

# Dual-Class IPOs, Share Recapitalizations, and Unifications: A Theoretical Analysis

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# **Dual-Class IPOs, Share Recapitalizations, and Unifications: A Theoretical Analysis**

## **Abstract**

We analyze a firm's choice between dual class and single class share structures, either at IPO or subsequently, prior to an SEO. We consider an entrepreneur ("incumbent") who obtains both security benefits and private benefits of control, and who wishes to sell equity to outsiders to raise financing to implement his firm's project. The incumbent may be either talented (lower cost of effort, comparative advantage in implementing projects) or untalented: the incumbent's ability is private information, with outsiders observing only a prior probability that he is talented (his "reputation"). The firm's project may be either long-term (intrinsically more valuable, but showing less signs of success in the short run) or short-term (faster resolution of uncertainty). Thus, under a single class share structure, an incumbent (not holding a majority equity stake in the firm) has a greater chance of losing control to potential rivals if he adopts the long-term project, since outside equity holders may vote for the rival if they believe that the project is not progressing well. A dual class share structure allows the incumbent to have enough votes to prevail, but may be misused by untalented incumbents to dissipate value by not exerting effort. In equilibrium, the incumbent simultaneously chooses the IPO share structure (dual class or single class), project type (long-term or short-term), and how much effort to exert. Our results help to explain firm's choices between dual class and single class IPOs and the relative post-IPO operating performance of dual class versus single class IPO firms. We also characterize the situations under which a firm will undergo a share unification or a dual class recapitalization, the announcement effect of these events on the firm's equity, and their effect on its subsequent operating performance.

# Dual-Class IPOs, Share Recapitalizations, and Unifications: A Theoretical Analysis

## 1 Introduction

When private firms go public, entrepreneurs and other insiders choose the voting structure of their firm's shares and incorporate these into the corporate charter: while most firms choose a single class share structure (one share, one vote), a substantial minority (about 11% of U.S. IPOs in 2001 and 16.5% in 2002) choose a dual class share voting structure, where one class of shares have superior voting rights (we often refer to these as "supervoting" shares from now on) while another class has inferior voting rights ("ordinary" shares).<sup>1</sup> Typically, the supervoting shares are held by the entrepreneur and other insiders who wish to maintain control of the firm after the IPO; the ordinary shares are sold to outside investors in the IPO. A prominent recent example of a dual class IPO was that of the internet search firm Google, which has drawn tremendous media attention. Google's dual class IPO had class A shares (with one vote per share), sold to outsiders in the IPO; it also had class B shares (with ten votes per share), which is held by the founders, Larry Page and Sergey Brin, as well as other insiders.

Dual class share structures confront financial economists with a puzzle. On the one hand, they have been criticized by corporate governance activists and often the media as violating the tenets of shareholder democracy, and for violating the one-share one-vote principle, which states that investors must share a firm's cash flows and voting power in the same proportion (see Grossman and Hart (1988) and Harris and Raviv (1989)). Thus, Google's dual class IPO share structure came in for considerable criticism from such activists, with the influential proxy adviser, Institutional Shareholder Services (ISS) ranking Google near the bottom of its corporate governance rankings, below any company in the S&P 500 stock index.<sup>2</sup> On the other hand, the empirical evidence is far from clear that dual class share structures necessarily destroy shareholder value. The recent empirical evidence, though inconclusive, indicates that the opposite may, in fact, be true. In a study of dual class IPOs, Bohmer, Sanger and Varshney

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<sup>1</sup>Dual class share structures have been growing in popularity in the U.S.. About 10% or more of all listed companies currently have dual class share structures, almost twice as many as in the 1980s. Dual class share structures are even more common abroad: approximately 22% of companies in Canada's TSX Index have dual class arrangements, and they are at least as common in Western European countries such as Italy, Switzerland, and Sweden, as well as in emerging market countries.

<sup>2</sup>See, e.g., the *Wall Street Journal*, August 23, 2004, which quotes ISS special counsel Patrick McGurn: "Because Google lacks the usual checks and balances provided at public companies by shareholder votes, holders must closely scrutinize the judgement of the company's top decision makers. Rank-and-file shareholders have no meaningful avenue for recourse – other than selling their low-vote shares, of course – if the company loses its way."

(1996) document that firms going public with a dual class share structure outperform their matched single class counterparts in terms of stock market returns as well as accounting measures of firm performance. Similarly, in a study of firms undergoing dual class recapitalizations (changing from a single class share structure to a dual class share structure), Dimitrov and Jain (2001) find that such firms exhibit long-term abnormal stock returns over the four years after the recapitalization, and also superior operating performance in these years: they conclude that, on average, dual class recapitalizations are shareholder value-enhancing decisions. Further, while there have been a few notorious recent examples of entrenched managers destroying shareholder value by consuming excessive perquisites (e.g., Lord Conrad Black, the CEO of Hollinger International, which manages the Chicago Sun-Times and the London Telegraph newspapers), some of the best companies, run by highly reputable managers, seem to have adopted a dual class share structure: in addition to Google (which is one of the few companies in the recent past to be profitable at the time of IPO), examples include Berkshire Hathaway (run by Warren Buffett), the New York Times Co. (run by the Sulzberger family), the Washington Post, Inc., and Dow Jones & Co. (which publishes the Wall Street Journal) and companies like Volkswagan A.G. in Europe. Further, a substantial fraction of “family owned” firms in the U.S. and abroad have a dual class share structure, which does not seem to have hurt their performance: in a study of the relationship between founding-family ownership and firm performance, Anderson and Reeb (2003) document that family owned firms within the S&P 500 (about 35% of S&P 500 firms) exhibit significantly better accounting and stock return performance than those which are not family owned. In summary, it is by no means clear that, in practice, dual class share structures destroy shareholder value, despite the arguments of corporate governance activists based on the existing theoretical analyses that one-share one-vote is optimal.

Our objective in this paper is to provide a resolution to the above puzzle by developing a fresh theoretical analysis of the equilibrium choice of firms between dual class and single class share structures. The starting point of our analysis is the rationale that top managers of many firms give for adopting such a share structure: that it makes them to focus on long-term value maximization without paying attention to temporary fluctuations in a firm’s share value (“the next quarter’s earnings report”).<sup>3</sup> However, we recognize that, while a few talented managers may be able to create considerable shareholder value by focusing exclusively on long run value maximization, we also

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<sup>3</sup>For example, in their letter to shareholders, Google’s founder managers made clear this desire to continue focusing on long-term value creation even after its IPO. To quote Google’s founders, Larry Page and Sergey Brin: “In our opinion, outside pressures too often tempt companies to sacrifice long-term opportunities to meet quarterly market expectations... If opportunities arise that might cause us to sacrifice short-term results but are in the best long-term interests of our shareholders, we will take these opportunities...”

recognize that the average CEO may not be able to create such long-term value, but will instead use this insulation from the disciplining effect of the takeover market to slack off and enjoy the perquisites of control. Further, the equity market may find it difficult to distinguish perfectly between the two kinds of managers. This is therefore the second ingredient driving our analysis. In such a setting, we characterize incumbent management's equilibrium choice between dual class and single class IPO share structures. We distinguish between situations where the equilibrium choice of dual class IPO share structure is driven primarily by incumbent's desire to maximize his private benefits of control, and those in which a dual class IPO share structure is truly value maximizing, so that firms choosing a dual class IPO can be expected to outperform firms choosing single class IPO share structure (in terms of accounting performance). Using our dynamic model (section 3), we also characterize the equilibrium evolution of firms' share structures subsequent to the IPO: thus, we study the conditions under which a firm which undertakes a dual class IPO may choose to have a "share unification" (thus choosing a single class share structure for its SEO), and those under which a firm will choose to retain its dual class share structure. We also study the conditions under which a firm that chose a single class IPO share structure will have a dual class recapitalization prior to its SEO (thus choosing a dual class share structure for its SEO) and those under which it will choose to maintain its single class share structure. We also study the announcement effects of share unifications and dual class recapitalizations on a firm's equity, characterizing the conditions under which each of these will have a positive announcement effect and those under which each will have a negative announcement effect.

We consider an entrepreneur (the incumbent, from now on) who currently owns all the equity in his private firm, but who wishes to sell equity to outsiders in an IPO to raise external financing to implement the firm's project. The incumbent obtains both security benefits (from the equity he owns in the firm) and private benefits of control. The firm can adopt one of two projects (strategies): a long-term project or a short-term project. A long-term project is intrinsically more valuable than a short-term project, and therefore maximizes long run value. However, adopting it may cause the firm's equity to be under-valued in the short-term, since it may show less signs of success in the short-run compared to a short-term project. Thus, incumbent management has a greater chance of losing control to potential rivals (even those less able than him) if he adopts the long-term project and outside investors believe that the firm's project is not progressing well in the short-term, and therefore vote for the rival in a control contest occurring at that time (if the incumbent does not hold enough voting power on his own account to defeat such a

rival). The incumbent may be either talented or untalented: talented managers have a lower cost of exerting effort, and a comparative advantage in implementing projects relative to the untalented incumbent. In particular, long-term project yields higher cash flows than a short-term project only if managed by a talented incumbent. While the incumbent knows his own type, outsiders only observe a prior probability that he is talented (i.e., his “reputation”). In this situation, the incumbent makes a joint decision regarding the share structure (dual class or single class) for his IPO, the kind of project to adopt (long-term or short-term), and how much effort to exert in implementing this project.

The equilibrium in the above situation will be driven by the choices made by a truly talented incumbent (since an untalented incumbent would mimic such choices as well, in order to not reveal his true type to the equity market). The choice of a talented incumbent between a dual class and a single class share structure depends on three effects. First, the insulation from the takeover market provided by a dual class share structure would allow him to create more value by implementing a long-term rather than a short-term project, without a fear of losing control if rivals for control appear before the resolution of uncertainty about such a long-term project. Since project horizon is observable to outsiders, this “long-term value creation” effect would be reflected in the firm’s IPO share price (and allow him to reduce the dilution in his equity holdings due to the IPO). However, the insulation from the takeover market provided by a dual class share structure also allows untalented incumbents to slack off by not exerting effort, thus dissipate value without any fear of losing control to potential rivals. Since the equity market cannot perfectly distinguish between talented and untalented incumbents, this “loss of discipline” effect is also reflected in the talented incumbent’s firm’s IPO share price if he adopts a dual class share structure (and favors his adopting a single class share structure instead). Finally, since, regardless of the kind of project adopted, there is always a chance that the incumbent will lose control to potential rivals under a single class share structure (but no such chance of losing control under a dual class share structure), the expected value of the incumbent’s control benefits will always be greater under a dual class share structure. While this third (“control benefits”) effect does not directly affect share value, it nevertheless enters the incumbent’s objective and favors him choosing a dual class share structure. We show that, when the incumbent’s reputation is high and the difference in intrinsic values between the long-term and short-term projects available to a firm is large, the first and third effects together dominate the second, so that a dual class IPO share structure is chosen by him in equilibrium and the firm implements a long-term project. On the

other hand, when the incumbent's reputation is low, and the difference in intrinsic values between the long-term and short-term projects is small, the second (discipline) effect (of a single class share structure) dominates the first and third effects, so that the firm adopts a single class IPO share structure and implements a short-term project.

While, in our single period model, each firm has only one project and enters the equity market only once, in our dynamic (two-period) model we assume that the firm receives a new project in the second period and therefore re-enters the equity market (by making an SEO) to raise external financing to implement it. This allows us to study the conditions under which share unifications and dual class recapitalizations arise in equilibrium. By the time of the SEO, the realization of the firm's first period project becomes known to outside investors, and they update the incumbent's reputation upward or downward (according to this realization). We show that, if the projects available to a firm and the extent of takeover activity in the two periods are similar, then a firm which had a dual class IPO in the first period will have a share unification (and therefore a single class SEO) if its first period performance was poor (so that the incumbent's reputation declines significantly); it will retain its dual class share structure if it performed well in the first period (so that the incumbent's reputation is enhanced). Under similar assumptions, we show that a firm which had a single class IPO may have a dual class share recapitalization (and a dual class SEO) if its first period project was a success, so that the incumbent's reputation is enhanced considerably; it will retain a single class share structure for its SEO if its first period performance was poor. Share unifications and dual class recapitalizations may also occur in equilibrium for reasons unrelated to first period performance and managerial reputations. For example, share unifications can occur if the firm matures and the difference in the intrinsic values between the long-term and short-term projects available to it is significantly reduced in the second period compared to that in the first period (this seems to have been the driving force behind the recapitalizations of the mid-to-late eighties).

While, in our basic model, we assume that the voting ratio (ratio of the voting power of supervoting to ordinary shares) chosen by the incumbent under a dual class share structure is large enough to guarantee the incumbent's control against all rivals, we relax this assumption in an extension to our basic model (in section 4), where we allow for potential rivals of two different ability levels relative to the incumbent, and also allow incumbents to exert two different effort levels (in addition to no effort). In this section, the voting ratio (under a dual class structure) is an endogenous variable, and both the share structure and voting power are chosen simultaneously in equilibrium.<sup>4</sup> We

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<sup>4</sup>There is some variation in the voting ratio across firms adopting dual class share structures in practice. For example, Google has

show that, when the incumbent's private benefits are large, the talented incumbent chooses a high voting ratio (in a dual class equilibrium), since the incumbent does not wish to lose control of the firm under any circumstances. On the other hand, when the incumbent's private benefits are small, then the incumbent chooses a low voting ratio in equilibrium. In the case of a low voting ratio, the risk of losing control to a (high ability) rival exerts a disciplining effect on an untalented incumbent (inducing him to exert at least a low level of effort), which is reflected in the share price of even a talented incumbent's firm's share price (as discussed earlier). The incumbent chooses a low voting ratio when this latter effect dominates.

Our analysis generates several testable predictions, which can be summarized as follows. First, our model predicts that dual class IPOs will be more prevalent in three kinds of firms: first, firms operating in industries where a considerable amount of value can be created by pursuing long-term goals while ignoring short-term trends (e.g., the newspaper industry, where sacrificing editorial integrity in pursuit of short-term profits can be disastrous); second, family owned firms and firms run by founder entrepreneurs, who tend to have a high reputation in managing the firm; and third, firms characterized by high private benefits of control. Second, our model makes predictions regarding the relative post-IPO operating performance of dual class and single class IPO firms. In particular, it predicts that dual class IPOs will outperform single class IPOs if the reputation of incumbent management is high and the firm is operating in an industry where the difference in intrinsic values between the long-term and short-term projects available to the firms is large. On the other hand, single class IPOs will outperform dual class IPOs if incumbent reputation is low and the firm is operating in an industry where the difference in intrinsic values between long-term and short-term projects is small.

Our model also has predictions for the prevalence of dual class recapitalizations and share unifications, for the abnormal returns in the equity market to the announcement of these events, and for the operating performance of firms subsequent to these events. Regarding the prevalence of unification, our prediction is that, after a dual class IPO, firms will undergo share unifications under three different situations: first, if the performance subsequent to the IPO has been poor (or if firm's management's reputation has declined for any other reason); second, following a change in incumbent management (e.g., retirement of the founding entrepreneur and transfer of control to professional management); third, maturing of the firm's industry (e.g., from an industry characterized by innovative

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a 10 to 1 voting ratio, as have many other firms. However, the supervoting shares held by Comcast CEO Brian Roberts have 85 votes against one vote for each ordinary share; the shares held by Frank Stronach, CEO of Magna International, have a 500 to 1 voting ratio; and finally, the European firm Ericsson's class B shares have a 1000 to 1 voting ratio.

products requiring risky long-term investments to one characterized by less risky investments with smaller changes across product cycles) or other drastic changes in the product market. Regarding the prevalence of dual class recapitalizations, our prediction is that firms undergoing dual class share recapitalizations will be those in three different situations: first, firms whose management reputation has increased, either due to good performance in the past, or due to reputable new management; second, firms in industries with a significant increase in takeover activity; third, firms undergoing drastic changes in the product market (e.g., significant technological change, entry into a new market) requiring them to start making risky long-term investments with no guarantees of high returns in the short-run. Our model predicts that the announcement effect of a share unification will be positive if the current reputation of incumbent management is low; it will be negative if this reputation is high. Further, it predicts that operating performance will improve following share unifications. In contrast, it predicts that the announcement effect of a dual class recapitalization will be positive (and the firm's operating performance will improve) if incumbent management reputation is high; the announcement effect will be negative (and the firm's operating performance will deteriorate) if incumbent management's reputation is low. Finally, our analysis has testable predictions for the voting ratio between supervoting and ordinary shares in firms adopting dual class share structures. It also has policy implications for regulators for controlling management abuses under a dual class share structure.

The paper is related to several strands in the theoretical and empirical literature. As discussed before, the seminal theoretical analysis of the optimal design of share structure by firms is by Grossman and Hart (1988) and Harris and Raviv (1989), whose analyses come to the conclusion that the optimal share structure in terms of shareholder wealth maximization involves sharing a firm's cash flow and voting power in the same proportion (one share, one vote) since it minimizes the chance that a value increasing takeover by a rival would not be consummated (in a setting where incumbent management obtains private benefits from control). However, in the symmetric information analysis of Grossman and Hart (1988) and Harris and Raviv (1989), all agents: incumbent, rival, and outside investors, share the same information about the actions to be taken to maximize firm value, and the focus is only on the incentive problem between incumbent management and outsiders. In contrast, in our setting, there is asymmetric information between the incumbent and outside shareholders about the incumbent's ability (talent), and later, regarding how effective the incumbent has been in implementing the firm's project. This asymmetric information interacts with the incentive problem faced by the incumbent in our setting, so that in same situation, it is a dual class share structure

which maximizes shareholder wealth while in others, a single class share structure maximizes shareholder wealth.

Subsequent to the seminal analyses of Grossman and Hart (1988) and Harris and Raviv (1989), there have been relatively few theoretical analyses directly dealing with the design of share structure by firms.<sup>5</sup> However, to the extent that a dual class share structure can be thought of as one among many different antitakeover provisions in company charters, the paper is also related to the law and economics literature explaining why companies may go public with corporate governance arrangements that are known to be inefficient by both investors and by those taking firms public. A prominent recent example of this literature is Bebchuk (2002). He shows that, in a setting where firm insiders have private information about the true value of the firm's projects and the cash flows of the firm are positively correlated with incumbent's private benefits, firms may adopt inefficient corporate governance arrangements to signal their true value to outsiders. Unlike the analysis of Bebchuk (2002) where such antitakeover provisions are inefficient, and are adopted only to "burn money" and thus signal credibly to outsiders, in our setting, dual class share structure are often efficient (shareholder value maximizing). Thus, the motivation for adopting dual class share structures is quite different in our setting from that in the above literature.

In contrast to the relative paucity of theoretical analyses, there is a substantial empirical literature dealing with firms' adoption of a dual class share structure, either at IPO or subsequently. Field (1999), Field and Karpoff (2002), and Daines and Klausner (2001) study the characteristics of IPO firms adopting dual class share structures and other antitakeover provisions, and compare them with those adopting single class share structures: they arrive at the conclusion that such firms are not necessarily of lower quality. Bohmer, Sanger and Varshney (1995) compare the performance of firms adopting a dual class share structure at IPO and industry and size matched sample of single class IPO firms. There is also a large literature studying long-term stock return and operating performance of firms following dual class recapitalizations (e.g., Dimitrov and Jain (2001), Mikkelson and Partch (1994) and Lehn et al (1990)), or the short term abnormal stock returns to the announcements of these events: see, e.g., Partch (1987), who found a significantly positive announcement effect, and Jarrell and Poulsen (1988), who found a significantly negative announcement effect. Finally, a small literature has studied the announcement effect of the abolition of dual class share structures (share unification): these include Dittman and Ulbricht (2004), who study German firms, and

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<sup>5</sup>However, a number of important papers have made informal arguments regarding the benefits and costs of dual class share structure and other corporate governance arrangements that entrench top management to some degree. These include Alchian and Demsetz (1972), who argued that dual class shares may deter outside shareholders from incorrectly replacing competent incumbent management, and DeAngelo and DeAngelo (1985), who argued that effective defenses against change in control can enhance managers' incentive to make firm-specific investments, thus adding to firm value. See also Partch (1987) and Jarrell and Poulsen (1988) for summaries of alternative arguments.

find a significantly positive announcement effect. In summary, the existing empirical literature seems to be undecided so far regarding whether dual class share structures create or destroy shareholder value: our theoretical analysis can help resolve these contradictions in the empirical literature by suggesting sharper empirical tests and by generating new hypotheses for empirical research.

The rest of the paper is organized as follows. Section 2 describes the essential features of our basic model. Section 3 characterizes the various equilibria of the model and develops results. Section 4 builds on our basic model to develop a two-period (dynamic) model where each firm obtains a second project at the end of the first period and raises financing to implement this project by making a seasoned equity offering. Section 5 develops an extension of the basic model to allow for rivals of two different ability relative to the incumbent, and characterizes the equilibrium voting ratio in a dual class structure. Section 6 highlights the testable and policy implications of the model. Section 7 concludes. The proofs of propositions 1, 2, 3, and 4 are in appendix A (to be published) and propositions 5, 6, 7, 8, 9, and 10 are in appendix B (not to be published).

## 2 The Basic Model

The basic (the single-period) model has two dates: time 0 and time 1. There are three types of agents in this model: the incumbent, outside investors, and the rival. Consider a firm initially set up by a risk-neutral entrepreneur (the incumbent hereafter) as an all-equity firm. The incumbent holds all of the firm's equity at the beginning of the game.

At time 0, the incumbent has access to two projects: a long-term project ( $l$ ) and a short-term project ( $s$ ). The terminology “long-term” and “short-term” project do not necessarily refer to the length of the project itself; instead, they refer to the horizon over which they maximize stock value. Thus, a long-term project is one which maximizes stock value in the long-run, but in the short-run may not show any signs of project success, potentially leading to the firm's equity being undervalued in the short-run. A short-term project has a lower NPV than a long-term project, but has a faster resolution of uncertainty (and information asymmetry) than a long-term project, thus potentially leading to higher stock value for the firm in the short-run (we discuss the resolution of information asymmetry in the two kinds of projects in detail later). The incumbent can only choose to implement one of the two projects. Both of these two projects require an investment amount of  $I$  to implement at time 0, which the incumbent wishes to raise from outside investors through an initial public offering (IPO) of equity (at time 0), since the firm has no internal

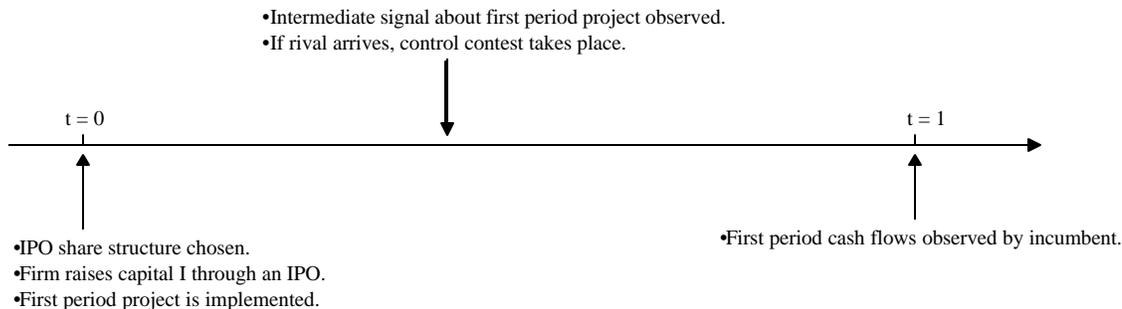


Figure 1: Sequence of events in the single-period model

capital available. When taking his firm to the IPO market, the incumbent can either have a dual-class IPO ( $D$ ) or a single-class IPO ( $S$ ) share structure.

If he chooses to have a dual-class IPO, the incumbent will hold all the supervoting shares (with  $t$  votes per share), and sell all the ordinary shares (with one vote per share) to outside investors.<sup>6</sup> If he chooses to have a single-class IPO, both he and outside investors will hold shares with equal voting rights (one vote per share) and cash flow rights. To begin with, the equity in the firm is assumed to be divided into a large number of shares, all owned by the incumbent. After choosing the IPO share structure for his firm, the incumbent now sells a certain number of additional shares to outside investors. Both the investment horizon (long-term project or short-term project) and the IPO share structure are publicly observable.

In our basic model, we allow firms to sell equity only once (in an IPO). In section 4, we build on this basic model to develop a dynamic (two-period) model, allowing each firm to enter the equity market a second time at time 1 (to fund a new project) by making a seasoned equity offering (SEO). In the dynamic model, the incumbent is a long-term player who takes into consideration this second period project when taking his firm to the IPO market.

Shortly after the IPOs at time 0, outside investors receive a noisy intermediate signal about the potential success or failure of the project chosen by firms at time 0. After outside investors observe the realization of this signal, with probability  $\phi$  a rival will arrive and try to take over the firm currently run by the incumbent by buying outside investors' shares using his own wealth (we use  $\phi$  to capture the extent of takeover activity in the industry the firm is operating in). The outcome of the control contest at this time will affect the time 1 cash flow to the firm (since it

<sup>6</sup>Note that the supervoting shares and ordinary shares have the same cash flow rights.

determines the identity of the management team, incumbent or rival, that will be in charge of the firm).

At time 1, all cash flows from the firm's first period project are realized.

We assume that all agents are risk-neutral and normalize the risk free rate of return to zero.

The sequence of events in the basic (single-period) model is depicted in Figure 1.

## 2.1 Project Technology and Information Structure

Incumbents are of two types: type  $T$  ("talented") or type  $U$  ("untalented"). The talented incumbent has two advantages over the untalented incumbent. First, the talented incumbent has a lower personal cost of exerting effort compared to the untalented incumbent. For simplicity, we assume that the effort cost of talented incumbent is 0, while that of the untalented incumbent is  $e > 0$ . We assume that incumbents choose to exert one of two possible effort levels: a high (positive) level of effort or a low level of effort (which we normalize to be zero). We assume that incumbent management can improve the expected cash flow from a project by exerting effort. Given that the talented incumbent has an effort cost of 0, he will always exert effort in implementing a project. Whether an untalented incumbent exerts effort or not depends on his trade-off between his monetary and private benefits from the project and his effort cost. The incumbent's effort level is not publicly observable.

The second advantage of the talented incumbent over the untalented is his superior ability in implementing projects: this comparative advantage is especially pronounced when implementing long-term projects, as we discuss in detail below. In other words, for a given level of effort, the talented incumbent can generate a higher cash flow on average than an untalented incumbent, regardless of the type of project chosen. We model the cash flow generated by a firm's projects as follows. Each project implemented by a firm generates a high cash flow  $C_H$  with a certain probability and a low cash flow  $C_L$  with the complementary probability. Given our earlier assumptions, the probability of a high cash flow from the firm's projects depends on three variables: (i) whether incumbent management is talented or not; (ii) whether the management exerts effort or not; (iii) whether the project is long-term or short-term. We denote the probability of a high cash flow from a long-term project under a talented incumbent exerting effort by  $\eta_l$ ;  $\beta_l < \eta_l$  denotes the corresponding probability under an untalented incumbent (i.e., managing a long-term project, also exerting effort). Similarly,  $\eta'_l$  and  $\beta'_l$  respectively denote the high cash flow probabilities when the talented and untalented incumbents manage the long-term project without exerting effort,

$\eta'_l > \beta'_l$ . The corresponding high cash flow probabilities for a short-term project are:  $\eta_s$  and  $\beta_s$  (when this project is managed by a talented incumbent exerting effort or an untalented incumbent exerting effort, respectively); and  $\eta'_s$  and  $\beta'_s$  (when this project is managed by the two kinds of incumbents without exerting effort). As in the case of the long-term project, the talented incumbent's advantage in managing a short-term project is captured by assuming that  $\eta_s > \beta_s$  and  $\eta'_s > \beta'_s$ .

It now only remains to specify how the expected cash flows from the long-term and short-term projects relate to each other. We assume that while the talented incumbent can manage a long-term project to generate higher cash flows than a short-term project ( $\eta_l > \eta_s$  and  $\eta'_l > \eta'_s$ ), long-term projects offer no such advantage over short-term projects if managed by an untalented incumbent ( $\beta_l = \beta_s$  and  $\beta'_l = \beta'_s$ ). Our parametric assumptions can be summarized as:  $\eta_l > \eta_s > \beta_l = \beta_s > \beta'_l = \beta'_s$  (note that we do not include the high cash flow probabilities when the talented incumbent does not exert effort,  $\eta'_l$  and  $\eta'_s$ , in the above summary, since given that his effort cost is zero and that exerting effort creates value, the talented incumbent always exerts effort, so that  $\eta'_l$  and  $\eta'_s$  are unimportant for our analysis from now on).

The equity market is characterized by asymmetric information. While incumbents know their own true types, at time 0, outside investors only have a prior probability distribution on the incumbents' types: they believe that with a probability  $\theta$  the incumbent is of type  $T$ , and is of type  $U$  with the complementary probability. We will refer to  $\theta$  as the incumbent's reputation at time 0.

## 2.2 Intermediate Signal About the Incumbent's Progress in Project Implementation

Between time 0 and time 1, outside investors receive an intermediate signal about how successful the incumbent has been so far in implementing the firm's project. This intermediate signal has two possible realizations: it can be either "good" ( $G$ ) or "bad" ( $B$ ).<sup>7</sup> We assume that, while this intermediate signal is informative about the success of project implementation, the signal is less informative about the long-term project than about the short-term project. Thus, consistent with the assumptions we made in section 1.1 about the probability of a project yielding a high cash flow, we assume that the probability of receiving a good intermediate signal if a talented incumbent is implementing a project (denoted by  $\delta$  with subscripts denoting project horizon, and primes denoting the case where the incumbent

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<sup>7</sup>An equivalent specification is to assume that a good signal is received with a certain probability and no signal is received with the complementary probability.

does not exert effort) is higher than the same probability if an untalented incumbent is implementing it (denoted by  $\psi$  with subscripts denoting project horizon, and primes denoting the case where the incumbent does not exert effort). Thus, we assume, for the long-term project:  $\delta_l > \psi_l$ , and  $\delta'_l > \psi'_l$ ; and for the short-term project:  $\delta_s > \psi_s$ , and  $\delta'_s > \psi'_s$ . Similarly, we assume that the probability of getting a good signal is greater when the incumbent exerts effort compared to the case where he does not: thus, we assume that  $\delta_l > \delta'_l$  and  $\delta_s > \delta'_s$  (for the talented incumbent); similarly,  $\psi_s > \psi'_s$  and  $\psi_l > \psi'_l$  (for the untalented incumbent). However, we assume that this intermediate signal is less informative (i.e., has a greater chance of being erroneous) about the long-term project than about the short-term project. Thus, we assume:  $\delta_s > \delta_l$  and  $\delta'_s > \delta'_l$  (for the talented incumbent with or without effort, respectively). Similarly, we assume that  $\psi_s > \psi_l$  and  $\psi'_s > \psi'_l$  (for the untalented incumbent, with or without effort, respectively). In summary, we assume:  $\delta_s > \psi_s > \delta_l > \psi_l > \psi'_s > \psi'_l$  (since the talented incumbent always exerts effort,  $\delta'_l$  and  $\delta'_s$  are unimportant for our further analysis, and will not be mentioned from now on).

### 2.3 The Rival

After outside investors receive the intermediate signal about the incumbent's progress to date in project implementation, a rival may arrive and try to take over control of the firm. At time 0, the incumbent and outside investors are uncertain about whether any rival will arrive or not: they only observe a prior probability  $\phi$  that a rival with a wealth of  $W_R$  will arrive (and with the complementary probability, no rival will arrive). There is no uncertainty about the ability of the potential rival in the basic model (we will relax this assumption by introducing multiple rival ability levels in section 5). If the rival succeeds in taking over the firm, he will generate a time 1 cash flow of  $C_R$  with probability 1 (regardless of project horizon). We assume that the rival, if he arrives, has a higher ability than an untalented incumbent in implementing a short-term project, and has a lower ability than a talented incumbent in implementing a short-term project:  $\eta_s C_H + (1 - \eta_s) C_L > C_R > \psi_s C_H + (1 - \psi_s) C_L$ . Further, the intermediate signal received by outsiders is precise enough that the expected cash flow from the firm's project under the incumbent conditional on a good intermediate signal is higher than the expected cash flow under rival management; on the other hand, the expected cash flow under the incumbent conditional on a bad intermediate signal is worse than that under rival management:  $\Pr ob(T|G)[\eta_s C_H + (1 - \eta_s) C_L] + \Pr ob(U|G)[\beta_s C_H + (1 - \beta_s) C_L] > C_R$ ,  $\Pr ob(T|B)[\eta_s C_H + (1 - \eta_s) C_L] + \Pr ob(U|B)[\beta_s C_H + (1 - \beta_s) C_L] < C_R$ . Furthermore, we assume that if the rival

takes over the firm, the incumbent will lose all of his private benefits of control,  $B$ .

The rival's objective in investing his wealth  $W_R$  in the equity of the firm(s) is to maximize the sum of his security and private benefits (assumed to be positive). We assume that the rival can only buy equity from outside investors. Outside investors (and the incumbent) know all the features of the rival immediately after he arrives. Thus the rival has to pay a "fair price" for the equity he buys from the passive investors, who price the firm's equity based on rational expectations. In other words, the price paid by the rival for the firm's equity depends on his own ability and the expected outcome of the control contest.

## 2.4 Outside Investors and the Control Contest

We now specify the voting behavior of passive (outside) investors. Whether or not the firm chooses a single class or dual class share structure, outside investors' shares have only one vote per share (i.e., in a dual class share structure, the incumbent holds all supervoting shares). We assume that outside investors vote for the party which maximize their long-term share value. Given our earlier assumptions, this means that all passive investors vote for the incumbent if they receive a good intermediate signal, and for the rival if they receive a bad intermediate signal about the incumbent's progress in implementing the firm's project. We assume that, under a single class share structure, the incumbent's wealth (subsequent to the dilution of his equity holding due to the firm's IPO) is small enough that he needs passive investors' votes to maintain control: i.e., he cannot maintain control solely by relying on voting for himself in the control contest. At the same time, the rival's wealth  $W_R$  is also not large enough to buy up enough equity to ensure success in the control contest by relying only on voting his own shares: in other words, the rival also needs passive investors' votes to prevail in the control contest. Thus, passive investors' votes are pivotal in determining whether it is the incumbent or rival who controls the firm subsequent to the control contest.

Outsiders' votes, however, are not important to the incumbent under dual class share structures. This is because, under a dual class share structure, the incumbent can always structure the voting ratio between supervoting and ordinary shares (denoted by  $t$ ) such that he will never lose to a rival in a control contest. Regardless of how small his share holding in the firm, the incumbent can always choose  $t$  such that he retains at least 50% control of the firm (in the basic model, we assume that  $t$  is not a choice variable, in a dual class IPO, the firm's equilibrium share price is invariant to  $t$ , as long as the incumbent is able to maintain control; in section 5, where we introduce multiple rival

types, we will relax this assumption, and allow the incumbent to choose the optimal level of  $t$ ). In summary, if a dual class IPO is chosen at time 0, the incumbent is always able to maintain control regardless of the intermediate signal, even if a rival arrives and attempts to take over control. In contrast, if a single class IPO is chosen at time 0, the incumbent loses control of the firm if a rival arrives and outsiders receive a bad signal about his progress in implementing the firm's project (since outsiders vote against him in this case); he maintains control if either no rival arrives, or a rival arrives but outsiders receive a good signal about his progress in implementing the firm's project (and therefore vote in support of the incumbent). We denote the fraction of outside investors voting for the incumbent in a control contest by  $v$ . Note that  $v$  is a function of the share structure chosen by the incumbent and the intermediate signal the outside investors receive for a firm. We also assume that it increases in the ratio between the incumbent's and the rival's abilities.

## 2.5 The Incumbent's Objective

As discussed in this section so far, the incumbent obtains both security benefits and private benefits of control from managing the firm under his control.<sup>8</sup> The security benefits arise from the cash flows of the projects accruing to the firm's equity held by the incumbent, and are captured by the market value of this equity. Security benefits accrue to all equity holders. In contrast, the private benefits of control (which are non-contractible) accrue only to the management team in control, and are not reflected in the market value of the equity of the firm.

We use  $\alpha_i$ ,  $i \in \{D, S\}$ , to denote the fraction of equity retained by the incumbent in his firm's IPO (a dual-class or a single-class IPO), and  $P_i$ ,  $i \in \{D, S\}$ , to denote the market price of equity in the IPO. Therefore, the security benefits the incumbent gets is  $\alpha_i P_i$ ,  $i \in \{D, S\}$ . Further, we use  $o_i \in \{0, 1\}$ ,  $i \in \{D, S\}$ , to denote the outcome of the control contest.  $o_i = 0$  if the incumbent loses the control of his firm to a rival, and  $o_i = 1$  if the incumbent wins the control contest and remains in control of his firm. Thus the expected private benefits of control the incumbent gets is  $o_i B$ .

We use  $e_m$ ,  $m \in \{T, U\}$  to denote the cost of effort for the two types of the incumbents. As discussed before, we assume that  $e_T = 0$ , and  $e_U = e > 0$ . That is, the talented incumbent has an effort cost of zero, and the untalented incumbent has a positive cost of effort. Whether the incumbent exerts effort or not is not observable to outsiders

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<sup>8</sup>This assumption is standard in the corporate control literature. See, for example, Grossman and Hart (1988) or Harris and Raviv (1988).

and is thus non-contractible.

In summary, the objective of each type of the incumbent is to make a choice of the share structure of his firm ( $i \in \{D, S\}$ ), project horizon ( $p \in \{l, s\}$ ), and whether to exert effort or not ( $w \in \{0, 1\}$ ), in order to maximize the expected value of the sum of his time 1 security and control benefits, net of any personal effort costs incurred by him. This is given by:

$$\underset{i, p_i, w_{mi}}{Max} (\alpha_i P_i + o_i B - w_{mi} e_m). \quad (1)$$

We discuss the incumbent's problem in detail in section 2.

### 3 Equilibrium in the Basic Model

In this section, we will analyze the problems of the incumbent, outside investors, and the rival (if he arrives) in the basic model. We will characterize the different equilibria that prevail in the equity market as various model parameters changes are made.

The equilibrium concept we use is that of Perfect Bayesian Equilibrium.<sup>9</sup> An equilibrium consists of (i) a choice of IPO share structure by the incumbent, along with his choices of IPO share price, the number of shares to be offered to outside investors, project horizon, and effort level in implementing the chosen project; (ii) a decision by each outside investor about whether or not to participate in the IPO; and (iii) a decision by the rival (if he arrives) about whether or not to purchase the firm's shares from outside investors in an attempt to take over the firm. Each of the above choices must be such that: (a) The choices of each party maximize their objectives, given the equilibrium beliefs and choices of others; (b) The beliefs of all parties are consistent with the equilibrium choices of others; further, along the equilibrium path, these beliefs are formed using Bayes' rule; (c) Any deviation from his equilibrium strategy by any party is met by beliefs by other parties which yield the deviating party a lower expected payoff compared to that obtained in equilibrium.

In proposition 1 and 2, we characterize the basic structure of the equilibria in the single-period model. We discuss the nature of these equilibria at some length, since we build on these basic equilibria in subsequent sections of the

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<sup>9</sup>See Fudenberg and Tirole (1991) for detailed description of this equilibrium concept. In section 4 we will make use of a dynamic model where there is a second round of equity financing, possibly a second round of control contest, and an adjustment of share structure after cash flows of the first period project are realized. In section 5 we will characterize the equilibrium while allowing for more than one type of rival coming in the basic model, and allowing for more flexibility in the incumbent's choice on the voting ratio between supervoting shares and inferior shares,  $t$ . However, the general definition of equilibrium used in these sections will be same as the one described here.

paper.<sup>10</sup>

**Proposition 1 (Dual Class IPO Equilibrium).** *For a given level of takeover activity  $\phi$ , and private benefit  $B$ , there exists an equilibrium where the incumbent chooses a dual class IPO if his reputation and the difference in the intrinsic value between the long-term and the short-term projects are high enough (i.e., above a threshold value). Such equilibrium involves the following:*

**The talented ( $T$ ) incumbent:** *He sells a fraction  $(1 - \alpha_D)$  of the firm's equity (in the form of ordinary voting shares carrying one vote per share) to outsiders at a price  $P_D$  ( $P_D$  is given by (2) and  $\alpha_D$  by (3)). He retains the remaining fraction  $\alpha_D$  of equity in the form of supervoting shares carrying a fraction  $\frac{\alpha_D}{\alpha_D t + (1 - \alpha_D)}$  of its total voting power. He implements a long-term project and exerts effort.*

**The untalented ( $U$ ) incumbent:** *He mimics the talented incumbent by selling a fraction  $(1 - \alpha_D)$  of equity at a price  $P_D$ , retaining a fraction of  $\alpha_D$  of equity as supervoting shares. He also implements a long-term project, but exerts no effort.*

**Outside investors:** *They participate in the firm's IPO, paying  $P_D$  for a fraction  $(1 - \alpha_D)$  of the firm's shares. If there is a control contest at time 1, they vote for the incumbent if they get a good realization of the intermediate signal, and for the rival if they get a bad realization.*

**The rival:** *If he arrives, he invests all of his wealth,  $W_R$ , in buying shares from outside investors, but he will not be able to take over the firm.*

The incumbent chooses between a dual class and a single class IPO share structure based on the costs and benefits of each over the other. The equilibrium in this case is driven by the choices made by the talented incumbent, since the untalented incumbent finds it optimal to mimic the talented incumbent. The benefit of the dual class share structure for the talented incumbent is that it insulates him from short-term pressures from the equity (or takeover) market, thus allowing him to undertake the long-term project (which is truly value maximizing). If, instead, he chooses a single class share structure, he has to worry about the possible loss of control (and therefore his private benefits) if the equity market perceives that the long-term project is not progressing well in the short-run (i.e., outsiders

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<sup>10</sup>Throughout this paper, our focus will be on pooling equilibria, where two types of incumbents pool by making similar decisions on IPO share structure, equity pricing, number of shares to offer to outside investors, and project horizon. We will not focus on equilibria where the actions taken by the two types of incumbents are different in equilibrium, so that the equilibrium is fully separating, and the choice of IPO share structure is a signal of the incumbent's true type. This set of equilibria are not interesting in the sense that they arise when the high type incumbent can separate himself from the low type incumbent at very low cost, so that the issue of interest in this paper does not arise at all.

receives a bad intermediate signal about its progress) and a rival for control appears. The cost of a dual class share structure, however, is that it not only insulates talented managers from the takeover market, but also untalented managers (who mimic talented managers in equilibrium by undertaking the same equilibrium action, so that the market cannot distinguish between the two with probability 1). Untalented managers benefit from insulation from the takeover market provided by the dual class share structure by slacking off (not exerting effort), thus reducing the firm's project cash flows. However, since untalented managers find it optimal to mimic the talented managers by taking the same equilibrium actions (such as undertaking the long-term project, even though they may not be able to create any additional value for the firm by doing so), the market is unable to perfectly distinguish between talented and untalented managers, assessing a probability  $\theta$  that the incumbent manager is talented and a probability  $(1 - \theta)$  that he is untalented (and value the firm's equity accordingly at a weighted average of its value under a talented and an untalented incumbent, respectively). In other words, the dissipation in equity value by an untalented incumbent slacking off under a dual class share structure gets reflected in the share price that even a talented incumbent is able to obtain for equity in his firm's IPO, imposing a cost on the talented incumbent. However, when the incumbent manager's reputation is high, this cost imposed on the talented incumbent is low. On the other hand, when the difference between the intrinsic value between the short-term and long-term project is high, the additional value that can be created by undertaking a long-term over a short-term project is high. Therefore, under these circumstances, the benefits of choosing a dual class IPO exceeds the cost of doing so, and the talented incumbent therefore chooses a dual class IPO in equilibrium, and implement the long-term project. In this situation, the untalented incumbent is better off mimicking the talented incumbent since doing so not only yields him a higher price for the equity he sells in the IPO, but also insulation from the takeover market (ensuring that he can consume his benefits of control regardless of the arrival of the rival and the intermediate signal outsiders receive about the firm's progress in project implementation), without any countervail disadvantages.

**Proposition 2 (*Single Class IPO Equilibrium*).** *For a given level of takeover activity  $\phi$ , and private benefit  $B$ , there exists an equilibrium where the incumbent chooses a single class IPO if his reputation is low enough and the difference in the intrinsic value between the long-term and the short-term projects is small enough (i.e., below a threshold value). Such an equilibrium involves the following:*

**The talented ( $T$ ) incumbent:** *He sells a fraction  $(1 - \alpha_S)$  of the firm's equity to outsiders in the form of ordinary*

shares at a price  $P_S$  ( $P_S$  is given by (5) and  $\alpha_S$  by (6)). He retains the remaining fraction  $\alpha_S$  of equity, carrying the same fraction  $\alpha_S$  of its total votes. He implements a short-term project and exerts effort.

**The untalented ( $U$ ) incumbent:** He mimics the talented incumbent by selling a fraction  $(1 - \alpha_S)$  of equity at a price  $P_S$ , retaining a fraction of  $\alpha_S$  of equity and total voting power. He also implements a short-term project, and exerts effort.

**Outside investors:** They participate in the firm's IPO, paying  $P_S$  for a fraction  $(1 - \alpha_S)$  of the firm's shares. If there is a control contest at time 1, they vote for the incumbent if they get a good realization of the intermediate signal, and for the rival if they get a bad realization.

**The rival:** If he arrives, he invests all of his wealth,  $W_R$ , in buying shares from outside investors. He will not be able to take over the firm if the realization of the intermediate signal is good, and he will be able to take over the firm if the realization of the intermediate signal is bad.

The talented incumbent chooses to structure the IPO under a single class share structure when the cost of having a dual class share structure dominates its benefits. When the difference in intrinsic values between the long-term and short-term project is small, the benefits of being insulated from the takeover market and being able to implement the long-term rather than the short-term project (without fear of loss of control in the event when the long-term project is not progressing well in the short-run, and a rival for control appears) is small. At the same time, if the incumbent's reputation is low, the reduction in equity value due to the untalented incumbent not exerting effort under a dual class share structure and pooling with the untalented incumbent imposes significant cost on the talented incumbent (since the market assesses a high probability that the incumbent is of the untalented type, and values the firm's equity closer to its true value under the untalented incumbent). Thus, the talented incumbent is better off choosing a single class IPO share structure in this situation. Further, given the probability of loss of control under a single class share structure (and the small incremental value that can be created by implementing a long-term project rather than a short-term project), the talented incumbent prefers to implement a short-term project, thus ensuring that the probability of outsiders receiving a good intermediate signal about his implementation of the project and his maintaining control is maximized. The untalented incumbent mimics the talented incumbent (thereby ensuring that his firm receives the same pooled share price as the talented incumbent) by choosing a single class IPO as well, and by also implementing a short-term project. By doing so, the untalented incumbent becomes exposed to the

takeover market (and loses control if outsiders receives a bad intermediate signal and a rival arrives). He minimizes this risk of losing control by exerting effort and implementing the firm's project better: while doing so requires him to incur a personal cost of effort, the resulting increase in his expected benefits from control (due to the reduction in the probability of his losing control) is greater than this effort cost. In this case, the single class share structure has a disciplining effect on untalented incumbents, resulting in a corresponding increase in share value).

We now derive in detail the equilibrium strategies of the incumbent, outside investors, and the rival in the dual class IPO equilibrium and in the single class IPO equilibrium.

*The Type T Incumbent's Problem*

The type  $T$  incumbent, when considering his strategy (given the strategies of the type  $U$  incumbent, outside investors, and the rival), is faced with the choice of a dual class IPO and a single class IPO. In the dual class IPO equilibrium, given the other agents' strategies, if a type  $T$  incumbent chooses to have a dual class IPO, he will sell his IPO shares at the market price of  $P_D$ , which is given by:

$$P_D = \theta[\eta_l C_H + (1 - \eta_l)C_L] + (1 - \theta)[\beta'_l C_H + (1 - \beta'_l) C_L]. \quad (2)$$

The part in the first bracket of equation (2) is the expected value of the time 1 cash flows from a long-term project implemented by a type  $T$  incumbent, and the part in the second bracket of equation (2) is the expected value of the time 1 cash flow from a long-term project implemented by a type  $U$  incumbent. The market price in the dual class IPO equilibrium is thus the average of these two values, weighted by the time 0 reputation of the incumbent.

The purpose of the IPO is to raise an amount of  $I$  to implement the new project. Therefore, the fraction of the firm's cash flow rights retained by the incumbent in a dual class IPO is:

$$\alpha_D = \frac{P_D - I}{P_D} = \frac{\theta[\eta_l C_H + (1 - \eta_l)C_L] + (1 - \theta)[\beta'_l C_H + (1 - \beta'_l) C_L] - I}{\theta[\eta_l C_H + (1 - \eta_l)C_L] + (1 - \theta)[\beta'_l C_H + (1 - \beta'_l) C_L]}. \quad (3)$$

The rest of the firm's cash flow rights are sold to outside investors.

Given other agents' strategies, if a type  $T$  incumbent chooses to implement a long-term project, his expected payoff is:

$$\Pi_D^T = \alpha_D[\eta_l C_H + (1 - \eta_l)C_L] + B. \quad (4)$$

In the dual class IPO equilibrium, if any incumbent chooses to have a single class IPO (an out-of-equilibrium move), outside investors infer that with probability 1 the incumbent of this firm is a type  $U$  incumbent, who will choose to implement a long-term project and exert no effort in implementing it. Furthermore, if a rival arrives, outside investors will vote in a way such that the rival will always be able to take over the control of the firm. The market price for such a firm's IPO shares is  $P = \phi C_R + (1 - \phi)[\beta'_t C_H + (1 - \beta'_t) C_L]$ , which by assumption is less than  $P_D$ . Thus no type  $T$  incumbent will choose a single class IPO in a dual class IPO equilibrium. If any incumbent chooses to implement a short-term project (another out-of-equilibrium move), outside investors again infer that with probability 1 the incumbent of this firm is a type  $U$  incumbent, who will exert no effort in implementing the project. The market price for such a firm is  $P = \beta'_s C_H + (1 - \beta'_s) C_L$ , which we assume is less than  $P_D$ . Thus no type  $T$  incumbent will choose to implement a short-term project in a dual class IPO equilibrium.

In the single class IPO equilibrium, given other agents' strategies, if a type  $T$  incumbent choosing to have a single class IPO, he will sell his IPO shares at the market price of  $P_S$ , which is given by:

$$P_S = \theta[(\delta_s + (1 - \delta_s)(1 - \phi))(\eta_s C_H + (1 - \eta_s) C_L) + (1 - \delta_s)\phi C_R] \\ + (1 - \theta)[(\psi_s + (1 - \psi_s)(1 - \phi))(\beta_s C_H + (1 - \beta_s) C_L) + (1 - \psi_s)\phi C_R]. \quad (5)$$

The part in the first bracket of equation (5) is the expected value of the time 1 cash flows from a short-term project implemented by a type  $T$  incumbent (taking into consideration that his firm may be taken over by a rival), and the part in the second bracket of equation (5) is the expected value of the time 1 cash flow from a short-term project implemented by a type  $U$  incumbent (taking into consideration that his firm may be taken over by a rival). The market price in the single class equilibrium is thus the average of these two values, weighted by the prior probabilities of the types of the incumbents.

The fraction of the firm's equity retained by the incumbent in a single class IPO is:

$$\alpha_S = \frac{P_S - I}{P_S}. \quad (6)$$

The rest of the firm's equity is sold to outside investors.

Given other agents' strategies, if a type  $T$  incumbent chooses to implement a short-term project, his expected payoff is:

$$\begin{aligned}\Pi_S^T &= \alpha_S[(\delta_s + (1 - \delta_s)(1 - \phi))(\eta_s C_H + (1 - \eta_s)C_L) + (1 - \delta_s)(1 - \phi)C_R] \\ &\quad + (\delta_s + (1 - \delta_s)(1 - \phi))B.\end{aligned}\tag{7}$$

In the single class IPO equilibrium, if any incumbent chooses to have a dual class share structure at IPO (an out-of-equilibrium move), outside investors infer with probability 1 that the incumbent of this firm is a type  $U$  incumbent, he will implement a long-term project, and he will exert no effort in implementing the project. In this case, the market price for the firm is  $P = \beta'_i C_H + (1 - \beta'_i) C_L$ , which we assume is less than  $P_S$ . Therefore no type  $T$  incumbent will choose to have a dual class IPO in a single class IPO equilibrium. If a firm chooses to implement a long-term project (another out-of-equilibrium move), outside investors infer with probability 1 that the incumbent of this firm is a type  $U$  incumbent, and he will exert no effort in implementing the project. Furthermore, in the second case, if a rival appears, outside investors will always vote for the rival in the control contest and the incumbent will lose control of his firm. In this case, the market price for the firm is  $P = \phi C_R + (1 - \phi)[\beta'_i C_H + (1 - \beta'_i) C_L]$ , which we assume is less than  $P_S$ . We assume the dilution and risk of losing control to the rival will outweigh the increased expected cash flow from the long-term project in this case. Thus no type  $T$  incumbent will choose to implement a long-term project in a single class IPO equilibrium.

#### *The Type U Incumbent's Problem*

The type  $U$  incumbent, when considering his strategy (given the strategies of the type  $T$  incumbent, outside investors, and the rival), is also faced with the choice of a dual class IPO and a single class IPO. In the dual class IPO equilibrium, given the other agents' strategies, if a type  $U$  incumbent chooses to have a dual class IPO, he will sell his IPO shares at the market price specified in equation (2) (since the equilibrium is pooling). The fraction of the firm's cash flow rights retained by the incumbent in a dual class IPO is as specified in equation (3). The incumbent will sell the rest of his firm's cash flow rights to outside investors.

Given other agents' strategies, if a type  $U$  incumbent chooses to implement a long-term project, his expected payoff is:

$$\Pi_D^U = \alpha_D[\beta'_i C_H + (1 - \beta'_i)C_L] + B.\tag{8}$$

In the dual class IPO equilibrium, if a firm choose to have a single class IPO, its IPO share price is  $P =$

$\phi C_R + (1 - \phi)[\beta'_I C_H + (1 - \beta'_I) C_L]$ . If a firm choose to implement a short-term project, its IPO share price is  $P = \beta'_s C_H + (1 - \beta'_s) C_L$ . We assume both of these two prices are less than  $P_D$ . Furthermore, we assume the loss of private benefit or dilution or the cost of effort is such that no type  $U$  incumbent will choose to have a single class IPO or to implement a short-term project in a dual class IPO equilibrium.

In the single class IPO equilibrium, given the other agents strategy, if a type  $U$  incumbent chooses to have a single class IPO, he will sell his IPO shares at the market price specified in equation (5) (since the equilibrium is pooling). The fraction of the firm's equity retained by the incumbent in a single class IPO is as specified in equation (6). The incumbent will sell the rest of his firm's equity to outside investors.

Given other agents' strategies, if a type  $U$  incumbent chooses to implement a short-term project, his expected payoff is:

$$\begin{aligned} \Pi_S^U &= \alpha_S[(\psi_s + (1 - \psi_s)(1 - \phi))(\beta_s C_H + (1 - \beta_s)C_L) + (1 - \psi_s)(1 - \phi)C_R] \\ &\quad + (\psi_s + (1 - \psi_s)(1 - \phi))B - e. \end{aligned} \tag{9}$$

In the single class IPO equilibrium, if any incumbent chooses to have a dual class IPO, the market price for his firm's share will be  $P = \beta'_I C_H + (1 - \beta'_I) C_L$ , which we assume is less than  $P_S$ . Furthermore, we assume that the discipline effect of the single class share structure outweighs the increase in private benefit under dual class share structure, so no type  $U$  firm will choose to have a dual class IPO in a single class IPO equilibrium. If any incumbent chooses to implement a long-term project, the market price for his firm's share will be  $P = \phi C_R + (1 - \phi)[\beta'_I C_H + (1 - \beta'_I) C_L]$ , which we assume is less than  $P_S$ . Thus no type  $U$  incumbent will choose to implement a long-term project in a single class IPO equilibrium.

### *The Outside Investors' Problem*

Outside investors make their investment decision based on their break-even conditions between investing in the firm's equity at IPO and in the risk free asset, whose return is normalized to 0.

In the dual class IPO equilibrium, outside investors, based on their equilibrium beliefs and the equilibrium strategies of other agents, evaluate the firm's equity at a price as specified in equation (2), and they pay an amount  $I$  for a fraction  $(1 - \alpha_D)$  ( $\alpha_D$  as in (3)) of the firm's cash flow rights. In this equilibrium, one sufficient condition for the incumbent to remain in control in the situation where a rival arrives is that the incumbent retain more than 50%

of voting rights at IPO, i.e.,  $\frac{\alpha_D t}{\alpha_D t + 1 - \alpha_D} > \frac{1}{2}$ , which is equivalent to  $t > \frac{1 - \alpha_D}{\alpha_D}$ . In the dual class IPO equilibrium, we assume that this condition always holds, thus no matter what shape the outside investors' voting function takes, incumbent always wins in the control contest.

In the single class IPO equilibrium, outside investors evaluate the firm's equity at a price as specified in equation (5), and they pay an amount  $I$  for a fraction  $(1 - \alpha_S)$  ( $\alpha_S$  as in (6)) of the firm's equity. In this equilibrium, if a rival arrives, incumbent remains in control if the realization of the intermediate signal for his firm is good, and he loses the control right of his firm if the realization of the intermediate signal for his firm is bad. We assume incumbent always votes for himself in a control contest in the basic model. The rival, if he arrives, will invest all his wealth,  $W_R$ , in buying shares from outside investors. Before time 1, the share price of the firms will be updated by the investors after observing the realizations of the intermediate signals. If a good realization of the intermediate signal arrives for a firm, its share price will be updated to  $P_S^G = \frac{\theta \delta_s}{\theta \delta_s + (1 - \theta) \psi_s} (\eta_s C_H + (1 - \eta_s) C_L) + \frac{(1 - \theta) \psi_s}{\theta \delta_s + (1 - \theta) \psi_s} (\beta_s C_H + (1 - \beta_s) C_L)$ . If a bad realization of the intermediate signal arrives for a firm, its share price will be updated to  $P_S^B = C_R$ . To ensure the existence of the single class IPO equilibrium, we need the voting functions of the investors ( $v_G$  and  $v_B$  denote the fraction of the investors who vote for the incumbent in the cases of a good realization of the intermediate signal and a bad realization of the intermediate signal respectively) are such that incumbent will have more than 50% of the votes if a good realization of the intermediate signal arrives for his firm, and he will have less than 50% of the votes if a bad realization of the intermediate signal arrives for his firm. These are equivalent to  $\alpha_S + (1 - \alpha_S - \frac{W_B}{P_S^G}) v_G > \frac{1}{2}$  and  $\alpha_S + (1 - \alpha_S - \frac{W_B}{P_S^B}) v_B < \frac{1}{2}$ , which we assume to hold in the single class IPO equilibrium.

#### *The Rival's Problem*

Like the investors, the rival makes his investment decision based on their break-even conditions between investing in the firm's equity in the secondary market and in the risk free asset. In both the dual class IPO equilibrium and the single class IPO equilibrium, the rival, if he arrives, always pays a fair price for the equity of the firm.

In the dual class IPO equilibrium, if a good realization of the intermediate signal arrives for a firm, its share price will be updated to  $P_D^G = \frac{\theta \delta_l}{\theta \delta_l + (1 - \theta) \psi_l'} (\eta_l C_H + (1 - \eta_l) C_L) + \frac{(1 - \theta) \psi_l'}{\theta \delta_l + (1 - \theta) \psi_l'} (\beta_l' C_H + (1 - \beta_l') C_L)$ . If a bad realization of the intermediate signal arrives for a firm, its share price will be updated to  $P_D^B = \frac{\theta (1 - \delta_l)}{\theta (1 - \delta_l) + (1 - \theta) (1 - \psi_l')} (\eta_l C_H + (1 - \eta_l) C_L) + \frac{(1 - \theta) (1 - \psi_l')}{\theta (1 - \delta_l) + (1 - \theta) (1 - \psi_l')} (\beta_l' C_H + (1 - \beta_l') C_L)$ . The rival will buy shares from the investors at these prices, but he will not be able to take over the firm because of the existence of the dual class share structure.

In the single class IPO equilibrium, the rival will buy shares at the prices  $P_S^G$  and  $P_S^B$  (as specified in the investors' problem). He will win the control contest if the realization of the intermediate signal for the firm is bad, and the incumbent will remain in control if his firm receives a good realization of the intermediate signal.

In summary, for the dual class IPO equilibrium to exist (the case where dual class share structure dominates single class structure), we need that both type  $T$  incumbent and type  $U$  incumbent to prefer a dual class IPO to a single class IPO at time 0. In other words, in addition to the assumptions we made in this section and last section, we need  $\Pi_D^T \geq \Pi_S^T$  (as in (4) and (7) respectively) and  $\Pi_D^U \geq \Pi_S^U$  (as in (8) and (9) respectively) to hold at the same time. On the other hand, for the single class IPO equilibrium to exist (the case where single class share structure dominates dual class share structure), we need that both type  $h$  incumbent and type  $U$  incumbent to prefer a single class IPO to a dual class IPO at time 0. That is, we need  $\Pi_S^T > \Pi_D^T$  and  $\Pi_S^U > \Pi_D^U$  to hold at the same time.

In next proposition we derive the comparative statics results on these factors' effects on the equilibrium choice of the incumbents.

**Proposition 3** (*Comparative Statics on the Incumbent's Equilibrium Choice Between Dual Class and Single Class IPOs*).

- (i) *As the difference between the expected cash flows from a long-term project and a short-term project increases, incumbents will prefer a dual class IPO to a single class IPO for lower values of managerial reputation  $\theta$ .*
- (ii) *As the magnitude of the incumbent's private benefit of control,  $B$ , increases, incumbents will prefer a dual class IPO to a single class IPO for lower values of managerial reputation  $\theta$ .*
- (iii) *As the probability of a rival arriving,  $\phi$ , increases, incumbents will prefer a dual class IPO to a single class IPO for lower values of managerial reputation  $\theta$ .*

As discussed before, the equilibrium choice of firms between a dual class and a single class share structure is driven by the talented incumbent's choice between the two, since the untalented incumbent mimics the talented incumbent in equilibrium. The talented incumbent maximizes his objective, which is the sum of his security (cash flow) benefits and private benefits when choosing between a dual class and a single class share structure in his firm's IPO. There are four factors affecting this objective, two affecting his security benefits and two affecting his private benefits. The advantage of a dual class share structure in terms of cash flow benefits is that it allows him to create more value, by implementing the long-term project rather than the short-term project: clearly, as the intrinsic value difference

between the two projects increases, this advantage becomes bigger. However, the disadvantage of a dual class share structure to the talented incumbent is that it insulates the untalented incumbent from the disciplining effect of the takeover market, thus allowing him to dissipate share value. Since the equity market is unable to distinguish perfectly between talented and untalented incumbents *ex ante*, it affects the talented incumbent's firm share price as well to some degree, which, in turn, leads to a dilution in his post-IPO equity holding and thereby his long-term cash flow from the firm. However, the greater the talented incumbent's reputation, the smaller this cost imposed on the talented manager due to having to pool with the untalented manager. Part (i) above shows that as the difference in intrinsic value between the long-term and short-term project increases, the cost-benefit trade-off between a dual class and single class IPO favors a dual class IPO for lower levels of the incumbent's reputation, making dual class his equilibrium choice.

However, a dual class share structure also offers the talented incumbent advantages in terms of private benefits. This arises from the fact that under a dual class share structure he is insulated from the takeover market and does not have any chance of losing control, in contrast to the single class share structure, under which a talented incumbent exerting effort may lose control with some probability (if outsiders get a bad intermediate signal of the incumbent's progress in project implementation). This advantage (in the expected value of private benefits) of a dual class share structure over a single class share structure is increasing in the level of the incumbent's private benefits from the firm,  $B$  (the greater the level of private benefits, the more the incumbent has to lose if a rival takes over), and the extent of takeover activities in the firm's industry,  $\phi$  (the greater the probability of a rival arriving, the greater the chance that the incumbent will lose control). Therefore, the higher the levels of each of these two variables, the lower the reputation level at which the incumbent chooses a dual class IPO share structure over a single class IPO share structure in equilibrium (as shown in parts (ii) and (iii) respectively of the above proposition).

In the rest of this section, we will compare the IPO prices and operating performance of the firms in these two equilibria.

**Proposition 4** (*Comparison of Share Values and Post-IPO Operating Performance in Dual Class and Single Class IPOs*).

(i) *Let the reputation of incumbent management be high and the difference in intrinsic values between the long-term and the short-term projects be large. Then, a dual class share structure maximizes shareholders' value. Further,*

*the post-IPO operating performance of such firms undertaking dual class IPOs will be better than similar firms undertaking single class IPOs.*

*(ii) Let the reputation of incumbent management of a firm be low and the difference in intrinsic values between the long-term and short-term projects available to firms be small. Then, single class IPO share structure maximizes shareholders' value. Further, the post-IPO operating performance of such firms undertaking dual class IPOs will be worse than similar firms undertaking single class IPOs.*

As discussed under proposition 3, the talented incumbent (who drives the equilibrium, since the untalented incumbent mimics the talented one) chooses between dual class and single class IPOs with the objective of maximizing the sum of his security (cash flow) and private benefits. However, this means that the talented incumbent's choice between dual class and single class IPOs need not necessarily be the one which maximizes shareholders' value (and subsequent operating performance) since it may also be driven by considerations of maximizing the expected value of his private benefits. When the difference between the expected cash flows from the long-term and short-term projects is large, the additional value that can be created by the incumbent implementing a long-term (as in a dual class IPO) rather than a short-term project (as in a single class IPO) is large. At the same time, if the incumbent's reputation is high, the market assesses a high probability that the incumbent is talented, so that the reduction in share value arising from the talented incumbent having to pool with an untalented one (who uses the dual class share structure to slack off by not exerting effort) is small. In such a situation, if an incumbent chooses a dual class share structure for its IPO, it not only maximizes his personal objective, but also maximizes shareholders' value and operating performance (as shown in part (i) above).

Conversely, if an incumbent chooses a single class IPO share structure in a situation where his reputation is low and the difference in expected cash flows between the long-term and short-term projects is small, then a single class IPO share structure maximizes not only the talented incumbent's objective (making it the equilibrium choice) but also maximizes shareholders' value (as shown in part (ii) above). This is because, the additional value that can be created by the talented incumbent implementing a long-term project instead of a short-term project (using a dual class share structure) is small and the advantage of the single class share structure of disciplining the untalented incumbent is large (since the incumbent's reputation is low).

## 4 The Dynamic Model

In this section, we build upon the single-period model discussed in last section to develop a dynamic model (two-period, three dates: 0, 1, and 2) to incorporate the possibility that the firm can change its share structure after the cash flows of the project in the first period are realized. We assume in this section that the firm has two projects, one in each period: the first project arrives at time 0 (as in the single-period model), and the second project arrives at time 1.

At time 1, the firm implements its second period project, which requires an investment amount of  $I_2$ .<sup>11</sup> To implement the new project, the firm needs to issue new shares in an SEO (seasoned equity offering).<sup>12</sup> At time 1, the incumbent will observe the cash flow realization of his firm's first project, but outside investors will only observe it later (after firms make their decisions on their share structures in the second period and announce them). The share structure by the firm in the second period may or may not be different from that in the first period. If a firm has a dual class share structure in the first period, its incumbent can choose to stay with it, or to have a share unification, which will give his firm a single class share structure in the second period. Similarly, if a firm has a single class share structure in the first period, its incumbent can choose to stay with it, or to have a dual class recapitalization, which will give his firm a dual class share structure in the second period. After the second period share structure is chosen, and after outside investors observe the cash flow realization of the firm's first project, the new shares are issued in an SEO and the second project is implemented.

After time 1, a noisy intermediate signal about the second period project of the firm will arrive to outside investors. After outside investors receive these intermediate signals, a new rival may arrive with probability  $\phi_2$ , buying shares from outside investors, and trying to take over the firm in a control contest. At time 2, all cash flows are realized and all information asymmetry is resolved.

The sequence of events in the dynamic model is given in Figure 2.

The properties of the second period project is very similar to the first period project. In addition, the distribution of the second period intermediate signal is also very similar to the first period intermediate signal. Note that

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<sup>11</sup>From now onward, we use subscripts 1 and 2 to denote periods 1 and 2, respectively. All relevant probabilities and other variables will carry such subscripts.

<sup>12</sup>We assume that the firm can not raise the investment for both projects together at time 0. To understand this assumption, consider the case where the probability of having a second project is very small. Thus if any incumbent raises money for two projects at time 0, outside investors will believe that the chance of the incumbent wasting the investment for the second project is very high. Hence the IPO price will be very low so that no incumbent will choose to raise money for two projects at time 0.

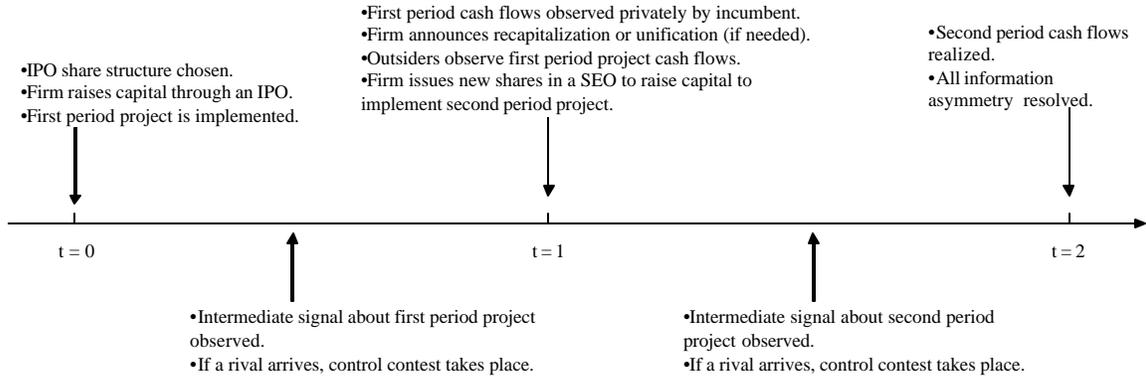


Figure 2: Sequence of events in the dynamic model

$\delta_{2s} > \psi_{2s} > \delta_{2l} > \psi_{2l} > \psi'_{2l} = \psi'_{2s}$ , similar to our assumption about these probabilities regarding the first period project ( $\delta_{1s} > \psi_{1s} > \delta_{1l} > \psi_{1l} > \psi'_{1l} = \psi'_{1s}$ ) for the reasons given in the single-period model. Furthermore, we assume that the ability of the second period rival is the same as that of the first period rival.

In the dynamic model, the objective of both types of incumbents is to maximize the sum of the first period and second period cash flows they get from the two projects, and the private benefits from controlling the firm over the two periods (taking into consideration of the effort cost in the case of the untalented incumbent). Outside investors and rival price equity in a competitive equity market using rational expectations.

There are many reasons for which an incumbent may choose to change his firm's share structure at time 1. We will discuss three of them here. The first reason is the change in an incumbent's reputation (this is the reason we concentrate on in the propositions in this section). When the reputation of an incumbent is higher, a dual class share structure is more beneficial to him (see proposition 4), and he is more likely to stay with a dual class share structure (if his firm has such a share structure in the first period) or have a dual class recapitalization (if his firm has a single class share structure in the first period) in the second period. Otherwise he is more likely to stay with a single class share structure (if his firm has such a share structure in the first period) or have a share unification (if his firm has a dual class share structure in the first period) in the second period.

The second reason is the change in the properties of the projects the firms are facing (see proposition 3(i)). When the NPV of a long-term project becomes larger than that of a short-term project, the incumbents are more likely to stay with dual class share structures or have dual class recapitalizations in the second period. Otherwise they are

more likely to stay with single class share structures or have share unifications in the second period.

The third reason is the change in the distribution of the probability that a rival may arrive (see proposition 3(ii)). When the chance of a rival arriving increases, dual class share structure becomes more appealing to the incumbents. Thus they are more likely to stay with dual class share structures or have dual class recapitalizations in the second period. Otherwise they are more likely to stay with single class share structures or have share unifications in the second period.

In the following two propositions, we will characterize the equilibrium behavior of the two types of incumbents, outside investors, and the rivals in the dynamic model. Proposition 5 describes the equilibrium evolution of share structure over time in a situation where the incumbent chooses a dual class IPO at time 0. Proposition 6 describes the equilibrium evolution of share structure over time in a situation where the incumbent chooses a single class IPO at time 0.

For an equilibrium where both types of the incumbents choose to have a dual class IPO, and then have a share unification at time 1 if the cash flow realizations of their firms' first projects is low to exist, the reputation of the incumbent, the project value, the private benefits, the distribution of the rival, and the effort cost have to be such that both types of the incumbents will be better off if they choose to do so rather than making any out-of-equilibrium moves. Furthermore, keeping all the other parameters unchanged, the reputation of the incumbent has to be high enough such that it is more beneficial for him to be in an equilibrium of dual class IPOs than in an equilibrium of single class IPOs. More specifically, the payoff for a talented incumbent in such an equilibrium is:

$$\Pi_D^T = \delta_{1l}\eta_{1l}\Pi_{DGD}^T + \delta_{1l}(1 - \eta_{1l})\Pi_{DGS}^T + (1 - \delta_{1l})\eta_{1l}\Pi_{DBD}^T + (1 - \delta_{1l})(1 - \eta_{1l})\Pi_{DBS}^T, \quad (10)$$

where  $\Pi_{DGD}^T$  ( $\Pi_{DBD}^T$ ) is a type  $T$  incumbent's payoffs when his firm receives a good (bad) realization of the first period intermediate signal and a good realization of the first period cash flow, and  $\Pi_{DGS}^T$  ( $\Pi_{DBS}^T$ ) is his payoffs when his firm receives a good (bad) realization of the first period intermediate signal and a bad realization of the first period cash flow. The payoff for a type  $U$  incumbent in such an equilibrium is:

$$\Pi_D^U = \psi'_{1l}\beta'_{1l}\Pi_{DGD}^U + \psi'_{1l}(1 - \beta'_{1l})\Pi_{DGS}^U + (1 - \psi'_{1l})\beta'_{1l}\Pi_{DBD}^U + (1 - \psi'_{1l})(1 - \beta'_{1l})\Pi_{DBS}^U, \quad (11)$$

where  $\Pi_{DGD}^U$  ( $\Pi_{DBD}^U$ ) is a type  $U$  incumbent's payoffs when his firm receives a good (bad) realization of the first period intermediate signal and a good realization of the first period cash flow, and  $\Pi_{DGS}^U$  ( $\Pi_{DBS}^U$ ) is his payoffs when

his firm receives a good (bad) realization of the first period intermediate signal and a bad realization of the first period cash flow. In an equilibrium of single class IPOs (as specified in proposition 6), the payoff for a talented incumbent is:

$$\begin{aligned}\Pi_S^T &= \delta_{1s}\eta_{1s}\Pi_{SGD}^T + \delta_{1s}(1-\eta_{1s})\Pi_{SGS}^T + (1-\phi_1)(1-\delta_{1s})\eta_{1s}\Pi_{SBD}^T + \\ &\quad (1-\phi_1)(1-\delta_{1s})(1-\eta_{1s})\Pi_{SBS}^T + \phi_1(1-\delta_{1s})\Pi^R,\end{aligned}\tag{12}$$

where  $\Pi_{SGD}^T$  ( $\Pi_{SBD}^T$ ) is a type  $T$  incumbent's payoffs when his firm receives a good (bad) realization of the first period intermediate signal and a good realization of the first period cash flow, and  $\Pi_{SGS}^T$  ( $\Pi_{SBS}^T$ ) is his payoffs when his firm receives a good (bad) realization of the first period intermediate signal and a bad realization of the first period cash flow.  $\Pi^R$  is his payoff when his firm is taken over by a rival in the first period. Similarly, the payoff for an untalented incumbent is:

$$\begin{aligned}\Pi_S^U &= \psi_{1s}\beta_{1s}\Pi_{SGD}^U + \psi_{1s}(1-\beta_{1s})\Pi_{SGS}^U + (1-\phi_1)(1-\psi_{1s})\beta_{1s}\Pi_{SBD}^U + \\ &\quad (1-\phi_1)(1-\psi_{1s})(1-\beta_{1s})\Pi_{SBS}^U + \phi_1(1-\psi_{1s})\Pi^R,\end{aligned}\tag{13}$$

where  $\Pi_{SGD}^U$  ( $\Pi_{SBD}^U$ ) is a type  $U$  incumbent's payoffs when his firm receives a good (bad) realization of the first period intermediate signal and a good realization of the first period cash flow, and  $\Pi_{SGS}^U$  ( $\Pi_{SBS}^U$ ) is his payoffs when his firm receives a good (bad) realization of the first period intermediate signal and a bad realization of the first period cash flow.

**Proposition 5 (*Equilibrium Evolution of Share Structure in Dual Class IPOs*).** *Let the first period and second period projects of a firm be similar, and the incumbent's private benefits and the extent of takeover activity in the two periods also be similar. Then, if the incumbent's reputation at time 0 and the difference in intrinsic values between the long-term and the short-term projects is large enough, there exists an equilibrium involving the following:*

**The talented ( $T$ ) incumbent:** *He chooses to have a dual class IPO at time 0, raising a total amount of  $I_1$  to implement a long-term project in the first period. He announces a share unification at time 1 and implements a short-term project in the second period if the cash flow realization of his firm's first period project is low. Otherwise his will keep the dual class share structure for his firm and implement a long-term project in the second period.*

**The untalented ( $U$ ) incumbent:** *He chooses to have a dual class IPO at time 0, raising a total amount of  $I_1$  to implement a long-term project in the first period, and he exerts no effort in implementing it. He announces a*

share unification at time 1, implements a short-term project in the second period (exerting effort) if the cash flow realization of his firm's first period project is low. Otherwise he will keep the dual class share structure for his firm, implements a long-term project in the second period, and exerts no effort in implementing it.

**First period rival:** If a rival arrives, he invests all of his wealth,  $W_{1R}$ , in buying shares from outside investors, but he will not be able to take over the firm.

**Second period rival:** If a rival arrives, he invests all of his wealth,  $W_{2R}$ , in buying shares from outside investors. He will take over a firm if it announces a share unification at time 1, and receives a bad second period intermediate signal. Otherwise he will not be able to take over the firm.

The intuition behind the incumbent's choice of a dual class share structure for his IPO is very similar in the dynamic model to that in the sing-period model (see the discussion under proposition 1). As in the single-period model, here also the equilibrium is driven by the talented incumbent's choices; the untalented incumbent finds it optimal to mimic the talented incumbent). There are three effects that determine the talented incumbent's choice between a dual class share structure and a single class share structure, either for the firm's IPO or its SEO. First, the insulation from the takeover market provided by a dual class share structure, which allows the talented incumbent to implement long-term projects rather than short-term projects, creating additional value. Second, the loss of the disciplining effect of the takeover market under a dual class share structure, which allows the untalented incumbent to dissipate value by not exerting effort (and which is reflected in the firm's share price, either in an IPO or in an SEO). Third, the greater expected value of private benefits to the incumbent under a dual class share structure compared to that under a single class share structure, arising again from the insulation from the takeover market provided by a dual class share structure. When the difference in intrinsic values between the long-term and the short-term project is large, the first effect (which favors a dual class IPO share structure) is large. At the same time, when the incumbent's reputation is large, the second effect (which favors the talented incumbent choosing a single class IPO) is small (since, in this case, the market assesses only a low probability that the incumbent is untalented). Therefore, the net of the first two effects favors the incumbent choosing a dual class IPO under the conditions specified in this proposition. Since the third (private benefits) effect always favors a dual class IPO share structure, dual class IPOs are the incumbent's equilibrium choice in this case.

At the end of the first period (i.e., at time 1), the incumbent comes to know the realization of his first period

project's cash flows. At this point, the talented incumbent has to decide on the share structure to be adopted for his SEO. The trade-off between a dual class and a single class share structure depends upon the three factors discussed above in the context of the talented incumbent's choice of IPO share structure. However, the talented incumbent knows that outside investors will price his firm's equity in the SEO knowing how well (or poorly) the incumbent performed in implementing the firm's first period project. If the firm's first period cash flow is high, outsiders would update his reputation (i.e., the probability that he is talented) upward, while, if this cash flow is low, they would update it downward. Therefore, even though the three effects mentioned above are the same, their magnitudes will be different at time 1 compared to their magnitudes at time 0.

Thus, if the firm's first period cash flow was low (and the talented incumbent's reputation will be significantly lower at time 1 at the time of the SEO compared to time 0 at the time of the IPO), then the second effect (the effect of the loss of the disciplining effect of the takeover market on the untalented incumbent under a dual class structure) becomes significantly larger, while the first effect becomes smaller and the third effect remains essentially unchanged. Therefore, the second effect may now dominate the first and the third effects, in which case the talented incumbent will choose a single class share structure for his SEO, and announce an unification at time 1. As in the case of the choice of share structure in an IPO, the untalented incumbent will continue to find it optimal to mimic the talented one at time 1, announcing a unification as well. This is because, while he has to incur greater effort costs under a single class share structure, and also suffer the probability of loss of control to a second period rival (if the intermediate signal about the second period project is not good), he will suffer even greater losses arising from a lower SEO share price (and resulting dilution in his equity holdings) if he were to retain a dual class share structure (since he would be revealed as untalented with probability one in this case).

On the other hand, if the firm's first period cash flow is high, the market will update the talented incumbent's reputation upward. In this case, the talented incumbent will retain a dual class share structure in the SEO, for the same reasons (and based on the same three effects) that led him to choose a dual class IPO in the first place. The first effect will now be larger than the second (which will be smaller, since the incumbent's reputation is higher) and the third effect remains unchanged, so that a dual class SEO will be the incumbent's equilibrium choice. The untalented incumbent will also find it optimal to mimic a talented incumbent by retaining the dual class share structure if the firm's first period cash flow is high (since he obtains a higher SEO share price, incurs no effort cost, and obtains

higher expected value of private benefits in this case compared to the case where he deviates by choosing a single class IPO, thus revealing his type with probability one).

The equilibrium in proposition 6 describes the scenario where the incumbent chooses to have a single class IPO at time 0, and then chooses to have a share recapitalization at time 1 if the cash flow realization of his firm's first period project is high. We call it the equilibrium of single class IPOs.

**Proposition 6 (*Equilibrium Evolution of Share Structure in Single Class IPOs*).** *Let the first period and second period projects of a firm be similar, and the incumbent's private benefits and the extent of takeover activity in the two periods also be similar. Then, if the incumbent's reputation at time 0 and the difference in intrinsic values between the long-term and the short-term projects is small enough, there exists an equilibrium involving the following:*

**The talented ( $T$ ) incumbent:** *He chooses to have a single class IPO at time 0, raising a total amount of  $I_1$  to implement a short-term project in the first period. He announces a dual class recapitalization at time 1 and implements a long-term project in the second period if the cash flow realization of his firm's first period project is high. Otherwise he will keep the single class share structure for his firm and implement a short-term project in the second period.*

**The untalented ( $U$ ) incumbent:** *He chooses to have a single class IPO at time 0, raising a total amount of  $I_1$  to implement a short-term project in the first period, and exerts effort in implementing it. He announces a dual class recapitalization at time 1, implement a long-term project in the second period (and exert no effort) if the cash flow realization of his firm's first period project is high. Otherwise he will keep the single class share structure for his firm, implement a short-term project in the second period, and exerts effort.*

**First period rival:** *If he arrives, he invests all of his wealth,  $W_{1R}$ , in buying shares from outside investors. He will take over the firm if the realization of its first period intermediate signal is bad. Otherwise the incumbent will remain in control of the firm in the first period.*

**Second period rival:** *If the firm has not been taken over at time 1, and if he arrives, he invests all of his wealth,  $W_{2R}$ , in buying shares from outside investors. He will take over the firm if it has a single class share structure at the time when he arrives, and if the realization of its second period intermediate signal is bad. Otherwise the incumbent will remain in control of the firm in the second period as well.*

The intuition behind the incumbent's choice of a single class share structure for his IPO is very similar in the

dynamic model to that in the single-period model (see the discussion under proposition 2). As in the single-period model, here also the equilibrium is driven by the choices made by the talented incumbent. As discussed under the previous proposition, there are three effects which determine a talented incumbent's choice between single class and dual class IPOs. The first effect is the fact that while the incumbent can implement a long-term project under a dual class share structure, he will only undertake a short-term project under the single class share structure. This effect favors a dual class share structure over a single class share structure, but is small when the difference between the intrinsic values of the long-term and short-term project is small. The second effect is the disciplining effect of the takeover market on the untalented incumbent, which induces him to exert effort, thus increasing project cash flows (and which is reflected in even a talented incumbent's firm's share price, whether in an SEO or in an IPO, since the market cannot perfectly distinguish between the two types of incumbents). Since there is such a disciplining effect under a single class share structure but no such effect under a dual class share structure, this effect favors a single class IPO over a dual class IPO; further, this effect is large when the incumbent's reputation is small (since, in this case, the equity market assesses a high probability that the incumbent is untalented, so the impact of this effect on share price is large). The third effect, which results in the incumbent receiving a higher expected value of his private benefits under a dual class share structure than under a single class share structure, also favors a dual class IPO. However, when the difference in intrinsic values between the long-term and short-term project is small, and the incumbent's reputation is small, the second effect dominates the first and third effects, so that the talented incumbent chooses a single class IPO at time 0. The untalented incumbent is better off mimicking untalented incumbent in equilibrium. This is because, while he has to incur the cost of exerting effort under a single class share structure, and also receives lower benefits of control, the cost of deviating is that he will be revealed as untalented with probability one, thus yielding him a much lower share price in the IPO compared to the share price he can obtain by mimicking a talented incumbent.

The talented incumbent's choice between a dual class and single class share structure for the firm's SEO (at time 1) is also driven by the three effects discussed above, except that by the date of the SEO, the market comes to know about the realization of the firm's first period project cash flow, and updates the incumbent's reputation accordingly.<sup>13</sup> If the realization of the firm's first period project cash flow is low, the market updates the incumbent's

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<sup>13</sup>Note that at the end of the first period, outside investors only update the reputation of the incumbents whose firms are not taken over by the rivals in the first period, and adjust the share prices of these firms accordingly. For the firms that are taken over in the first period, there is no uncertainty about their values in both periods, and their share prices are adjusted to their true values at time 1.

reputation downward, and the incumbent retains the firm's single class share structure for its SEO as well (since, in this case, the second effect continues to be greater than the combination of the first and third effects). If, however, the realization of the firm's first period project cash flow is high, the market revises the incumbent's reputation upward. As a result of this, the second effect becomes smaller (since the market assesses a smaller probability that the incumbent is untalented, the effect of the disciplining effect of the takeover market on the firm's share price becomes smaller) while the first effect becomes larger (since it is the talented incumbent who can create additional value by undertaking the long-term project, the effect of this value creation on share price is greater as the market's probability assessment that the incumbent is talented is larger), and the third effect (the differences in the expected value of the incumbent's private benefits under the two share structures) is unchanged. If the combination of the first and third effects (which favors a dual class share structure) dominates the second effect (which favors a single class share structure) at the talented incumbent's revised reputation level, then he chooses a dual class share structure for his SEO, and announces a share recapitalization. Under these circumstances, the untalented incumbent also chooses a dual class share structure for his SEO, since he is clearly better off mimicking the talented incumbent (apart from the higher share price he obtains by mimicking the talented incumbent, he is able to slack off under the dual class share structure, avoiding the cost of exerting effort; he also obtains a greater expected value of his control benefits, since there is no chance of loss of control under a dual class share structure).

**Proposition 7 (*Announcement Effect and Subsequent Operating Performance upon a Share Unification*).** *Within the set of firms announcing a share unification: (i) If the incumbent management's reputation is low, the announcement effect of a share unification will be positive. (ii) If the incumbent management's reputation is high, the announcement effect of a share unification will be negative. (iii) The average operating performance of a firm will improve subsequent to a share unification.*

As discussed under proposition 5, the incumbent's choice of share structure in the SEO involves three effects: the first effect, dealing with the incremental value creation from a long-term project relative to a short-term project, which will be lost under a single class share structure; the second effect, arising from the disciplining effect of a single class share structure; and the third effect, arising from the lower expected value of the incumbent's control benefits under a single class share structure. While the incumbent will choose to have a single class share structure if the second effect dominates the first and third effects, only the first and second effects affect the firm's share price (since

the third effect affects only the incumbent's personal objective). There is, however, a fourth effect which affects the equity market reaction to a share unification: the fact that there is information asymmetry between the incumbent and outside investors about the realization of the firm's first period project cash flow, which gets resolved upon the announcement of a share unification (since outside investors infer from the announcement of unification that the firm's first period cash flow was low).<sup>14</sup> Thus, if the second effect (under which the incremental value created will be more in a firm having a single class share structure compared to a dual class share structure) dominates the first effect (under which the incremental value created will be less in a firm having a single class share structure than in a dual class share structure) and the fourth effect (which also results in the share price being lower, since the market infers that the firm's first period cash flow realization is the lower of the two possible values), then the announcement effect of a share unification will be positive. Conversely, if the combination of the first and fourth effects dominates the second effect, then the announcement effect will be negative. Since the first ("value creation by undertaking the long-term project") effect is lower with lower incumbent reputation and the second ("disciplining") effect is higher with lower management reputation, and the fourth effect is unaffected by managerial reputation, this implies that in a sample of firms announcing a share unification, the subsample of firms with incumbents with lower reputation will have positive announcement effects; those with higher incumbent reputation will have negative announcement effects.

Finally, since the fourth effect does not affect a firm's *future operating performance*, the second (disciplining) effect discussed above dominates the first (value creation by undertaking the long-term project) effect for all firms which choose a share unification, so that operating performance improves subsequent to a share unification.

**Proposition 8 (*Announcement Effect and Subsequent Operating Performance upon a Dual Class Share Recapitalization*).** *Within the set of firms announcing a share recapitalization: (i) If the incumbent management's reputation is high, the announcement effect of a share recapitalization will be positive. In this case, the average operating performance will improve or remain the same subsequent to a recapitalization. (ii) If the incumbent management's reputation is low, the announcement effect of a share recapitalization will be negative. In this case, the firm's average operating performance will deteriorate subsequent to a recapitalization.*

<sup>14</sup>Since the incumbent realizes that the firm's first period cash flow would be public information by the time the firm makes its SEO, the incumbent cannot benefit from attempting to mislead the market by announcing a dual class SEO share structure when his objective is truly maximized by a single class SEO share structure or by announcing a single class SEO share structure when his objective is truly maximized by a dual class share structure (in the equilibrium in proposition 5). Therefore, this fourth effect does not enter into the incumbent's choice between a single class and a dual class share structure for this firm's SEO.

The announcement effect of a share recapitalization on the firm's equity will be positive if investors revise their expectation firm's future cash flows upward upon hearing the announcement; announcement effect will be negative if investors revise this expectation downward. As discussed under a firm's decision whether or not to undertake a recapitalization depends on three effects: the first (value creation by focusing on the long-term rather than on the short-term) effect, which favors recapitalization; the second (disciplining) effect, which favors retaining a single class share structure; and a third effect (effect of share structure on the incumbent's expected value of private benefits), which favors recapitalization: recapitalization occurs when the first and third effect together dominate the second. However, the announcement effect of a share recapitalization depends only on the first and second effect above (since the third effect above does not affect share price), plus a fourth effect similar to that discussed under the previous proposition: the effect of outside shareholders' inferring from the recapitalization announcement that the realization of the firm's first period project cash flow was high (this last effect affects share price positively). If the combination of the first and fourth effect dominates the second, the net effect of the recapitalization announcement on the firm's share price will be positive. Further, if the first effect alone dominates the second, recapitalization improves the firm's operating performance as well. If, however, the second effect dominates the combination of the first and fourth effects, then the announcement effect of a recapitalization will be negative. Further, in this case the operating performance of the firm will determine subsequent to recapitalization as well.

## 5 Equilibrium Voting Ratio in Dual Class IPOs

We now study an extension to our basic model. In our basic model, the voting ratio between supervoting and ordinary shares was exogenous: we assumed that this ratio was large enough that if the incumbent chooses a dual class share structure, he is guaranteed to maintain in control against any rival. In this section, we endogenize the voting ratio in a dual class share structure, assuming that the incumbent simultaneously chooses the share structure and the voting ratio (in the case of a dual class share structure) at the time of his firm's IPO at time 0. This means that, in some cases, the voting ratio chosen by the incumbent may be such that even with a dual class share structure, the incumbent may lose control to a rival.

We relax two other assumptions from our basic model in this section. First, we assume that the rival may have two possible levels of ability: high ability or low ability. We assume that the high ability rival can generate a cash

flow of  $C_R$  for the firm, while the low ability rival can generate a cash flow of  $C'_R < C_R$ . The ability levels of both the low ability and the high ability rivals are in between that of the talented and untalented incumbents, so that:  $\eta_s C_H + (1 - \eta_s) C_L > C_R > C'_R > \beta_s C_H + (1 - \beta_s) C_L$ . We assume that the probability of a high ability rival arriving is  $\phi$ ; that of a low ability rival arriving is  $\phi'$ ; and that of no rival arriving is  $(1 - \phi - \phi')$ . Second, unlike in the basic model, we now allow incumbents to exert two different effort levels (in addition to zero effort), with the corresponding costs to untalented incumbents denoted by  $e$  and  $\hat{e}$ ,  $\hat{e} < e$ . As in the basic model, the talented incumbent has a zero cost of effort, so that he will always exert high effort.

We now characterize the equilibrium in the above setting.

**Proposition 9 (Equilibrium Choice of Share Structure and Voting Ratio).** *(i) If the incumbent's reputation is high enough and the difference in intrinsic value between the long-term and the short-term project is large (i.e., above a threshold value), there exists an equilibrium where the incumbent chooses a dual class IPO at time 0. In this equilibrium:*

*(a) If the private benefits of control from the firm are high, both talented (T) and untalented (U) incumbents choose to have a dual class IPO with a high voting ratio  $t_H$  and implement a long-term project. The untalented (U) incumbent does not exert effort. The firm will never be taken over by any type of rival.*

*(b) If the private benefits of control from the firm are small, both talented (T) and untalented (U) incumbents choose to have a dual class IPO with a low voting ratio  $t_L$  and implement a long-term project. The untalented (U) incumbent exerts low effort. The firm will be taken over by a high ability rival (if he arrives) if the realization of the intermediate signal is bad. It will never be taken over by a low ability rival.*

*(ii) If the incumbent's reputation is low enough and the difference in intrinsic value between the long-term and the short-term project is small (i.e., below a threshold value), there exist an equilibrium where the incumbent chooses a single class IPO at time 0. In this equilibrium, both talented (T) and untalented (U) incumbents choose to have a single class IPO and implement a short-term project. The untalented (U) incumbent exerts high effort. The firm will always be taken over by a high ability rival (if he arrives). It will be taken over by a low ability rival (if he arrives) if the realization of the intermediate signal is bad.*

As in previous propositions, the equilibrium choices here also are driven by those made by a talented incumbent, since the untalented incumbent is better off mimicking the talented incumbent in equilibrium. In the above equi-

librium, the trade offs faced by the talented incumbent in choosing between a single class and a dual class share structure are similar to those in the basic model, so that we will not discuss them here. Within a dual class share structure, however, the incumbent's choice between a high voting ratio and a low voting ratio depends on his trade off between security and control benefits. A high voting ratio dual class share structure has two advantages over a low voting ratio dual class share structure from the point of view of a talented incumbent. The first advantage of a high voting ratio dual class share structure over a low voting ratio dual class share structure is that it is able to deter both the high ability and the low ability rivals from taking over the firm, thus ensuring that the incumbent can always maintain control (and thus enjoy his control benefits with probability 1). The second advantage of a high voting ratio dual class share structure over a low voting ratio dual class share structure arises from a "long-term value creation effect." This effect arises from the fact that, even though both types of incumbents implement a long-term rather than a short-term project under both a high voting ratio and a low voting ratio dual class share structure, at time 0, the expected value created will be smaller under the low voting ratio share structure, since a talented incumbent may lose control to a high ability rival in the event of a bad realization of the intermediate signal, thereby reducing firm value (since the talented incumbent implementing a long-term project can in fact create greater value than a high ability rival).<sup>15</sup> On the other hand, the advantage of a low voting ratio dual class share structure over a high voting ratio share structure is that, the risk of the incumbent losing control (to a high ability rival) exerts a disciplining effect on an untalented incumbent (inducing him to exert a low level of effort, compared to no effort under the high voting ratio dual class share structure). As discussed under the basic model, this disciplining effect has a positive effect on the share price of even a talented incumbent, since the market cannot distinguish perfectly between the two. When the control benefits from the firm are large, the advantages of a high voting ratio relative to a low voting ratio (the combination of the control benefits and long-term value creation effect) dominate its disadvantage (in terms of a reduced IPO price arising from the loss of the above disciplining effect), and the incumbent chooses a dual class share structure with a high voting ratio. On the other hand, when the incumbent's control benefits are small (but still in the range of values where the incumbent chooses a dual class IPO), the disadvantage of a high voting ratio dominates, and the incumbent chooses a dual class share structure with a low voting ratio.

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<sup>15</sup>However, this difference in long-term value creation effect between a high voting ratio and low voting ratio dual class share structure is smaller than the corresponding difference between a dual class and a single class share structure (since the incumbent implements a long-term project under a high voting ratio or a low voting ratio dual class share structure, but he implements a short-term project under a single class share structure).

**Proposition 10 (*Share Value Improvement with Restriction on Voting Ratio*).** *If the maximum voting ratio between supervoting shares and ordinary shares is restricted to  $\hat{t}$  (where  $t_H > \hat{t} > t_L$ ), then the share value of the firm will be greater than if no such restriction is imposed.*

As we saw from the previous proposition, an incumbent chooses a dual class share structure with a high rather than a low voting ratio when the combination of the control benefits and the long-term value creation effect dominates the loss of discipline effect. In many of these situations (when the incumbent's control benefits are large), the loss of discipline effect dominates the value creation effect, so that the incumbent's choice of a high voting ratio over a low voting ratio is driven primarily from his desire to maximize control benefits (and does not arise from considerations of value creation). In such situations, putting an upper limit on maximum voting ratio that can be chosen forces the incumbent to adopt the low voting ratio, increasing shareholder value.

## 6 Implications and Testable Hypotheses

1. *The prevalence of dual class IPOs:* Our model has predictions about the kinds of firms that will choose to have dual class rather than single class IPOs. First, our model predicts that dual class IPOs are more likely to be prevalent in industries where a considerable amount of value can be created by making investments in pursuit of long-term strategic goals while ignoring short-term trends. One example of such industry is the newspaper industry, where editorial independence needs to be protected, and cultivating a particular clientele over the long-run (while ignoring short-run value benefits) may be important: e.g., liberal (and somewhat more left-wing) readers in the case of the New York Times Co. and conservative (and more right-wing) readers in the case of Dow Jones and Co. (which owns the Wall Street Journal). A second example is the movie industry, where large and expansive investments need to be made (often in opposition to conventional wisdom) in the hope of long-term payoffs. Similar examples can be found in other industries where large amounts need to be invested in Research and Development in the hope of achieving great long-term payoffs, but with little chance of short-run success. Second, our model predicts that dual class IPOs are likely to be associated with family-owned firms and other firms run by high reputation managements (e.g., founding entrepreneurs, as in the case of Sergey Brin and Larry Page of Google or Warren Buffett of Berkshire Hathaway). Thus, our model predicts that, greater the reputation of firm management, greater the likelihood of

dual class share structures and other antitakeover provisions in a firm's IPO shareholder charter. Third, our model predicts, consistent with the argument made by corporate governance activists, that dual class share structures will also be prevalent in the IPOs of firms where incumbent management enjoys large private benefits of control (in a bid to preserve these managements' private benefits). However, in our setting, such private benefits are only one among the many factors which drive firms to adopt a dual class shareholder and other antitakeover provisions.

2. *Dynamic evolution of share structure following dual class IPOs:* Our model has several predictions about how the share structure of a firm will evolve over time following a dual class IPO. First, our model predicts that, of the firms undertaking dual class IPOs, those which perform poorly subsequent to the IPO over time (and whose incumbent management's reputation has declined over time, for this as well as any other reason) are more likely to have share unifications. In contrast, firms that perform well and whose incumbent managements retain a high reputation are unlikely to have a share unification. Second, our model predicts that firms are likely to have a share unification when the founding entrepreneur or other high reputation incumbent retires, transferring control to professional managers.<sup>16</sup> Third, our model predicts that firms are likely to have share unifications as the industry the firm is operating in matures (reducing the difference in intrinsic values between long-term and short-term projects available to firms in that industry), or undergoes drastic changes in the product market (e.g., increase in competition in the product market, with a resulting reduction in the private benefits of control accruing to firm management).

3. *Dynamic evolution of share structure following single class IPOs:* Our model has several predictions regarding the situations in which firms undergo dual class recapitalizations (creation of a new class of shares with superior or inferior voting rights). First, our model predicts that firms undergoing dual class recapitalizations are those which have performed well in the recent past and which incumbent managements have maintained a high reputation, and which are therefore confident of raising new equity capital even with a dual class share structure without excessive dilution in insiders' cash flow holdings. Second, our model predicts that firms undergoing dual class recapitalizations will be more prevalent in industries when the extent of takeover activity has increased recently. The recapitalization wave of the eighties seems to have been triggered by such conditions. Third, our model predicts that firms which undergo drastic changes in the product market (such as entry into a dramatically new market place, rapid technological change in the existing product market requiring the firm to make risky long-term investment with no guarantees of

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<sup>16</sup>An example of such a situation is the share unification of Robert Mondavi Corp., which eliminated the firm's class B shares, thus reducing the Mondavi family's voting power from 84.9% to 39.5%. The overhaul of the corporate structure at Robert Mondavi Corp. began when founder and chairman Emeritus Robert Mondavi stepped down from the company's board of directors.

high short-term returns) may also undergo recapitalization to provide management with some degree of insulation from the takeover market.

4. *Comparison of share value maximization and operating performance in dual class versus single class IPOs:* First, our model predicts that dual class IPOs maximize shareholder value if the incumbent management's reputation is high, and the firm is operating in an industry where the difference between the intrinsic values of long-term and short-term projects is large. Second, single class IPOs maximize shareholder value if the incumbent management's reputation is small, and the firm is operating in an industry where the difference between the long-term and short-term projects available is small. This implies that, if we compare post-IPO operating performance by constructing industry and size-matched samples of firms undertaking dual class and single class IPOs, and split each sample into two based on managerial reputation, the higher reputation dual class subsample will outperform the higher reputation single class subsample; however, the lower reputation dual class IPO subsample will underperform the lower reputation single class IPO subsample. Though they do not perform such a split sample comparison, evidence provided by Bohmer, Sanger, and Varshney (1998) is broadly consistent with the above prediction of our model: they find that dual class IPO firms in their sample outperform industry and size-matched single class IPO counterparts in terms of post-IPO accounting performance.

5. *Announcement effects of share unifications and subsequent operating performance:* First, our model predicts that, within the class of firms announcing share unifications (abolishing dual class structures), the announcement effect will be positive on ordinary shares (usually held by outsiders) if the incumbent management's reputation is low and negative if this reputation is high. Second, it predicts that the operating performance of firms will improve (unambiguously) upon share unification. Preliminary evidence consistent with this prediction is provided by Dittmann and Ulbricht (2004), who document a strong positive announcement effect for voluntary share unifications in German firms.

6. *Announcement effects of dual class share recapitalizations and subsequent operating performance:* Our model makes two predictions regarding the announcement effect of dual class share recapitalizations on outstanding (ordinary) shares. First, it predicts that, in the subsample of firms announcing recapitalizations with high incumbent management reputation, the recapitalization is value improving, so that the announcement effect is positive and the firm's operating performance will improve subsequent to the recapitalization. On the other hand, our model predicts

that, in the subsample of firms with low incumbent management reputation, the recapitalization is value reducing, so that the announcement effect will be negative, and operating performance will deteriorate subsequent to the recapitalization. These predictions help us to interpret the existing empirical evidence, and design sharper empirical tests. The empirical evidence on dual class recapitalizations has been mixed: while Partch (1987) found a positive effect of recapitalization announcements on shareholder wealth, Jarrell and Poulsen (1988) found a negative effect of such announcements on shareholder wealth. More recently, Dimitrov and Jain (2001) found a positive long-term abnormal stock return and improvements in operating performance for firms announcing dual class recapitalizations: they conclude that recapitalizations are shareholder value enhancing.<sup>17</sup> Our analysis indicates that, depending on incumbent management reputation, dual class recapitalizations can be either value enhancing or value destroying.

*7. Implication for the regulation of dual class share structure:* Our analysis has several implications for the regulation of dual class share structures. First, it implies that dual class share structures are not necessarily value reducing; allowing the listing of firms with dual class share structures may even enhance value.<sup>18</sup> Further, our analysis of section 4 indicates that weaker restrictions on dual class share structures such as imposing a maximum voting ratio between supervoting and ordinary (one vote) shares may be more towards maximizing shareholder value compared to the case where there is no regulation at all on dual class share structures (at one extreme) or the case where dual classes of shares are completely forbidden.<sup>19</sup> Finally, our analysis suggests that the best regulation of dual class shares would be more direct regulation aimed at managements which use the dual class share structure only to entrench themselves and extract private benefits while sparing managements which use this structure to create long-term shareholder value.<sup>20</sup> One such direct regulation might involve supervoting shares in firms consistently underperforming their industry peers over a long period (say ten years) losing some of their superiority over ordinary shares in terms voting power (that is, having the voting ratio shrink in such underperforming firms).

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<sup>17</sup>See, however, Gompers, Ishii and Metrick (2003), who find from their study of U.S. dual class companies that the relationship of firm value to insiders' voting rights is negative and convex, which they interpret as consistent with an entrenchment effect of voting control. They, however, admit the possibility that the share structure (dual class versus single class) chosen by a firm may be driven by the quality of firm management (which would be consistent with our theoretical analysis).

<sup>18</sup>Until 1984, the NYSE imposed a one-share one-vote rule. In that year, they imposed a moratorium on its enforcement of this policy, after General Motors announced it would issue a second class of stock with lower voting rights. Before this moratorium, the NYSE had delisted five firms for violating the one-share one-vote rule.

<sup>19</sup>Of course, one question that may arise here is regarding the precise value of the maximum voting ratio between supervoting and ordinary shares that regulations should establish. The AMEX requires that the ratio of voting rights between high-vote and low-vote stock cannot exceed 10 to 1, and that the low vote shares must have certain rights in selecting the board of directors.

<sup>20</sup>Several proposals have been put forward by various legal and other experts, both in the U.S. and in Europe, for the regulation of dual class share structure (see Gilson (1993) for a review). One such proposal is the "break through rule" under which a bidder that has acquired 75% of a company's cash flow rights should be able to gain control and to this end "break through" any mechanisms and structures that have been established by the company's outsiders or otherwise. Under this proposed rule, if the company has established a dual class structure and the bidder has acquired shares with inferior or no voting rights, the bidder will still be able to cast votes in proportion to the fraction of capital that it has acquired (see, e.g., Financial Times, May 31, 2002).

## 7 Conclusion

We analyze a firm's choice between dual class and single class share structures, either at IPO or subsequently, prior to an SEO. We consider an entrepreneur ("incumbent") who obtains both security benefits and private benefits of control, and who wishes to sell equity to outsiders to raise financing to implement his firm's project. The incumbent may be either talented (lower cost of effort, comparative advantage in implementing projects) or untalented: the incumbent's ability is private information, with outsiders observing only a prior probability that he is talented (his "reputation"). The firm's project may be either long-term (intrinsically more valuable, but showing less signs of success in the short run) or short-term (faster resolution of uncertainty). Thus, under a single class share structure, an incumbent (not holding a majority equity stake in the firm) has a greater chance of losing control to potential rivals if he adopts the long-term project, since outside equity holders may vote for the rival if they believe that the project is not progressing well. A dual class share structure allows the incumbent to have enough votes to prevail, but may be misused by untalented incumbents to dissipate value by not exerting effort. In equilibrium, the incumbent simultaneously chooses the IPO share structure (dual class or single class), project type (long-term or short-term), and how much effort to exert. Our results help to explain firm's choices between dual class and single class IPOs and the relative post-IPO operating performance of dual class versus single class IPO firms. We also characterize the situations under which a firm will undergo a share unification or a dual class recapitalization, the announcement effect of these events on the firm's equity, and their effect on its subsequent operating performance.

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## Appendix A

**Proof of Proposition 1 and 2.** Given the equilibrium behavior and beliefs of the agents in the dual class IPO equilibrium, the IPO price for a firm in such an equilibrium is  $P_D = \theta[\eta_l C_H + (1 - \eta_l)C_L] + (1 - \theta)[\beta'_i C_H + (1 - \beta'_i) C_L]$ . The fraction of equity (the fraction of cash flow rights) retained by incumbent in this equilibrium is:

$$\alpha_D = \frac{P_D - I}{P_D} = \frac{\theta[\eta_l C_H + (1 - \eta_l)C_L] + (1 - \theta)[\beta'_i C_H + (1 - \beta'_i) C_L] - I}{\theta[\eta_l C_H + (1 - \eta_l)C_L] + (1 - \theta)[\beta'_i C_H + (1 - \beta'_i) C_L]}, \quad (\text{A1})$$

the rest of the cash flow rights is sole to outside investors. In this equilibrium, the expected payoff for a type  $T$  incumbent is:

$$\Pi_D^T = \alpha_D[\eta_l C_H + (1 - \eta_l)C_L] + B, \quad (\text{A2})$$

and the expected payoff for a type  $U$  incumbent is:

$$\Pi_D^U = \alpha_D[\beta'_i C_H + (1 - \beta'_i)C_L] + B, \quad (\text{A3})$$

where  $\alpha_D$  in both (A2) and (A3) is as specified in (A1).

In the dual class IPO equilibrium, we also need that the equilibrium payoffs for each type of incumbent are greater than the payoffs they can get from any off-equilibrium moves. If any incumbent chooses to have a single class IPO, outside investors infer that with probability 1 the incumbent of this firm is a type  $U$  incumbent, who will choose to implement a long-term project and exert no effort in implementing it. Furthermore, if a rival appears, outside investors will vote in a way such that the rival will always be able to take over the control of the firm. The market price for such a firm's IPO shares is  $P = \phi C_R + (1 - \phi)[\beta'_i C_H + (1 - \beta'_i) C_L]$ .

We assume:

$$\phi C_R + (1 - \phi)[\beta'_i C_H + (1 - \beta'_i) C_L] \leq P_D. \quad (\text{A4})$$

Thus no type  $T$  incumbent will choose a single class IPO in a dual class IPO equilibrium. If any incumbent chooses to implement a short-term project (another off-equilibrium move), outside investors again infer that with probability 1 the incumbent of this firm is a type  $U$  incumbent, who will exert no effort in implementing the project. The market price for such a firm is  $P = \beta'_s C_H + (1 - \beta'_s) C_L$ . We assume:

$$\beta'_s C_H + (1 - \beta'_s) C_L \leq P_D. \quad (\text{A5})$$

Thus no type  $T$  incumbent will choose to implement a short-term project in a dual class IPO equilibrium.

Furthermore, we assume:

$$\phi C_R + (1 - \phi)[\beta'_l C_H + (1 - \beta'_l) C_L] - I + (1 - \phi)B \leq \Pi_D^U, \quad (\text{A6})$$

$$\frac{\phi C_R + (1 - \phi)[\beta'_l C_H + (1 - \beta'_l) C_L] - I}{\phi C_R + (1 - \phi)[\beta'_l C_H + (1 - \beta'_l) C_L]} [\beta_s C_H + (1 - \beta_s) C_L] - e + (1 - \phi)B \leq \Pi_D^U, \quad (\text{A7})$$

$$\frac{\phi C_R + (1 - \phi)[\beta'_l C_H + (1 - \beta'_l) C_L] - I}{\phi C_R + (1 - \phi)[\beta'_l C_H + (1 - \beta'_l) C_L]} [\beta'_s C_H + (1 - \beta'_s) C_L] + (1 - \phi)B \leq \Pi_D^U, \quad (\text{A8})$$

$$\beta'_s C_H + (1 - \beta'_s) C_L - I + B \leq \Pi_D^U, \quad (\text{A9})$$

and

$$\frac{\beta'_s C_H + (1 - \beta'_s) C_L - I}{\beta'_s C_H + (1 - \beta'_s) C_L} [\beta_s C_H + (1 - \beta_s) C_L] - e + B \leq \Pi_D^U, \quad (\text{A10})$$

so that no type  $U$  incumbent will choose to have a single class IPO or implement a short-term project in the dual class IPO equilibrium.

Given the equilibrium behavior and beliefs of the agents in the single class IPO equilibrium, the IPO price for a firm in such an equilibrium is

$$\begin{aligned} P_S &= \theta[(\delta_s + (1 - \delta_s)(1 - \phi))(\eta_s C_H + (1 - \eta_s) C_L) + (1 - \delta_s)\phi C_R] \\ &\quad + (1 - \theta)[(\psi_s + (1 - \psi_s)(1 - \phi))(\beta_s C_H + (1 - \beta_s) C_L) + (1 - \psi_s)\phi C_R]. \end{aligned} \quad (\text{A11})$$

The fraction of equity (the fraction of cash flow rights) retained by incumbent in this equilibrium is:

$$\alpha_S = \frac{P_S - I}{P_S}, \quad (\text{A12})$$

where  $P_S$  is as specified in (A11), and he will sell the rest of the cash flow rights to outside investors. In this equilibrium, the expected payoff for a type  $T$  incumbent is:

$$\begin{aligned} \Pi_S^T &= \alpha_S[(\delta_s + (1 - \delta_s)(1 - \phi))(\eta_s C_H + (1 - \eta_s) C_L) + (1 - \delta_s)(1 - \phi)C_R] \\ &\quad + (\delta_s + (1 - \delta_s)(1 - \phi))B. \end{aligned} \quad (\text{A13})$$

and the expected payoff for a type  $U$  incumbent is:

$$\begin{aligned} \Pi_S^U &= \alpha_S[(\psi_s + (1 - \psi_s)(1 - \phi))(\beta_s C_H + (1 - \beta_s) C_L) + (1 - \psi_s)(1 - \phi)C_R] \\ &\quad + (\psi_s + (1 - \psi_s)(1 - \phi))B - e. \end{aligned} \quad (\text{A14})$$

where  $\alpha_S$  in both (A13) and (A14) is as specified in (A12).

In the single class IPO equilibrium, if any incumbent chooses to have a dual class share structure when his firm goes to IPO, outside investors infer with probability 1 that the incumbent of this firm is a type  $U$  incumbent, he will implement a long-term project, and he will exert no effort in implementing the project. In this case, the market price for the firm is  $P = \beta'_i C_H + (1 - \beta'_i) C_L$ . We assume:

$$\beta'_i C_H + (1 - \beta'_i) C_L \leq P_S. \quad (\text{A15})$$

Therefore no type  $T$  incumbent will choose to have a dual class IPO in a single class IPO equilibrium. If a firm chooses to implement a long-term project, outside investors infer with probability 1 that the incumbent of this firm is a type  $U$  incumbent, and he will exert no effort in implementing the project. Furthermore, if a rival appears, outside investors will always vote for the rival in the control contest and the incumbent will lose control of his firm. In this case, the market price for the firm is  $P = \phi C_R + (1 - \phi)[\beta'_i C_H + (1 - \beta'_i) C_L]$ .

We assume:

$$\phi C_R + (1 - \phi)[\beta'_i C_H + (1 - \beta'_i) C_L] \leq P_S, \quad (\text{A16})$$

$$\frac{\phi C_R + (1 - \phi)[\beta'_i C_H + (1 - \beta'_i) C_L] - I}{\phi C_R + (1 - \phi)[\beta'_i C_H + (1 - \beta'_i) C_L]} [\phi C_R + (1 - \phi)(\eta_l C_H + (1 - \eta_l) C_L)] + (1 - \phi)B \leq \Pi_S^T. \quad (\text{A17})$$

Thus no incumbent (either type  $T$  or type  $U$ ) will choose to implement a long-term project in a single class IPO equilibrium.

In addition, we assume:

$$\frac{\beta'_i C_H + (1 - \beta'_i) C_L - I}{\beta'_i C_H + (1 - \beta'_i) C_L} [\beta'_s C_H + (1 - \beta'_s) C_L] + B - e \leq \Pi_S^U, \quad (\text{A18})$$

$$\frac{\beta'_i C_H + (1 - \beta'_i) C_L - I}{\beta'_i C_H + (1 - \beta'_i) C_L} [\beta'_s C_H + (1 - \beta'_s) C_L] + B \leq \Pi_S^U, \quad (\text{A19})$$

and

$$\beta'_i C_H + (1 - \beta'_i) C_L - I + B \leq \Pi_S^U. \quad (\text{A20})$$

Thus no type  $U$  incumbent will choose a dual class IPO in the single class IPO equilibrium.

In the dual class IPO equilibrium, one sufficient condition for incumbent to remain in control in the situation where a rival appears is that incumbent retain more than 50% of voting rights when his firm goes IPO, i.e.,

$\frac{\alpha_D t}{\alpha_D t + 1 - \alpha_D} > \frac{1}{2}$ , which is equivalent to:

$$t > \frac{1 - \alpha_D}{\alpha_D}. \quad (\text{A21})$$

In the single class IPO equilibrium, Between time 0 and 1, the share price of the firms will be updated by the investors by the intermediate signals. If a good signal arrives for a firm, its share price will be updated to  $P_S^G = \frac{\theta \delta_s}{\theta \delta_s + (1 - \theta) \psi_s} (\eta_s C_H + (1 - \eta_s) C_L) + \frac{(1 - \theta) \psi_s}{\theta \delta_s + (1 - \theta) \psi_s} (\beta_s C_H + (1 - \beta_s) C_L)$ . If a bad signal arrives for a firm, its share price will be updated to  $P_S^B = C_R$ . We assume:

$$\alpha_S C_R \leq \Pi_S^U \quad (\text{A22})$$

thus the incumbent will always vote for himself in the control contest. In addition, we assume  $\Pr ob(T|G)[\eta_s C_H + (1 - \eta_s) C_L] + \Pr ob(U|G)[\beta_s C_H + (1 - \beta_s) C_L] > C_R$ , and  $\Pr ob(T|B)[\eta_s C_H + (1 - \eta_s) C_L] + \Pr ob(U|B)[\beta_s C_H + (1 - \beta_s) C_L] < C_R$ . So outsiders will vote for the incumbent if they get a good intermediate signal, and they will vote for the rival if they get a bad intermediate signal. Or, to ensure the existence of the single class IPO equilibrium, we need the voting functions of the investors ( $v_G$  and  $v_B$  for the proportion of the investors who vote for the incumbent in the cases of a good intermediate signal and a bad intermediate signal respectively) are such that incumbent will have more than 50% of the votes if a good intermediate signal arrives for his firm, and he will have less than 50% of the votes if a bad intermediate signal arrives for his firm. These are equivalent to:

$$\alpha_S + (1 - \alpha_S - \frac{W_R}{P_S^G}) v_G > \frac{1}{2}, \quad (\text{A23})$$

and

$$\alpha_S + (1 - \alpha_S - \frac{W_R}{P_S^B}) v_B < \frac{1}{2}, \quad (\text{A24})$$

which we assume to hold in the single class IPO equilibrium.

For the dual class IPO equilibrium to exist, in addition to (A4), (A5), (A6), (A7), (A8), (A9), (A10), and (A21), we need:

$$\Pi_D^T \geq \Pi_S^T, \quad (\text{A25})$$

and

$$\Pi_D^U \geq \Pi_S^U, \quad (\text{A26})$$

to hold at the same time.

For the single class IPO equilibrium to exist, in addition to (A15), (A16), (A17), (A18), (A19), (A20), (A22), (A23), and (A24), we need:

$$\Pi_D^T \geq \Pi_S^T, \quad (\text{A27})$$

and

$$\Pi_D^U \geq \Pi_S^U, \quad (\text{A28})$$

to hold at the same time. ■

**Proof of Proposition 3.** For a given  $[\eta_s C_H + (1 - \eta_s) C_L]$ , we take the derivative of  $\Pi_D^T$ ,  $\Pi_D^U$ ,  $\Pi_S^T$ , and  $\Pi_S^U$ . Note  $\frac{\partial}{\partial[\eta_s C_H + (1 - \eta_s) C_L]} \Pi_D^T > 0$ ,  $\frac{\partial}{\partial[\eta_s C_H + (1 - \eta_s) C_L]} \Pi_D^U > 0$ ,  $\frac{\partial}{\partial[\eta_s C_H + (1 - \eta_s) C_L]} \Pi_D^T = 0$ , and  $\frac{\partial}{\partial[\eta_s C_H + (1 - \eta_s) C_L]} \Pi_D^U = 0$ . Thus when the difference between the long-term project and the short-term project increases, the payoffs for both types of incumbents under dual class share structure increase, while the payoffs for both types of incumbents under single class share structure do not change. These implies that  $\{(A25) \cap (A26)\}_{old} \subset \{(A25) \cap (A26)\}_{new}$ , where  $\{(A25) \cap (A26)\}_{old}$  is the intersection of (A25) and (A26) with a smaller  $[\eta' C_h + (1 - \eta') C_l]$ , and  $\{(A25) \cap (A26)\}_{new}$  is the intersection of (A25) and (A26) with a bigger  $[\eta_s C_H + (1 - \eta_s) C_L]$ . Therefore, when the difference between the long-term project and the short-term project increases, more incumbent will prefer having a dual class IPO to having a single class IPO.

Note that  $\frac{\partial}{\partial \phi} \Pi_D^T = \frac{\partial}{\partial \phi} \Pi_D^U = 0$ ,  $\frac{\partial}{\partial \phi} \Pi_S^T < 0$ , and  $\frac{\partial}{\partial \phi} \Pi_S^U < 0$ . Thus when the chance of a rival coming increases, the payoffs for both types of incumbents under dual class share structure do not change, while the payoffs for both types of incumbents under single class structure decreases. These implies that  $\{(A25) \cap (A26)\}_{old} \subset \{(A25) \cap (A26)\}_{new}$ , where  $\{(A25) \cap (A26)\}_{old}$  is the intersection of (A25) and (A26) with a smaller  $\phi$ , and  $\{(A25) \cap (A26)\}_{new}$  is the intersection of (A25) and (A26) with a bigger  $\phi$ . Therefore, when the chance of having a rival at time 1 increases, more incumbent will prefer having a dual class IPO to having a single class IPO.

Note that  $\frac{\partial}{\partial B} \Pi_D^T = \frac{\partial}{\partial B} \Pi_D^U = 1$ ,  $\frac{\partial}{\partial B} \Pi_S^T < 1$ , and  $\frac{\partial}{\partial B} \Pi_S^U < 1$ . Thus as the magnitude of the private benefits of control increases, the payoffs for both types of incumbents increase under both dual class share structure and single class share structure, but they increase at a higher speed under dual class share structure. These

implies that  $\{(A25) \cap (A26)\}_{old} \subset \{(A25) \cap (A26)\}_{new}$ , where  $\{(A25) \cap (A26)\}_{old}$  is the intersection of (A25) and (A26) with a smaller  $B$ , and  $\{(A25) \cap (A26)\}_{new}$  is the intersection of (A25) and (A26) with a bigger  $B$ . Therefore, when the magnitude of the private benefits of control increases, more incumbent will prefer having a dual class IPO to having a single class IPO. ■

**Proof of Proposition 4.**  $P_D = \theta[\eta_l C_H + (1 - \eta_l)C_L] + (1 - \theta)[\beta'_l C_H + (1 - \beta'_l) C_L]$  and  $P_S$  is specified in (A11). Dual class share structure is value maximizing if  $\theta \geq [((\delta_s + (1 - \delta_s)(1 - \phi))(\beta_s C_H + (1 - \beta_s)C_L) + (1 - \psi_s)\phi C_R) - (\beta'_l C_H + (1 - \beta'_l) C_L)] / [(\eta_l C_H + (1 - \eta_l)C_L) - (\beta'_l C_H + (1 - \beta'_l) C_L) - ((\delta_s + (1 - \delta_s)(1 - \phi))(\eta_s C_H + (1 - \eta_s)C_L) + (1 - \delta_s)\phi C_R) + ((\psi_s + (1 - \psi_s)(1 - \phi))(\beta_s C_H + (1 - \beta_s)C_L) + (1 - \psi_s)\phi C_R)]$ .

The share price in the dual class IPO equilibrium is given by  $P_D = \theta[\eta_l C_H + (1 - \eta_l)C_L] + (1 - \theta)[\beta'_l C_H + (1 - \beta'_l) C_L]$ , and the share price in the single class IPO equilibrium is given by (A11). Note that  $\eta_l C_H + (1 - \eta_l)C_L > (\delta_s + (1 - \delta_s)(1 - \phi))(\eta_s C_H + (1 - \eta_s)C_L) + (1 - \delta_s)\phi C_R$ , and  $\beta'_l C_H + (1 - \beta'_l) C_L < (\psi_s + (1 - \psi_s)(1 - \phi))(\beta_s C_H + (1 - \beta_s)C_L) + (1 - \psi_s)\phi C_R$ . Thus to have  $P_D \geq P_S$  (specified in (A11)), we need  $\eta_l C_H + (1 - \eta_l)C_L > \frac{P_S - (1 - \theta')[\beta'_l C_H + (1 - \beta'_l) C_L]}{\theta'}$ . ■