - \phi(1-\psi)(v^r - v^i) \tag{28}$$

When bargaining power is considered by including the term $(1-\psi)$ in the equation, $\hat{B}$ is an unbiased estimator of a weighted average of the buyer's and seller's private benefits. This estimation can, by its very nature, capture only those private benefits that are revealed during a control sale. Therefore, it is unlikely to be representative for all companies being public, if there is reason to believe that firm characteristics are not the same for companies undergoing a control sale and those not being sold.

This might be the case, since firms self-select into the control sale sample through higher private benefits. To see this, consider the set of all firms which are up for sale. These firms go public, whenever the rival's cash flow valuation is higher than the incumbent's ($v^r > v^i$). If such a firm is sold by transferring the control block to the rival, private benefits ($\hat{B}$) can be measured. Otherwise, private benefits are those of the incumbent (B^i), but remain unobservable. Since control is sold only in those cases where the realisation of private benefits is higher than some critical point B_s (see figure 5), this subsample's mean (which is measured) is upward biased compared to the overall mean of the rival's private benefits. If this overall mean is, for example, as high as the incumbent's private benefits B^i, private benefits are overestimated by the standard method. In fact, the rival's mean private benefits can even be lower than B^i and still generate some bias due to the distribution's left tail being cut off during the sales process.

An estimation bias as described above would not have been possible in Zingales' original model, since no selection bias is possible. All companies going public are sold to the rival thereafter, because this is, what perfectly informed shareholders expected and paid for. In our model, however, all there is after the IPO, is a probability distribution of a control transfer, dependent on the rival's private benefits. The realisation of private benefits therefore generates two subsamples of public companies, whereof the one with high private benefits is sold to the rival.

While describing the measurement of private benefits when employing the block premium method, our model also accounts for variability between this method and estimation by measuring the price difference for share with differential voting rights (e.g. Nenova (2003) using dual class stocks). Dyck and Zingales (2004) discuss their findings in the light of Nenova's prior study and find that private benefits are generally higher in the study with dual class stocks. They attribute this to the higher probability of establishing dual class structures of firms with larger private benefits. Taken all these arguments together, we conclude that estimates of private benefits using dual class stocks should be higher than estimates by measuring control premiums, which in turn should be higher than the grand mean for all listed companies. Consequentially, due to a double selection bias, the highest private benefits should be observable for companies being sold after establishing dual class structures.

5.3 Optimal way to sell the company

Articles studying IPOs and the decision to go public mostly describe initial public offerings as reactions to financing needs along the growth path of the firm. This view has been called into question due to a broadening perspective of the functions of public offerings. Rydqvist and Högholm (1995) study the going public decision of family-owned firms in Sweden and find that a significant fraction of shares is sold by initial shareholders during the IPO. They explain this by the owner's consumption or portfolio diversification needs. Cusatis et al. (1993) examine a sample of spinoffs from 1965 to 1988, which shows a significantly positive abnormal two-year mean return. They attribute this abnormal return to the share price performance of firms that were taken over subsequent to the spinoff. The interesting point in studying spinoffs despite their similarity to IPOs is the possibility to abstract from the funding motive driving the spinoff. They argue that spinning off subsidiaries provides a low-cost method of transferring control of corporate assets to bidders who will create greater value but do not want to bid for the company as a whole.

The maximization of proceeds by going public is analyzed by Zingales (1995) within an extended merger and acquisition process. An owner-manager maximizes proceeds from selling cash flow rights by going public whereas revenue from the sale of voting rights is maximized by bargaining directly with a potential buyer. Therefore, the decision to go public depends on the fraction of the company which, when being sold to dispersed shareholders, maximizes the owner-manager's revenue. Zingales' model predicts that direct sales are preferable if the potential buyer is likely to reduce the value of cash flow rights. An initial public offering might yield a higher revenue if cash flow under the buyer's management is higher than the cash flow generated by the owner-manager. The fraction retained by the incumbent is always sold to the buyer following the IPO, which is not necessarily the case in our model. The phenomenon of an increased rate of changes of control after IPOs is found by Rydqvist and Högholm (1995) in a study of 166 Swedish public offerings between 1970 and 1991. Owners relinquish control in 36 percent of all IPOs within five years of listing, 48 percent retain control and 16 percent either go back private or go bankrupt. Moreover, 90 percent of the firms studied have dual-class shares structures implemented, a fact which is consistent with a prediction of our model that initial owners will employ dual-class structures to retain control even if selling the majority of cash flow rights is the revenue-maximizing choice.

Ellingsen and Rydqvist (1997) argue that many firms become publicly traded as the first stage of a longer term divestment plan. Listing the firm on a stock exchange generates information production by market participants which reduces adverse selection costs associated with sales of unlisted stock. The same argument is put forward by Mello and Parsons (1998) who model information aggregation by investors when demand by dispersed investors and value creating potential by potential buyers are uncertain. They point out that an optimal strategy for going public starts with an IPO with the final ownership structure in mind. The marketing of potential controlling blocks to investors should occur after the aggregate demand has been revealed by the market. Quite the opposite is proposed by Stoughton and Zechner (1998) who suggest first selling shares to the large investor and then selling to dispersed shareholders at the same per-unit average price. This order of events does not seem to be supported by the empirical evidence. They explain underpricing and rationing in IPOs as a second-best response to regulatory constraints to achieve an optimal ownership structure where the blockholder incurs monitoring costs. In our model, the new blockholder manages the firm himself and thus has no incentive to monitor.

Finally, Reuer and Shen (2004) locate initial public offerings within an extended merger and acquisition process where firms can ameliorate ex ante transaction costs due to search costs and information asymmetries in the M&A market. They argue that firms may use initial public offerings prior to divestiture in order to increase the firm's visibility to potential acquirors where information about the identity or availability of exchange partners is incomplete. In their empirical study they find that sequential divestiture is more likely in industries with spatially-dispersed firms and for firms with significant intangible resources.

The model developed in this paper does not focus on information production through market prices but emphasizes the importance of initial public offerings in extended divestiture processes where both the seller and buyer can extract private benefits from control.

The optimal way to sell the company is to first go public with a minority or non-voting fraction of the company and then to sell the voting block to some new owner, dependent on the realisation of this owner's private benefits. An IPO is always preferable to selling directly to some new majority shareholder, if a) this new owner generates higher cash flows than the incumbent, b) uncertainty about his private benefits exists, and c) the incumbent's bargaining power is not perfect. Uncertainty causes a non-zero probability that the company is sold following the IPO, which attracts minority shareholders to share in the gains from higher cash flows and a rising firm valuation. The incumbent thus sells a corresponding fraction of the company to dispersed shareholders, since she can extract their full utility due to perfectly competitive markets for dispersed shares, which she could not do when bargaining directly with the rival.

This feature of a strict IPO policy is new to our model compared to the original model by Zingales. The empirical observation of firms being sold privately, however, could be accounted for by lower expected cash flows under the rival or by introducing transaction costs. If one assumes a fixed cost of becoming and being listed, this cost could easily outweigh the benefits from going public. In this case, firms would chose not to go public, because to volume of stock being listed as predicted by our model would simply be too small to justify the expenses.

5.4 Mandatory tender offers

Throughout this paper we have assumed that transfers of control are either not regulated or they are conducted under a regime similar to the "Market Rule" (MR), which allows controlling shareholders to sell their controlling blocks without letting minority shareholders share in the gains (Bebchuk, 1994). In the following section, we will relax this assumption by introducing two other regimes governing takeovers. We will see that both produce results similar to those obtained from the model under MR as described above.

The first one is a simple "Mandatory Bid Rule" (MBR), which requires buyers to make a tender offer to minority shareholders whenever they acquire control of the firm. Furthermore, they have to offer a price which in some jurisdiction equals an average share price of the respective class of shares they want to buy over some past time period, while in other jurisdictions this price must be the highest price over some period. Since existing literature does not define mandatory bids identically (e.g. Berglöf and Burkart (2003), Hoffmann-Burchardi (1999), and Bebchuk (1994)), the terms "mandatory bid" and "mandatory bid rule" shall refer only to those kinds of mandatory tender offers which entitle minority shareholders to a fair consideration measured by an average share price.

The second regime, labelled the "Equal Opportunity Rule" (EOR), entitles non-controlling shareholders to participate in or otherwise benefit from control transactions, usually by being paid the same per-share price as the seller in a mandatory tender offer. This regulation has been implemented, for example, by the European Parliament and Council Directive 2004/25/EC of 21 April 2004 on takeover bids. The bidder's offer to minority shareholders shall be "the highest price paid for the same securities by the offerer, or by persons acting in concert with him, over a period [..] of not less than six months and not more than twelve before the bid." This rule effectively forces the bidder to pay the same per-share price for minority shares as for the controlling block.

Basic model with mandatory bid and perfect information

If the rival has to make a tender offer to minority shareholders, the optimal way to divest the company differs from the one resulting from the basic model with perfect information. Taking all the assumptions from the basic model and adding a mandatory bid rule yields a combination of share price and number of shares offered to dispersed shareholders, which allows the incumbent to extract the rival's whole surplus. Since the rival is required to make a tender offer to minority shareholders at some past average share price, his decision to take over the company depends on the outcome of the following tender offer. The mandatory tender offer always coincides with the rival acquiring the controlling block, which is why the incumbent sells to the rival whenever

$$B^i + \phi v^i + (1-\phi)v_s^r \leq B_s^r + \phi v^r + (1-\phi)v^r.$$

Introducing mandatory bids adds a new term to the inequality, which is the amount the rival has to pay minority shareholders for their stake. R has to acquire the minority shareholders' stake $(1-\phi)$ at an average share price, which could differ from the IPO price but will be the same, for the incumbent will set the IPO price to extract the whole minority shareholders' surplus. The rival values this stake at $(1-\phi)v^r$. Corporate control is thus transferred if $B^i + \phi v^i + (1-\phi)v_s^r \leq B^r + v^r$, and consequently

$$\phi \geq \frac{B_s^r - B^i + v^r - v_s^r}{v^i - v_s^r}, v_s^r > v^i.$$

For all $v_s^r > B^r - B^i + v^r$, these are all possible combinations of IPO price and fraction retained by the incumbent, which maximize the incumbent's revenue by extracting the rival's surplus completely. Dispersed shareholders are even willing to pay prices above expected cash flow v^r, since they can be sure that there will be a mandatory offer to get their money back. This result is true for both single-class and dual-class share structures, for the price paid by the rival will always be the past average price regardless of the shares being voting or non-voting ones.

Model with mandatory bid and uncertainty

The incumbent's ability to extract the rival's total utility disappears, if uncertainty of private benefits is introduced. For each realisation of private benefits B_s^r the optimal fraction retained by the incumbent after the IPO would be

$$\phi \geq \frac{B_s^r - B^i + v^r - v_s^r}{v^i - v_s^r}, v_s^r > v^i.$$

Facing a tender offer, minority shareholders have to decide whether to tender their shares. Declining the rival's offer yields $V_s = (1-\phi)v^r - (1-\phi)v_s^r$, for they can wait for v^r to be realised with certainty. Because the average share price offered by the rival to dispersed shareholders is the IPO price, tendering their shares results in a profit of zero. One can also rule out the possibility that shareholders tender for less than v^r, for they can free ride on the rival's improvements simply by doing nothing (Grossman & Hart, 1980). Theoretically, the incumbent could demand a higher initial public offering price v_s^r than in a model without mandatory bids (and even higher than v^r) to reduce the surplus to bargain for with the rival. The trade surplus for R would be zero if $B^i + \phi v^i + (1-\phi)v_s^r = B_s^r + v^r$, thus enabling I to extract the rival's surplus completely by selling first to dispersed shareholders and transferring control thereafter as in the basic model with perfect information.

Setting the IPO price above the rival's cash flow valuation v^r in order to extract his utility is not feasible with uncertain private benefits. If the incumbent sets some IPO price v_s^r higher than v^r and the realisation of private benefits satisfies the condition for a control transfer, minority shareholders' profit would be zero, since the rival offers some average price which is the IPO price. If private benefits turn out too small to trigger a control sale, the incumbent's cash flow will be realised, leaving shareholders with a loss of $(1-\phi)(v_s^r - v^i)$. This is essentially the same mechanism as in our general model with uncertainty.

To compensate minority shareholders for losses they incur if I does not sell the controlling block, the initial public offering price could be chosen such that the difference between IPO price and the maximum price possible $(v^* - v_s^r)$ sets off all these losses. However, this option is not feasible for I, if the market for dispersed shares is perfectly competitive. Shareholders would have to bid up the share price from v_s^r to v^*, leaving the last buyers with a loss in the moment the rival makes an offer, because being the ones paying the highest price, they would always have bid more than the average price. Therefore, there is no incentive for individual shareholders to bid up the price.

The maximum IPO price is thus $v_s^r = v^r$, which eliminates the possibility of using the mandatory bid rule to extract the rival's utility. This IPO price, substituted for

v_s^r in the equation above, yields

$$\phi \geq \frac{B_s^r - B^i}{v^i - v^r},$$

which is exactly the same as in our general model. The ability of mandatory bids with an average price rule to help the incumbent is limited to the special case of perfect information and cannot be generalised to a model with uncertainty.

Equal opportunity rule

In the following extension of the model with uncertainty, we will assume that whenever the rival acquires a controlling block, minority shareholders receive the same per-share price. The rival bids for the controlling block whenever his valuation of the whole company is higher than the incumbent's reservation utility and the price for outstanding dispersed shares, i. e. $B^i + \phi v^i + (1-\phi)p \leq B_s^r + \phi v^r + (1-\phi)v^r$, thus paying an amount to the incumbent which equals

$$v_c = B^i + \phi v^i + \psi(B_s^r + v^r - B^i - \phi v^i - (1-\phi)p), \tag{29}$$

which is the incumbent's reservation utility and her share in the surplus divided between I and R while

$$p = \frac{v_c}{\phi}$$

is the per-share price paid for the controlling block. Solving for p yields

$$p = \frac{B^i + \phi v^i + \psi(B_s^r + v^r - B^i - \phi v^i)}{\phi + \psi - \phi\psi} \tag{30}$$

Substituting equation 30 into the condition that the incumbent's reservation utility and the consideration paid to minority shareholders are less than or equal to the rival's valuation of the whole company (i.e. $B^i + \phi v^i + (1-\phi)p \leq B_s^r + v^r$) yields

$$\phi = \frac{B^i}{B_s^r + v^r - v^i}. \tag{31}$$

This is the result obtained by Zingales, while he employs a different argumentation. He argues that the rival will end up paying $(B^i + \phi v^i)/\phi = B^i/\phi + v^i$ for the whole company. If cash flow rights can be separated from control rights, the incumbent can always retain a sufficiently small fraction of cash flow rights attached to the majority of votes such that $B^i/\phi + v^i = B_s^r + v^r$, which is the same as equation 31.

If we use this result to substitute for ϕ in equation 30, we see that

$$p = B_s^r + v^r. \tag{32}$$

The price paid by the rival to acquire the whole company following a mandatory bid under an equal opportunity rule is exactly his reservation utility. Therefore, the incumbent can extract this full utility, if the rival's private benefits are known.

With uncertain private benefits, however, results change to some extent to allow I to extract more of the rival's surplus. The key difference between EOR and MR is that dispersed shareholders receive the rival's cash flow valuation v^r under MR, but participate in the control sale between incumbent and rival at some higher price p under EOR. Therefore, the maximisation constraint that dispersed shareholders net a zero return (equation 18) has solutions for higher IPO price and/or number of shares offered. If a control sale occurs, shareholders earn

$$V_{s,w} = (1-\phi)\int_{B_s}^{\infty}(p - v_s^r)B'(B_s^r)dB_s^r,$$

which is depicted in figure 8. As in the general model, the optimal number of shares to sell (ϕ) results from choosing a revenue-maximising B_s in $\phi = B^i/(B_s - v^i + v^r)$. In contrast to the general model, dispersed shareholders earn p instead of the rival's cash flow v^r, while p is now dependent on the optimisation parameter B_s and has a positive slope with respect to private benefits B_s^r, as

$$\frac{\partial p}{\partial B_s^r} = \frac{(B_s - v^i + v^r)\psi}{B^i(1-\psi) + (B_s - v^i + v^r)\psi},$$

which is positive, since $0 \leq \phi = B^i/(B_s - v^i + v^r) \leq 1$ must be true for the fraction sold.

Compared to the general model, adding an equal opportunity rule leads to higher revenues for the incumbent because she can utilize competitive markets for dispersed shares to a greater extent to extract the rival's surplus without bargaining. It is important to notice that there is no difference between the two takeover regimes for minority shareholders by definition, since the incumbent anticipates all wealth effects for shareholders and rival when deciding about IPO price and volume.

Under an EOR, public offerings can be conducted at a price higher than the rival's cash flow valuation, and up to $p = B_s^r + v^r$. Because the IPO price is not limited by the rival's cash flow v^r, the EOR even facilitates IPOs (and takeovers) where cash flow drops after the control sale. If cash flow under the rival is lower than under the incumbent ($v^r < v^i$), but R's expected private benefits B_s^r are sufficiently high, the

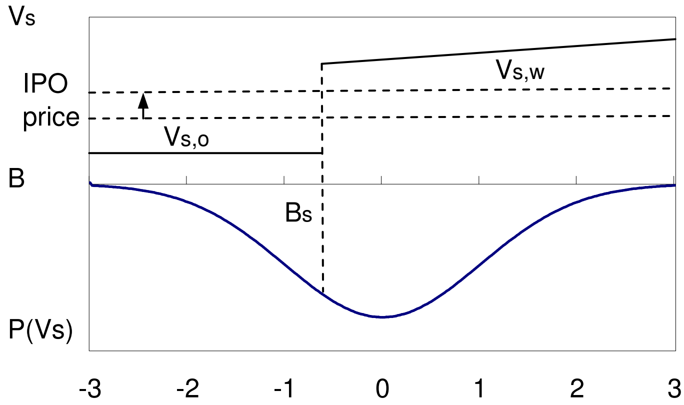

Figure 8: Sample probability density with EOR for fixed B_s

Dispersed shareholders gain more from control sales under EOR, since their revenue is now dependent on the transaction price p between incumbent and rival. This allows for higher IPO price (v_s^r) and/or fraction sold to dispersed shareholders (through B_s).

IPO price can still be attractive for minority shareholders, since $p \geq B_s^r + v^r \geq v^i$.

This anticipation of a higher price in control sales is crucial for overall wealth effects and considerations regarding the superiority of EOR or MR. In the general model with EOR, it is hard to derive general solutions for all cases possible. But there are indications that the superiority of each regime depends on the empirical distribution of private benefits. For some distributions the probability of a control transfer is higher for EOR, while for others the reverse is true. For instance, consider the standard numerical example as described in section 4.3. The probability of a control sale is $1 - B(B_s)$ where $B(B_s)$ is the value of the cumulative probability distribution at point B_s. For a distribution with mean $\mu = 10$ and standard deviation $\sigma = 5$, $B_s = 6.320$ for MR whereas $B_s = 6.289$ for EOR, implying a higher chance of the rival taking over under EOR. In a case where $\sigma = 15$, $B_s = 9.602$ for MR and $B_s = 9.680$ for EOR. This higher chance of a control transfer in the first case corresponds to greater social utility under EOR, since in order to establish a first best optimum, all realizations of private benefits B_s^r greater than zero should be followed by a control transfer in our example (because then $B_s^r + v^r > B^i + v^i$), while only those with $B_s^r > B_s$ actually are. We conclude that from a theoretical ex ante point of view it is not clear whether EOR facilitates transfers of control. Empirical research is needed to shed some more light on this matter, especially when theoretical predictions suggest only slight differences in efficiency.

6 Summary and conclusions

The decision to go public is an important step in the life cycle of the firm, which has been widely studied under different perspectives such as funding needs, portfolio aspects or management motivation issues. This paper focuses on the role of initial public offerings as an instrument to divest the company within an extended mergers and acquisitions context. The initial owner's valuation of the firm is assumed to consist of two parts: security benefits accruing to all shareholders and private benefits of control, which can only be extracted by an owner who holds a majority of votes in the firm. Zingales (1995) suggests that firms use two-stage sales to maximize total proceeds by relying on the capital market to auction off cash flow rights and the market for corporate control to negotiate the sale of the private benefits of control. This paper extends the basic model by Zingales in several directions.

The main contribution of this paper is to introduce uncertainty of the buyer's private benefits of control in the basic model. Relaxing the assumption that agents have perfect information about the other agents' types yields qualitatively new predictions.

Because dispersed shareholders only have knowledge about the distribution of the rival's private benefits, they must base their decision of how many shares to buy and which price to pay on estimates of these private benefits. If the shareholders' estimate is too high, the incumbent sells more shares to minority shareholders as would be possible if a subsequent control sale to the rival was to be conducted. The incumbent thus retains control and a possibly higher cash flow is not realized by the rival, which leaves shareholders with a loss. To compensate them for these losses on the left tail of the distribution of private benefits, the incumbent prices shares lower than she would under perfect information. As a consequence, the incumbent retains a larger fraction of the company.

This uncertainty about future security benefits which come with uncertain private benefits at the time of an IPO yields another interesting feature of our model. Conditional on the rival realizing sufficiently high private benefits and thus acquiring the controlling block, share prices increase when control sales are announced or decrease as the probability of a control transfer reaches zero. This explains the post-IPO underperformance of stocks which are not subject to control transfers compared to firms that are taken over subsequent to their initial public offering.

Empirical predictions for control premiums and the size of private benefits can be derived from our model. An estimate for control premiums in block trades using post-announcement share prices similar to the one employed by Barclay and Holderness (1989) and Dyck and Zingales (2004) identifies a new overestimation bias in prior estimates. This bias results from the fact that the sample of firms that get measured stems from a selection process which favours firms with high private benefits. Companies with low private benefits sometimes go public but are not taken over. If these firms with low private benefits were included, estimates for overall control premiums should be lower.

In line with existing literature, the importance of initial public offerings within a divestiture plan is confirmed. What's new is that with uncertain private benefits, the decision to list is independent from private benefits. This paves the way for IPOs even if on average the firm would be less valuable under some rival taking over subsequent to the IPO. The optimal way to sell the company is to first go public with a minority or non-voting fraction of the company and then to sell the voting block to some new owner, dependent on the realisation of this owner's private benefits. An IPO is always preferable to selling directly to some new majority shareholder, if this new owner is expected to generate higher cash flows than the incumbent and the incumbent's bargaining power is not perfect. Because in some cases realised private benefits will be large enough to make a sale viable, uncertainty causes a non-zero probability that the company is sold following an IPO, which attracts minority shareholders to share in the gains from higher cash flows and a more valuable firm. The incumbent thus sells a corresponding fraction of the company to dispersed shareholders, since she can extract their full utility due to perfectly competitive markets for dispersed shares, which she could not do when bargaining directly with the rival.

Finally, the assumption of unregulated takeovers or control transfers according to the "Market Rule" (MR) is relaxed. Mandatory bids which require the buyer to make tender offer to dispersed shareholders do not change the outcome of our model. Mandatory bids with an additional equal opportunity rule (EOR), which forces the buyer to pay dispersed shareholders the same per-share price as for the controlling block, change the distribution of profits among incumbent, rival, and dispersed shareholders, but do not alter the mechanism of our model. This model can, however, provide some insights into when and how superiority of MR or EOR can be established. We identify cases in which the distribution of private benefits alone – and specifically its standard deviation – causes social superiority of one regime or the other. Differences between the two rules are small and the reason might be found in the anticipation of possible wealth effects by the incumbent when setting IPO price and volume. These ex ante considerations have not been studied before in this extended framework with an IPO decision and subsequent control sale. Empirical research into this question under a life cycle perspective of the firm is clearly needed.

References

Admati, A. R., Pfleiderer, P., & Zechner, J. (1994). Large shareholder activism, risk sharing, and financial market equilibrium. *Journal of Political Economy*, *102*, 1097-1130.

At, C., & Morand, P.-H. (2000). The choice of the voting structure for privatizing a company. *Economics Letters*, *68*, 287-292.

Atanasov, V. (2005). How much value can blockholders tunnel? Evidence from the bulgarian mass privatization auctions. *Journal of Financial Economics*, *76*, 191-234.

Barclay, M. J., & Holderness, C. G. (1989). Private benefits from control of public corporations. *Journal of Financial Economics*, *25*, 371-395.

Barclay, M. J., Holderness, C. G., & Pontiff, J. (1993). Private benefits from block ownership and discounts on closed-end funds. *Journal of Financial Economics*, *33*, 263-291.

Bebchuk, L. A. (1994). Efficient and inefficient sales of corporate control. *Quarterly Journal of Economics*, *109*, 957-994.

Bebchuk, L. A. (1999). A rent-protection theory of corporate ownership and control. *NBER Working Paper*, *No. 7203*.

Bebchuk, L. A., & Zingales, L. (1996). Corporate ownership structures: Private versus social optimality. *NBER Working Paper*, *No. 5584*.

Berglöf, E., & Burkart, M. (2003). European takeover regulation. *Economic Policy*, *18*(36), 171-213.

Berle, A. A., & Means, G. C. (1932). *The modern corporation and private property.* New York: World Inc.

Bolton, P., & Thadden, E.-L. von. (1998). Blocks, liquidity, and corporate control. *The Journal of Finance*, *53*, 1-25.

Coffee, J. (2001). Do norms matter? A cross-country examination of private benefits of control. *Mimeo, Columbia University Law School.*

Cusatis, P. J., Miles, J. A., & Woolridge, J. R. (1993). Restructuring through spinoffs. *Journal of Financial Economics*, *33*, 293-311.

DeAngelo, H., & DeAngelo, L. (1985). Managerial ownership of voting rights: A study of public corporation with dual classes of common stock. *Journal of Financial Economics*, *14*(1), 33-69.

Demsetz, H., & Lehn, K. (1985). The structure of corporate ownership: Causes and consequences. *Journal of Political Economy*, *93*, 1155-1177.

Dyck, A., & Zingales, L. (2004). Private benefits of control: An international comparison. *Journal of Finance*, *59*, 537-600.

Ehrhardt, O., & Nowak, E. (2003). The effect of ipos on german family-owned firms: Governance changes, ownership structure, and performance. *Journal of Small Business Management*, *41*, 222-232.

Ellingsen, T., & Rydqvist, K. (1997). The stock market as a screening device and the decision to go public. *Stockholm School of Economics Working Papers in Economics and Finance*, *No. 174*.

Fama, E. F. (1998). Market efficiency, long-term returns, and behavioral finance. *Journal of Financial Economics*, *49*(3), 283-306.

Fama, E. H., & Jensen, M. C. (1983). Separation of ownership and control. *Journal of Law and Economics*, *26*, 301-326.

Grossman, S. J., & Hart, O. D. (1980). Takeover bids, the free-rider problem, and the theory of the corporation. *Bell Journal of Economics*, *11*, 42-64.

Grossman, S. J., & Hart, O. D. (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.

Harris, M., & Raviv, A. (1989). The design of securities. *Journal of Financial Economics*, *24*, 255-287.

Hoffmann-Burchardi, U. (1999). Barbarians in chains - takeover regulation and minority shareholder wealth. *London School of Economics, Financial Markets Group Working Paper*, *dp330*.

Holderness, C. G., & Sheehan, D. P. (1988). The role of majority shareholders in publicly held corporations. *Journal of Financial Economics*, *20*, 317-346.

Holmström, B., & Tirole, J. (1993). Market liquidity and performance monitoring. *Journal of Political Economy*, *101*, 678-709.

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, *3*, 305-360.

Levy, H. (1982). Economic evaluation of voting power of common stock. *Journal of Finance*, *38*, 79-93.

Lewis, C. M., Seward, J. K., & Foster-Johnson, L. (2000). Busted IPOs and windows of misopportunity. *Amos Tuck School of Business Working Paper*, *No. 00-06*.

Loughran, T., & Ritter, J. R. (1995). The new issues puzzle. *Journal of Finance*, *50*, 23-51.

Maug, E. (1998). Large shareholders as monitors: Is there a trade-off between liquidity and control? *Journal of Finance*, *53*, 65-98.

Mello, A. S., & Parsons, J. E. (1998). Going public and the ownership structure of the firm. *Journal of Financial Economics*, *49*, 79-109.

Mitchell, M. L., & Stafford, E. (2000). Managerial decisions and long-term stock price performance. *Journal of Business*, *73*(3), 287-329.

Nenova, T. (2003). The value of corporate voting rights and control: A cross-country analysis. *Journal of Financial Economics*, *68*, 325-351.

Nicodano, G., & Sembenelli, A. (2004). Private benefits, block transaction premiums and ownership structure. *International Review of Financial-Analysis*, *13*, 227-245.

Röell, A. (1996). The decision to go public: An overview. *European Economic Review*, *40*, 1071-81.

Reuer, J. J., & Shen, J.-C. (2004). Sequential divestiture through initial public offerings. *Journal of Economic Behavior & Organization*, *54*, 249-266.

Ritter, J. R. (1991). The long-run performance of initial public offerings. *Journal of Finance*, *46*, 3-27.

Rydqvist, K., & Högholm, K. (1995). Going public in the 1980s: Evidence from sweden. *European Financial Management*, *1*, 287-315.

Stoughton, N. M., & Zechner, J. (1998). IPO-mechanisms, monitoring and ownership structure. *Journal of Financial Economics*, *49*(1), 45-77.

Stulz, R. M. (1988). Managerial control of voting rights: Financial policies and the market for corporate control. *Journal of Financial Economics*, *20*, 25-54.

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.

Zingales, L. (1995). Insider ownership and the decision to go public. *Review of Economic Studies*, *62*, 425-448.

A Summary of Notation

Table 1: Summary of Notation

Symbol	**Explanation**
B^r	Private benefits accruing to the rival (R)
B^i	Private benefits accruing to the incumbent (I)
v^r	Cash flow with R managing the company
v^i	Cash flow with I managing the company
v_s^r	Initial public offering price
ϕ	Fraction retained by I after the IPO
ψ	Bargaining power of I
B_s	Private benefits parameter assumed by I and shareholders (S) to calculate ϕ
$B(B_s^r)$	Distribution of the rival's private benefits
$B'(B_s^r)$	Probability Density Function of the rival's private benefits
V_{DS}	Revenue accruing to I for individual realizations of B_s^r
V_{Direct}	Revenue accruing to I over the whole distribution of B_s^r
V_{IPO}	Revenue accruing to I in case of an IPO over the whole distribution of B_s^r
$V_{IPOsale}$	Revenue accruing to I after an IPO if control is transferred to R
V_{IPOwo}	Revenue accruing to I after an IPO if control is not transferred to R
$V_{s,w}$	Revenue accruing to S if control is transferred to R
$V_{s,o}$	Revenue accruing to S if control is not transferred to R
$V_{R,DS}$	Revenue accruing to R if the firm is sold directly to R
$V_{R,IPOsale}$	Revenue accruing to R if the firm is sold to R after going public
$V_{R,Direct}$	Revenue accruing to R if the firm is sold directly to R over the whole distribution of B_s^r
$V_{R,IPO}$	Revenue accruing to R in case of an IPO over the whole distribution of B_s^r
P	Control premium (premium paid for controlling blocks)

B Proofs

B.1 Proof of first order condition

The incumbent's revenue function is

$$V_{IPO} = \int_{-\infty}^{B_s} V_{IPOwo}(B_s^r)B'(B_s^r)dB_s^r + \int_{B_s}^{\infty} V_{IPOsale}(B_s^r)B'(B_s^r)dB_s^r.$$

Substitution of equations 11 and 10 yields

$$\begin{aligned} V_{IPO} = &\int_{-\infty}^{B_s} (B^i + \phi v^i + (1-\phi)v_s^r)B'(B_s^r)dB_s^r \\ &+ \int_{B_s}^{\infty} (B^i + \phi v^i + (1-\phi)v_s^r + \psi(B_s^r - B^i + \phi(v^r - v^i)))B'(B_s^r)dB_s^r \end{aligned}$$

We rearrange

$$V_{IPO} = B^i + \phi v^i + (1-\phi)v_s^r + \psi \int_{B_s}^{\infty} (B_s^r - B^i + \phi(v^r - v^i))B'(B_s^r)dB_s^r$$

and substitute the constraint on v_s^r from equation 19

$$\begin{aligned} V_{IPO} = \; & B^i + \phi v^i + (1-\phi)(v^i + (v^r - v^i)\int_{B_s}^{\infty} B'(B_s^r)dB_s^r) \\ &+ \psi \int_{B_s}^{\infty} (B_s^r - B^i + \phi(v^r - v^i))B'(B_s^r)dB_s^r \end{aligned}$$

and ϕ from equation 6

$$\begin{aligned} V_{IPO} = \; & B^i + v^i + (v^r - v^i - (v^r - v^i)\frac{B_s - B^i}{v^i - v^r})\int_{B_s}^{\infty} B'(B_s^r)dB_s^r) \\ &+ \psi \int_{B_s}^{\infty} (B_s^r - B^i + \frac{B_s - B^i}{v^i - v^r}(v^r - v^i))B'(B_s^r)dB_s^r \\ = \; & B^i + v^i + (v^r - v^i + B_s - B^i)\int_{B_s}^{\infty} B'(B_s^r)dB_s^r) \\ &+ \psi \int_{B_s}^{\infty} (B_s^r - Bs)B'(B_s^r)dB_s^r. \end{aligned}$$

Differentiation using the fundamental theorem of calculus results in

$$\begin{aligned} \frac{\partial V_{IPO}}{\partial B_s} &= -(v^r - v^i + B_s - B^i)B'(B_s) + \int_{B_s}^{\infty} B'(B_s^r)dB_s^r) - \psi \int_{B_s}^{\infty} B'(B_s^r)dB_s^r \\ &= -(v^r - v^i + B_s - B^i)B'(B_s) + (1-\psi)(1 - B(B_s)), \end{aligned}$$

which completes the proof.

B.2 Proof of revenue maximum

The first order condition is

$$\frac{1-\psi}{v^r - v^i + B_s - B^i} = \frac{B'(B_s)}{1 - B(B_s)}.$$

The second order condition is

$$\frac{\partial^2 V_{IPO}}{\partial B_s^2} = (\psi - 2)B'(B_s) + (B^i - B_s + v^i - v^r)B''(B_s),$$

and for B_s being an inflexion point

$$\frac{\psi - 2}{v^r - v^i + B_s - B^i} = \frac{B''(B_s)}{B'(B_s)}.$$

If the solution to B.2 is to be an inflexion point, the following condition must hold:

$$\frac{\partial V_{IPO}}{\partial B_s} = \frac{\partial^2 V_{IPO}}{\partial B_s^2} = 0.$$

The last equation can be written as

$$\frac{B'(B_s)}{1 - B(B_s)} = \frac{1-\psi}{\psi - 2} \cdot \frac{B''(B_s)}{B'(B_s)}.$$

For a standard normal distribution for B, this resolves to

$$\frac{B'(B_s)}{1 - B(B_s)} = \frac{1-\psi}{2-\psi} \cdot B_s$$

Since ψ lies between 0 and 1 by definition, the function of B_s on the right hand side of this equation has no joint solution with the – only numerically solvable – hazard function on the left, which establishes that there is no inflexion point at B_s.

B.3 Proof of equation 23

To find $\Delta V = V_{IPO} - V_{Direct}$, we first substitute v_s^r from equation 20 in equation 15 and expand the integral into two components by addends to get

$$\begin{aligned} V_{IPO} = \ & B^i + v^i + (1-\phi)(v^r - v^i)(1 - B(B_s)) \\ & + \psi \int_{B_s}^{\infty} (B_s^r - Bi) B'(B_s^r) dB_s^r \\ & + \psi \int_{B_s}^{\infty} \phi(v^r - v^i) B'(B_s^r) dB_s^r. \end{aligned}$$

Splitting the integral range in equation 14 to match the one above and subtracting gives

$$\begin{aligned} V_{IPO} - V_{Direct} = \ & (1-\phi)(v^r - v^i)(1 - B(B_s)) + \psi \int_{B_s}^{\infty} (B_s^r - B_s) B'(B_s^r) dB_s^r \\ & + \psi \int_{B_s}^{\infty} \phi(v^r - v^i) B'(B_s^r) dB_s^r \\ & - \psi \int_{v^i + B^i - v^r}^{B_s} (B_s^r - B_i + v^r - v^i) B'(B_s^r) dB_s^r \\ & - \psi \int_{B_s}^{\infty} (B_s^r - B_i + v^r - v^i) B'(B_s^r) dB_s^r \end{aligned}$$

Cancelling out corresponding terms and integrating where it is possible yields

$$\begin{aligned} V_{IPO} - V_{Direct} = \ & (1-\phi)(v^r - v^i)(1 - B(B_s)) + \psi\phi(v^r - v^i)(1 - B(B_s)) \\ & - \psi \int_{v^i + B^i - v^r}^{B_s} (B_s^r - B_i + v^r - v^i) B'(B_s^r) dB_s^r - \psi(v^r - v^i)(1 - B(B_s)). \end{aligned}$$

This simplifies to

$$\begin{aligned} \Delta V = V_{IPO} - V_{Direct} = & (v^r - v^i)(1-\phi)(1-\psi)(1 - B(B_s)) \\ & - \psi \int_{v^i + B^i - v^r}^{B_s} (B_s^r - B^i + v^r - v^i) B'(B_s^r) dB_s^r, \end{aligned}$$

which completes the proof.

B.4 Proof of IPO superior to direct sale

To show that $\Delta V = V_{IPO} - V_{Direct}$ is positive for all cases in which $v^r > v^i$ and uncertainty of private benefits is not zero, we evaluate the first order condition from equation 22 for uniformly distributed privated benefits and use the result in this equation.

Assume that B_s^r is uniformly distributed between parameters a and b, such that $B'(B_s) = \frac{1}{b-a} = p$ and $B(B_s) = pB_s$.

It follows from equation 22, that

$$B_s = \frac{p(v^r - v^i - B^i) + \psi - 1}{p(\psi - 2)}.$$

Substituting B_s from above and

$$\phi = \frac{B^i - B_s}{(v^r - v^i)}$$

in the revenue difference when going public vs outright sale (equation 23)

$$\begin{aligned}\Delta V = &(v^r - v^i)(1-\phi)(1-\psi)(1-B(B_s)) \\ &- \psi \int_{v^i+B^i-v^r}^{B_s} (B_s^r - B^i + v^r - v^i)B'(B_s^r)dB_s^r,\end{aligned}$$

we arrive at

$$\begin{aligned}\Delta V &= \frac{(p(B^i + v^i - v^r) - 1)^2(\psi - 1)^2}{p(\psi - 2)^2} - \psi\frac{(p(B^i + v^i - v^r) - 1)^2(\psi - 1)^2}{2p(\psi - 2)^2} \\ &= -\frac{(p(B^i + v^i - v^r) - 1)^2(\psi - 1)^2}{2p(\psi - 2)}.\end{aligned}$$

Since $0 \leq \psi \leq 1$, this expression is greater than zero for all $\psi < 1$, which completes the proof.

C Numerical Example

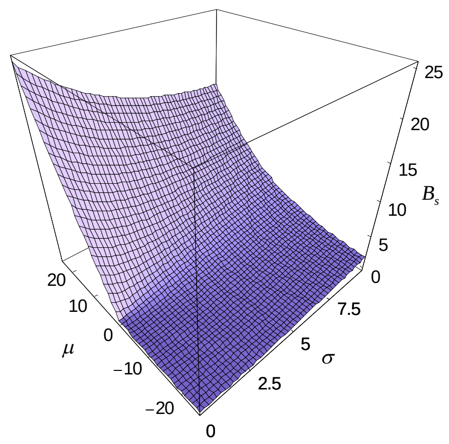

Figure 9: Parameter B_s dependent on the distribution characteristics

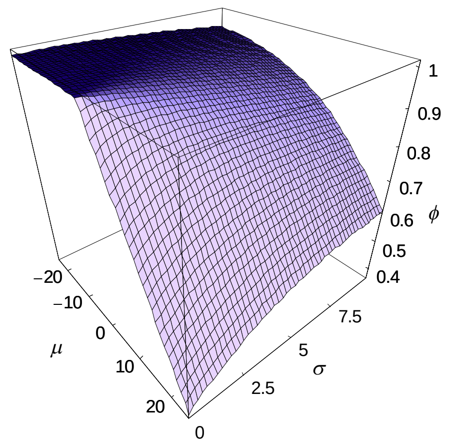

Figure 10: Fraction of the company retained by the incumbent dependent on the distribution characteristics

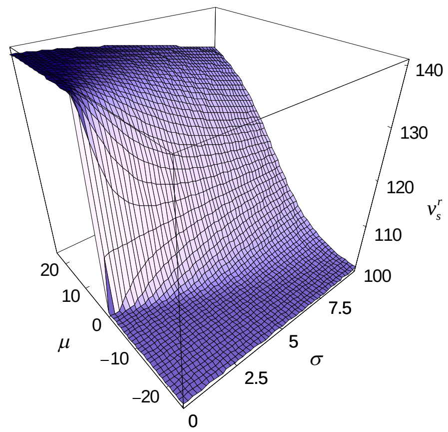

Figure 11: IPO price dependent on the distribution characteristics

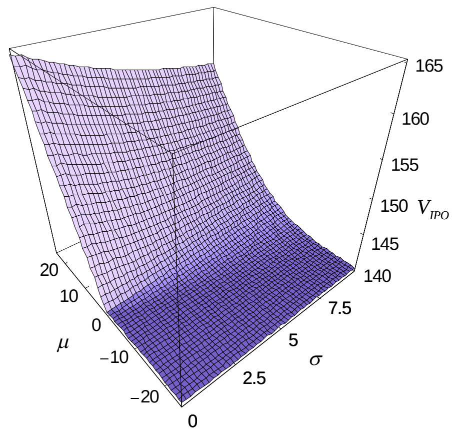

Figure 12: Revenue accruing to incumbent

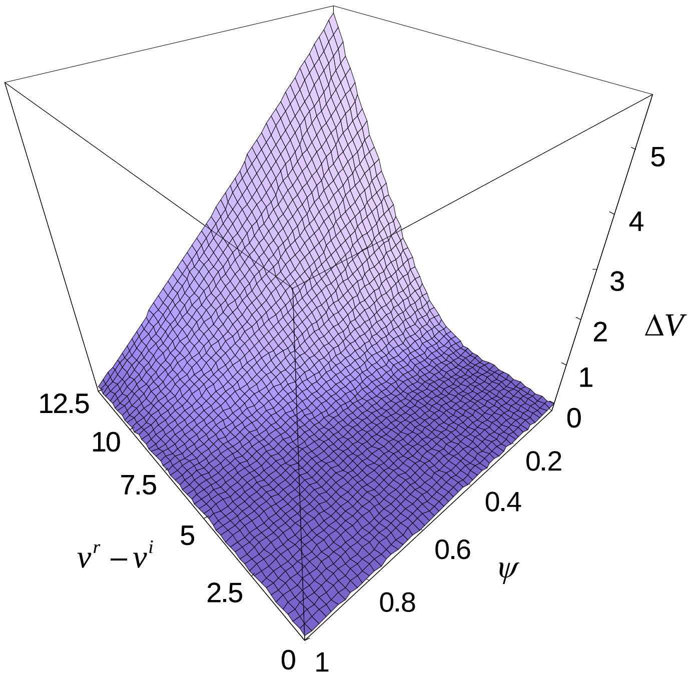

Figure 13: Going public vs direct sale

Difference between proceeds for going public (V_{IPO}) and for selling directly to the rival (V_{Direct}) for standard normally distributed private benefits. Parameters $v^r - v^i$ and ψ represent the difference in cash flow valuation unter the rival and incumbent and the incumbent's bargaining power, respectively. Incumbent's private benefits B^i have been fixed at 5, while other values for B^i show similar results.