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Thomas J. Chemmanur
Carroll School of Management, Boston College

Yawen Jiao
Carroll School of Management, Boston College

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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 has a greater chance of losing control to potential rivals if he undertakes 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 against any rival, 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 shortterm), and how much effort to exert. Our results help to explain firms' 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. Finally, our model provides testable predictions for the conditions under which firms will include stronger antitakeover provisions in their corporate charters and the relationship between the prevalence of such provisions in a firm's charter and its post-IPO operating performance.

Thomas J. Chemmanur
Associate Professor
Boston College - Department of Finance
Carroll School of Management
140 Commonwealth Avenue
Chestnut Hill, MA 02467-3808
United States
phone: 617-552-3980 , fax: 617-552-0431
e-mail: chemmanu@bc.edu

Yawen Jiao
Ph.D. Candidate in Finance
Boston College - Department of Finance
Carroll School of Management
140 Commonwealth Avenue
Chestnut Hill, MA 02467-3808
United States
phone: 617-552-2062 , fax: 617-552-0431
e-mail: jiao@bc.edu

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 its 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).[1] 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), which were sold to outsiders in the IPO; it also had class B shares (with ten votes per share), which were retained 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 (see Grossman and Hart (1988) and Harris and Raviv (1988, 1989), and the large academic literature which has followed them, discussed in section 2), which states that investors must share a firm's cash flows and voting power in the same proportion. 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.[2] 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

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[1]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 (20% of listed companies in the European Union have a dual class share structure), as well as in emerging market countries.

[2]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."

may, in fact, be true. In a study of dual class IPOs, Bohmer, Sanger, and Varshney (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 share 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 positive 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.

There have, of course, 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). However, 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.[3] 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 existing theoretical analyses implying 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 allows them to focus on long-term value maximization without paying attention to temporary fluctuations in a firm's share

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[3]The Ford family controls 40% of shareholder voting power with only about 4% of the total equity. Supervoting shares in Berkshire Hathaway have two hundred times the voting power of the company's B shares, with only thirty times the cash flow rights of the B shares.

value ("the next quarter's earnings report").[4] However, we recognize that, while talented managers may be able to create considerable shareholder value by focusing on long-run value maximization, 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 incumbent management's choice of dual class IPO share structure is driven primarily by the 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 those choosing a single class IPO share structure (in terms of operating performance). Further, using our dynamic model (section 5), 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 seasoned equity offering (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. Finally, we 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 his 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

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[4]For example, in their letter to shareholders, Google's founder managers made clear their 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..."

it may cause the firm's equity to be undervalued in the short-term, since it may show less signs of success in the short-run compared to a short-term project (in other words, a long-term project takes a longer time to resolve outsiders' uncertainty about project success or failure). 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, a 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 observe only 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 the extent of 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, 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 the incumbent to create more value by implementing a long-term rather than a short-term project, without a fear of losing control if a rival for control were to 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 dissipating 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 a significant chance that the incumbent will lose control to potential rivals under a single class share structure (but only a much lower 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 the incumbent 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 long-term and short-term projects is small, the second (loss of discipline) effect dominates the first and third effects, so that the firm adopts a single class IPO share structure in equilibrium and implements a short-term project.

While, in our basic 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 cash flow 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.

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. However, we relax this assumption in an extension to our basic model (section 6), 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 share structure)

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is an endogenous variable, and both the share structure and voting power are chosen simultaneously in equilibrium.[5]

We show that, when the incumbent's control benefits are large, the talented incumbent chooses a high voting ratio (in a dual class IPO equilibrium), since the incumbent does not wish to lose control of the firm under any circumstances. On the other hand, when the incumbent's control benefits are small, the incumbent chooses a low voting ratio in equilibrium. In the case of a dual class share structure with 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 favorably in the share price of even a talented incumbent's firm (as discussed earlier). When his control benefits are small, the benefit of a higher share price associated with a low voting ratio dominates the expected value of the control benefits lost by the incumbent, so that he chooses a low voting ratio in equilibrium.

While we focus only on the effects of a firm's performance in the first period on its subsequent share structure in developing various results in our dynamic model (proposition 5, 6, 7 and 8), share unifications and dual class recapitalizations may also occur in equilibrium in our setting for reasons unrelated to first period performance and managerial reputations. For example, share unifications will 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. Similarly, dual class recapitalizations may also occur if the extent of takeover activity in the firm's industry increases significantly in the second period relative to that in the first period (this seems to have been the driving force behind the recapitalizations of the mid-to-late eighties).[6]

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 and media 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 large private benefits of control. Second, our model makes predictions

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[5]There is some variation in the voting ratio across firms adopting dual class share structures in practice. For example, Google has 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 Erricson's class B shares have a 1000 to 1 voting ratio.

[6]While, in our current analysis, we do not allow the extent of takeover activity and the firm's investment opportunity set to vary from the first to the second period, our analysis can be extended in this direction at the expense of some additional complexity. For example, in a setting where we allow the extent of takeover activity to change from the first to the second period, an incumbent who observes an increase in takeover activity in his firm's industry after a single class IPO may choose to undertake a dual class recapitalization in the second period even though its first period performance was poor (provided that any loss in his security benefits due to the recapitalization is dominated by the increase in the expected value of his control benefits).

regarding the relative post-IPO operating performance of dual class versus 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 firm 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 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, due to maturing of the firm's industry (e.g., from an industry characterized by innovative products requiring risky long-term investments to one characterized by less risky investments with smaller changes across product cycles). 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 success 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 enough; it will be negative if this reputation is high enough. 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 subsequently) if incumbent management's reputation is high; the announcement effect will be negative (and the firm's operating performance will deteriorate subsequently) 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.

While, for concreteness, we model dual class share structures, our paper can also be thought of as providing a theory of anti-takeover provisions in general, since the focus of our paper is on the relationship between the quality and reputation of a firm's management and the costs and benefits of entrenching that management in control: clearly, such management entrenchment can also be accomplished through antitakeover provisions other than dual class share structures.[7] Our model answers the following questions related to antitakeover provisions: What are the costs and benefits of incorporating various antitakeover provisions in a firm's charter? Under what conditions are antitakeover provisions value-destroying and under what conditions do they enhance shareholder value? What is the relationship between the quality and reputation of a firm's management and their propensity to incorporate antitakeover provisions in their charter at the time of IPO? What is the relationship between the strength (or intensity) of the antitakeover provisions in a firm's charter and its subsequent operating performance? Our model generates testable predictions related to many of the above questions (see implication 7 in section 7).

The rest of the paper is organized as follows. Section 2 describes how our paper is related to the existing theoretical and empirical literature. Section 3 describes the essential features of our basic model. Section 4 characterizes the various equilibria of our basic model and develops results. Section 5 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 additional financing to implement this project by making a seasoned equity offering. Section 6 develops an extension of the basic model to allow for rivals of two different ability rivals relative to the incumbent, and characterizes the equilibrium voting ratio under a dual class share structure. Section 7 describes the testable and policy implications of our analysis. Section 8 concludes. The proofs of all propositions in our basic model (proposition 1, 2, 3, and 4) are in the appendix. The proofs of the propositions in our dynamic model, as well as those in section 6 (an extension to the basic model) are omitted due to space considerations and are placed in appendix B, available to interested readers upon request. We also confine the specific parametric restrictions and threshold values for various propositions to hold to the appendix.

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[7] In addition to dual class share structures, other commonly observed antitakeover provisions are: anti-greenmail provision, blank check preferred stock, staggered boards, fair price provision, poison pills, stakeholder clause, various shareholder meeting restrictions (e.g., meetings can be called only by directors or executives), various supermajority vote requirements (e.g., supermajority required to approve mergers), miscellaneous antitakeover provisions (e.g., directors can be removed only for cause). See Field and Karpoff (2002) or Chemmanur, Paeglis, and Simonyan (2005) for a detailed listing.

2 Relationship to the Existing Literature

Our paper is related to several strands in the theoretical and empirical literature. As discussed before, the seminal theoretical analyses of the optimal design of firms' share structures is by Grossman and Hart (1988) and Harris and Raviv (1988, 1989), whose analyses come to the conclusion that the optimal share structure in terms of shareholder wealth maximization involves allocating 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).[8] 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 some situations, 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 (1988, 1989), there have been relatively few theoretical analyses directly dealing with the design of share structure by firms.[9] However, to the extent that a dual class share structure can be thought of as one among many different antitakeover provisions in corporate charters, our 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

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[8]Grossman and Hart (1988) also suggest, however, that, in the case of competition, departing from one share-one vote can result in higher bid prices for the firm, though in their setting one share-one vote is always socially optimal (unlike in our paper). See also Burkart, Gromb, and Panunzi (1998), who study a setting with post-takeover moral hazard by the acquirer and free-riding by target shareholders, and demonstrate that deviating from the one share-one vote rule can help current majority shareholders achieve higher bid prices for the firm.

[9]However, there is a large literature that has studied the costs and benefits of a complete ownership (CO) structure (where the company remains private and the initial owner retains complete ownership) to a controlling shareholder (CS) structure (where the initial owner retains control of the firm but sells some of the cash flow rights to public investors: see, e.g., Bolton and von Thadden (1998), Holmstrom and Tirole (1993), Pagano and Roell (1998), and Zingales (1995). In particular, Bebchuk and Zingales (2000) argue that dual class share structures exacerbate the distortions associated with the socially excessive use of controlling shareholder structure, since they enable the initial owner to retain a majority of the voting rights in the firm while selling a majority of the cash flow rights to public investors. Further, our paper is also indirectly related to the broader literature on a firm's going public decision: see, e.g., Chemmanur and Fulghieri (1999) or Boot, Gopalan, and Thakor (2006).

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 managements's control 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 structures 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.[10]

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 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 (1996) compare the performance of dual class IPO firms and an industry and size-matched sample of single class IPO firms.[11] 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)), and 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 find a significantly positive announcement effect for German firms. In summary, the existing empirical literature seems to be undecided so far as to whether dual class share structures create or destroy shareholder value: our theoretical analysis can help to resolve these inconsistencies in the empirical literature by suggesting sharper empirical tests and by generating new hypotheses for empirical research.

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[10] A number of important papers have also made informal arguments regarding the benefits and costs of dual class share structures and other corporate governance arrangements that entrench top management to some degree. These include Alchian and Demsetz (1972), who argue that dual class share structure may deter outside shareholders from incorrectly replacing competent incumbent management, and DeAngelo and DeAngelo (1985), Fischel (1987), and Denis and Denis (1994) who conjecture 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.

[11] In this context, our paper is also related to the broader theoretical literature on IPOs (see, e.g., Alan and Faulhaber (1989), Chemmanur (1993), or Welch (1989)) as well as the large empirical literature on the post-IPO operating and stock return performance of firms (see Ritter and Welch (2002) for a review). Our paper is also related to the large literature on corporate myopia: see, e.g., Stein (1988) or Bebchuk and Stole (1993).

3   The Basic Model

The basic (single-period) model has two dates: time 0 and time 1. There are three types of agents in this model: the incumbent, passive (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, and obtains not only the cash flows accruing to this equity ("security benefits") but also private benefits of control ("control benefits") from managing the firm which are not obtainable by any other equity holder.

At time 0, the incumbent undertakes one of two possible projects available to his firm: a long-term project (l) or 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 a higher stock price 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 implement only one of the two projects. Both of these two projects require an investment amount 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 capital available. When taking his firm to the IPO market, the incumbent can either have a dual-class (D) or a single-class (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.[12] 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 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 5, we build on this basic model

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[12]Note that the supervoting shares and ordinary shares have the same cash flow rights.

t = 0   t = 1

•IPO share structure chosen.   •First period cash flows observed by incumbent.
•Firm raises capital I through an IPO.
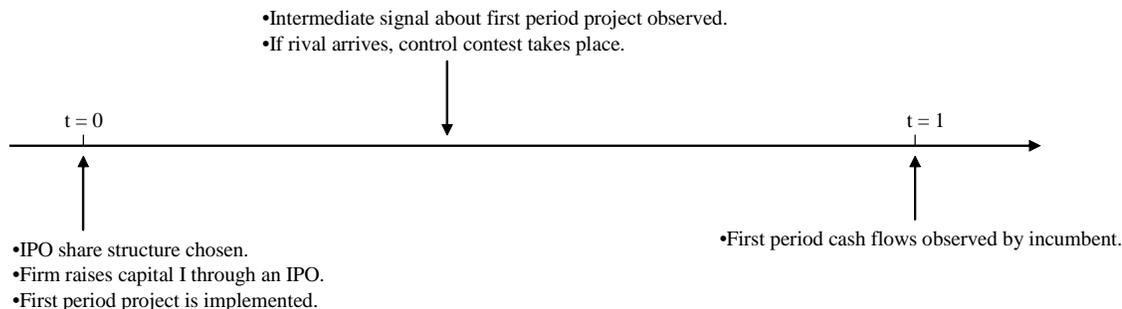•First period project is implemented.

Figure 1: Sequence of events in the single-period 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 acts as a long-term player who takes into consideration this second period project when taking his firm to the IPO market.)

Shortly after its IPO at time 0, outside investors receive a noisy intermediate signal about the potential success or failure of the firm's project chosen at time 0. After outside investors observe the realization of this signal, a rival will arrive with probability ϕ and try to take over the firm currently run by the incumbent by buying outside investors' shares using her own wealth (ϕ can be thought of as the probability capturing 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 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.

3.1 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. The first advantage is that the talented incumbent has a lower personal cost of exerting effort compared to the untalented incumbent. For simplicity, we assume that the cost of exerting effort for the talented incumbent is 0, while that of the untalented incumbent is $e > 0$. We assume that incumbents

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may 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). The incumbent 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 control 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 one 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 incumbent 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 η_l; $\beta_l < \eta_l$ denotes the corresponding probability under an untalented incumbent (i.e., an untalented incumbent managing a long-term project, also exerting effort). Similarly, η'_l and β'_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: η_s and β_s depending on whether this project is managed by a talented incumbent (exerting effort) or an untalented incumbent (exerting effort), respectively; and η'_s and β'_s give the same probability depending on whether this project is managed by the talented or untalented incumbent 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 $\beta'_l = \beta'_s$). In summary, our parametric assumptions

are as follows: $\eta_l > \eta_s > \beta_l = \beta_s > \beta'_l = \beta'_s$ (note that we do not include the high cash flow probabilities when the talented incumbent does not exert effort, η'_l and η'_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 η'_l and η'_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 θ the incumbent is of type T, and is of type U with the complementary probability. We will refer to θ as the incumbent's reputation at time 0.

3.2   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).[13] 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 2.1 about the probability of a project yielding a high cash flow, we assume that the probability of a project receiving a good intermediate signal if implemented by a talented incumbent (denoted by δ with subscripts indicating project horizon, and primes indicating the case where the incumbent does not exert effort) is higher than the corresponding probability if implemented by an untalented incumbent (denoted by ψ, with subscripts indicating project horizon, and primes indicating 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).

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[13]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.

In summary, we assume: $\delta_s > \psi_s > \delta_l > \psi_l > \psi'_s > \psi'_l$ (we do not mention δ'_l and δ'_s in the above summary since the talented incumbent always exerts effort, so that these are unimportant for our further analysis).

3.3   The Rival

After outside investors receive the intermediate signal about the incumbent's progress 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 the probability ϕ that a rival will arrive; no rival will arrive with the complementary probability. We denote the rival's wealth by W_R. 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 6). If the rival succeeds in taking over the firm, she will generate a time 1 cash flow of C_R with probability 1 (regardless of project horizon). We assume that the rival, if she arrives, has a higher ability than an untalented incumbent in implementing a short-term project, and a lower ability than a talented incumbent in implementing the same project: i.e., $\eta_s C_H + (1 - \eta_s)C_L > C_R > \beta_s C_H + (1 - \beta_s)C_L$. Further, we assume that 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:

$$\Pr ob(T|G)[\eta_s C_H + (1 - \eta_s)C_L] + \Pr ob(U|G)[\beta_s C_H + (1 - \beta_s)C_L] > C_R, \tag{1}$$

and

$$\Pr ob(T|B)[\eta_s C_H + (1 - \eta_s)C_L] + \Pr ob(U|B)[\beta_s C_H + (1 - \beta_s)C_L] < C_R. \tag{2}$$

Furthermore, we assume that if the rival takes over the firm, the incumbent will lose his control benefits, B.

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

3.4 Passive Investors and the Control Contest

We now specify the voting behavior of passive investors. Whether or not the firm chooses a single class or dual class share structure, passive 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 maximizes 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 the incumbent's wealth (subsequent to the dilution of his equity holding due to the firm's IPO) is small enough that, under a single class share structure 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 against any rival. 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 her 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.

Passive investors' votes, however, are not important to the incumbent under a dual class share structure. 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.[14] In summary, if a dual class IPO is chosen at time 0, the incumbent is always able to maintain control regardless of the realization 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 if a rival arrives and outsiders receive a bad intermediate signal (since all outsiders will vote against him in this case); he maintains control if either no rival arrives, or a rival arrives but outsiders receive a good intermediate signal (since all outsiders vote for the incumbent in this case).[15]

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[14]Note that in the basic model, we assume that the incumbent always chooses t to ensure control against any rival, so that t is not a choice variable. In section 6, where we solve for the optimal voting ratio in dual class IPOs, we will relax this assumption, and allow the incumbent to choose the optimal level of t.

[15]The underlying assumption here is that all outsiders vote for the management (incumbent or rival) which will maximize the expected value of their equity in the firm (conditional on the information set of outsiders). Our results go through qualitatively even if we assume instead that a majority of outsiders (rather than all outsiders) vote for the management team that outsiders perceive as value-maximizing.

3.5 The Incumbent's Objective

The incumbent obtains both security (cash flow) benefits and control benefits from managing the firm under his control.[16] The incumbent's security benefits arise from the cash flows of the projects accruing to the share of the firm's equity held by him (such cash flows accrue to all equity holders in proportion to their equity holdings in the firm). In contrast, control benefits (which are non-contractible) accrue only to the management team in control.

We use α_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 F_{mi}, $m \in \{T, U\}$, $i \in \{D, S\}$, to denote incumbent's expectation (conditional on his private information about his own talent) of the future cash flows from the firm. Therefore, the security benefits the incumbent gets is $\alpha_i F_{mi}$, $i \in \{D, S\}$, $m \in \{T, U\}$. 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 control to a rival, and $o_i = 1$ if the incumbent maintains control). Thus the expected value of the incumbent's control benefits 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 the talented incumbent has an effort cost of zero, and the untalented incumbent has a positive cost of effort (i.e., $e_T = 0$, and $e_U = e > 0$). Whether the incumbent exerts effort or not is unobservable to outsiders and is thus non-contractible. Whether the incumbent exerts effort or not is captured by $w \in \{0, 1\}$: $w = 1$ if he exerts effort and 0 otherwise.

In summary, the objective of each type of incumbent is to make a choice of IPO share structure ($i \in \{D, S\}$), 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:

$$\underset{i, p_i, w_{mi}}{Max} \ (\alpha_i F_{mi} + o_i B - w_{mi} e_m). \tag{3}$$

Note that, in the incumbent's objective (3) above, α_i is an endogenous variable which depends upon the share structure chosen by the firm (and thus the market value of its equity) and the amount of external financing I that the firm wishes to raise in the equity market; similarly, o_i and w_{mi} are also endogenous variables. We discuss the incumbent's problem in detail in the next section.

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[16]This assumption is standard in the corporate control literature. See, for example, Grossman and Hart (1988) or Harris and Raviv (1988).

4   Equilibrium in the Basic Model

In this section, we characterize the equilibria of our basic model. The equilibrium concept we use is that of Perfect Bayesian Equilibrium.[17] 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 the level of effort to exert in implementing the firm's project; (ii) a decision by each outside investor about whether or not to participate in the IPO and a choice of management team to vote for in the event of a control contest; and (iii) a decision by the rival (if she 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 propositions 1 and 2, we characterize the equilibria in our basic model for different model parameters. We discuss the nature of these equilibria at some length, since we build on these basic equilibria in subsequent sections of the paper.[18]

Proposition 1 *(Dual Class IPO Equilibrium). For a given level of takeover activity ϕ, and control benefits B, there exists an equilibrium where the incumbent chooses a dual class IPO if his reputation is high enough and the difference in the intrinsic value between the long-term and the short-term projects is large enough (the specific*

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[17]See Fudenberg and Tirole (1991) for a 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 control contest, and an adjustment of share structure after the cash flows of the first period project are realized. In section 6 we will also characterize the equilibrium while allowing the incumbent to choose the optimal voting ratio in addition to the share structure. However, the general definition of equilibrium used in these sections will be same as the one described here.

[18]Throughout this paper, our focus will be on pooling equilibria, where the 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. Two potential separating equilibria are as follows. The first separating equilibrium is the case where the talented incumbent chooses a single class share structure for his IPO while the untalented incumbent chooses a dual class share structure. This equilibrium is not very plausible, since it occurs only when the benefits to the talented incumbent of undertaking a long-term versus a short-term project is small enough (relative to the value benefit of separating from the untalented incumbent), and the incumbent's control benefits are large enough that the untalented incumbent does not wish to mimic the talented one (while at the same time, not so large that the talented incumbent is better off choosing a dual class share structure due to the reduction in his control benefits under a single class share structure). The second separating equilibrium involves the talented incumbent choosing a dual class share structure while the untalented incumbent separates by choosing a single class share structure. This equilibrium is equally implausible, since it arises only when the increased security benefits to the untalented incumbent of committing to exert effort through his choice of single class share structure is greater than the sum of the benefits of mimicking the talented incumbent and the greater expected value of control benefits under a dual class share structure relative to a single class share structure. Thus, the pooling equilibria studied here are the "natural" equilibria that arise in our setting. Further, separating equilibria are not interesting in our setting, since the most important issues that we analyze here do not arise in these equilibria. Never the less, details of the above separating equilibria are available to interested readers upon request.

parametric conditions are specified in the appendix). Such an 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 (4) and α_D by (5)). He retains the remaining fraction α_D of equity in the form of supervoting shares carrying a fraction $\frac{\alpha_D}{\alpha_D t + (1 - \alpha_D)}$ of the total voting power of the firm's equity.[19] He implements the 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 α_D of equity as supervoting shares. He also implements the long-term project, but exerts no effort.*

Outside investors: *They participate in the firm's IPO, paying $(1 - \alpha_D)P_D$ 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 she arrives, she invests all of his wealth, W_R, in buying shares from outside investors, but will not be able to take over the firm.[20]*

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 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 a rival for control arrives 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 in implementing the

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[19]Throughout this paper, whenever we refer to a fraction of a firm's "equity," we refer to the cash flow rights associated with this equity; on the other hand, we will specifically refer to the "voting power" of equity when this is the subject of discussion.

[20]There are two dimensions in which an incumbent can make an out-of-equilibrium move observable to outsiders in our setting. The first dimension is the incumbent's choice of share structure: i.e., an incumbent may choose a single class IPO in a dual class IPO equilibrium, or a dual class IPO in a single-class IPO equilibrium. The second dimension is the incumbent's choice of project horizon: the incumbent may choose a short-term project when the equilibrium behavior calls for his choosing a long-term project (as in proposition 1) or he may choose a long-term project when the equilibrium behavior calls for his choosing a short-term project. Throughout this paper, the out-of-equilibrium beliefs we specify are such that if outsiders observe a firm taking an out-of-equilibrium action, they believe with probability 1 that the incumbent of that firm is untalented, and will not exert any effort in implementing that firm's project.

project, thus dissipating 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). Third, 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.

When the incumbent manager's reputation is high, the cost imposed on the talented incumbent (the loss of discipline effect) is low. On the other hand, when the difference in intrinsic value between the short-term and the long-term project is high, the additional value that can be created by undertaking a long-term rather than a short-term project (the long-term value creation effect) is high. Therefore, under these circumstances, the benefit 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 implements 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 insulates him from the takeover market (ensuring that he can consume his benefits of control for sure, regardless of the arrival of the rival and the intermediate signal outsiders receive), without any significant countervailing disadvantages.

Proposition 2 *(Single Class IPO Equilibrium). For a given level of takeover activity ϕ, and control benefits B, there exists an equilibrium where the incumbent chooses a single class IPO if his reputation is low enough and the difference in intrinsic value between the long-term and the short-term project 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 (7) and α_S by (8)). He retains the remaining fraction α_S of equity, carrying the same fraction α_S of the total voting power of the firm's equity. 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 α_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 $(1-\alpha_S)P_S$ 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 she arrives, she invests all of her wealth, W_R, in buying shares from outside investors. She will not be able to take over the firm if the realization of the intermediate signal is good, and will be able to take over the firm if the realization of this signal is bad.*

The talented incumbent chooses to structure his firm's 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 (the control benefits effect) and being able to implement the long-term rather than the short-term project without fear of loss of control if a rival arrives (the long-term value creation effect) 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 (the loss of discipline effect) imposes significant costs 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 smaller 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

As discussed under proposition 1 and proposition 2, both the dual class IPO equilibrium and the single class IPO equilibrium are driven by the choices made by the type T incumbent (in both equilibria the type U incumbent finds it optimal to mimic the type T incumbent), who takes into account the long-term value creation effect, the loss of discipline effect, and the control benefits effect when deciding on his firm's equilibrium share structure (dual class or single class) and investment horizon (long-term or short-term). When the reputation of the incumbent is high, the sum of the long-term value creation effect and the control benefits effect will dominate the loss of discipline effect, so that a type T incumbent will choose to have a dual class IPO at time 0, making it the firm's equilibrium choice.

In the dual class IPO equilibrium (proposition 1), a type T incumbent will sell his IPO shares at the market price P_D, which is given by:

$$P_D = \theta[\eta_l C_H + (1 - \eta_l)C_L] + (1 - \theta)[\beta'_l C_H + \left(1 - \beta'_l\right) C_L]. \tag{4}$$

The part in the first parenthesis of equation (4) 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 parenthesis 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 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:

$$\alpha_D = \frac{P_D - I}{P_D} = \frac{\theta[\eta_l C_H + (1 - \eta_l)C_L] + (1 - \theta)[\beta'_l C_H + \left(1 - \beta'_l\right) C_L] - I}{\theta[\eta_l C_H + (1 - \eta_l)C_L] + (1 - \theta)[\beta'_l C_H + \left(1 - \beta'_l\right) C_L]}. \tag{5}$$

The rest of the firm's cash flow rights are sold to outside investors. In addition, in a dual class IPO, the incumbent will be able to retain majority voting rights in his firm, i.e., he does not bear any risk of losing control if a rival arrives.

Given the other agents' strategies, if a type T incumbent chooses to implement a long-term project in a dual class IPO equilibrium, his expected payoff is:

$$\Pi_D^T = \alpha_D[\eta_l C_H + (1 - \eta_l)C_L] + B. \tag{6}$$

It can be shown that his payoff in this case will be higher compared to the situation where he deviates from equilibrium and implements a short-term project after a dual class IPO.

When the reputation of the incumbent is low, the loss of discipline effect in a dual class IPO will dominate the long-term value creation effect and the control benefits effect, and in such a situation a single class IPO equilibrium (proposition 2) exists. In such an equilibrium, given other agents' strategies, if a type T incumbent chooses to have a single class IPO, he will sell his IPO shares at the market price of P_S, which is given by:

$$\begin{aligned} P_S \;=\; & \theta[(\delta_s + (1 - \delta_s)(1 - \phi))(\eta_s C_H + (1 - \eta_s)C_L) + (1 - \delta_s)\phi C_R] \\ & + (1 - \theta)[(\psi_s + (1 - \psi_s)(1 - \phi))(\beta_s C_H + (1 - \beta_s)C_L) + (1 - \psi_s)\phi C_R]. \end{aligned} \tag{7}$$

The expression in the first parenthesis of equation (7) 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 the firm may be taken over by a rival), and the expression in the second parenthesis of equation (7) is the expected value of the time 1 cash flow from a short-term project implemented by a type U incumbent (also taking into consideration that the firm may be taken over by a rival). The market price in the single class IPO equilibrium is thus the average of these two values, weighted by outsiders' prior probability assessment of the type of the incumbent.

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

$$\alpha_S = \frac{P_S - I}{P_S}. \tag{8}$$

The rest of the firm's equity is sold to outside investors. In a single class IPO, since all the shares have the same voting power, the fraction of voting rights retained by the incumbent is equal to his cash flow rights.

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

$$\Pi_S^T = \alpha_S[(\delta_s + (1-\delta_s)(1-\phi))(\eta_s C_H + (1-\eta_s)C_L) + (1-\delta_s)(1-\phi)C_R]$$

$$+(\delta_s + (1-\delta_s)(1-\phi))B. \tag{9}$$

It can be shown that his payoff in this case will be higher compared to the situation where he deviates from equilibrium and implements a long-term project after a single class IPO.

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 between a dual class IPO and a single class IPO. In an equilibrium where a type T incumbent chooses a dual class IPO, a type U incumbent also choosing to have a dual class IPO will be able to sell his IPO shares at the market price specified in equation (4) (i.e., at the pooling price). The fraction of the firm's cash flow rights retained by the incumbent in a dual class IPO is then specified by equation (5). The incumbent, while retaining majority voting rights in his firm, will sell the rest of his firm's cash flow rights to outside investors. Further, in such an equilibrium, if a type U incumbent chooses to pool with the type T by also choosing a long-term project, his expected payoff will be given by:

$$\Pi_D^U = \alpha_D[\beta_l' C_H + (1-\beta_l')C_L] + B. \tag{10}$$

It can be shown that his payoff in this case will be higher compared to the situation where he deviates from equilibrium by either choosing a single class IPO, or by implementing a short-term project. In summary, under the conditions specified for the existence of a dual class IPO equilibrium (proposition 1), the type U incumbent is always better off mimicking the type T by choosing the same (dual class) IPO share structure and (long-term) project horizon as the type T (since the sum of his security and control benefits minus any effort cost will be higher in the scenario where he mimics the type T incumbent).

In the single class IPO equilibrium (proposition 2), given the other agents' strategies, 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 (7) (since the equilibrium is pooling). The fraction of the firm's equity (with the same cash flow and voting rights) retained by the incumbent in a single class IPO is as specified in equation (8). 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:

$$
\begin{aligned}
\Pi_S^U &= \alpha_S[(\psi_s + (1 - \psi_s)(1 - \phi))(\beta_s C_H + (1 - \beta_s)C_L) + (1 - \psi_s)(1 - \phi)C_R] \\
&\quad + (\psi_s + (1 - \psi_s)(1 - \phi))B - e.
\end{aligned}
\tag{11}
$$

It can be shown that his payoff in this case will be higher compared to the situation where he deviates from equilibrium by either choosing a dual class IPO, or by implementing a long-term project. In summary, under the conditions specified for the existence of a single class IPO equilibrium (proposition 2), the type U incumbent is always better off mimicking the type T by choosing the same (single class) IPO share structure and (short-term) project horizon as the type T (since the sum of his security and control benefits minus his effort cost will be higher in the scenario where he mimics the type T incumbent).

Passive Investors and the Control Contest

Passive investors make their investment decision based on their break-even conditions between investing in the firm's equity in the IPO and in the risk free asset, whose return is normalized to 0. In the dual class IPO equilibrium (proposition 1), outside investors, based on their equilibrium beliefs and the equilibrium strategies of other agents, evaluate the firm's equity at the price P_D as specified in equation (4), and they pay an amount I for a fraction $1 - \alpha_D$ (where α_D is specified by (5)) of the firm's cash flow rights. In this equilibrium, a 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 the incumbent chooses the number of votes t for each supervoting share such that this condition always holds, so that the incumbent always wins in the control contest regardless of the realization of the intermediate signal outsiders receive about his progress in implementing the firm's project.

In the single class IPO equilibrium (proposition 2), outside investors evaluate the firm's equity at the price P_S as specified in equation (7), and they pay an amount I for a fraction $1 - \alpha_S$ (where α_S is specified by (8)) of the firm's equity. In this equilibrium, if a rival arrives, the incumbent remains in control if the realization of the outsiders' intermediate signal about his progress in implementing the firm's project is good since all investors vote for the incumbent in this case, the incumbent loses control of his firm if the realization of the outsiders' intermediate signal

about his progress in implementing the firm's project is bad, since all investors will vote for the rival in this case. We assume that the incumbent always votes for himself in a control contest (in the basic model). The rival, if she arrives, will invest all her wealth, W_R, in buying shares from outside investors. Before time 1, the share price of the firms will be updated by outside investors after observing the realizations of their intermediate signals. If the realization of the intermediate signal about the incumbent's progress in implementing the firm's project is good, the share price of this firm 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 the realization of the intermediate signal about the incumbent's progress in implementing the firm's project is bad, the share price of this firm will be updated to $P_S^B = C_R$. Note that these share prices reflect outside investors' equilibrium conjecture about the outcome of the control contest.

The Rival's Problem

Like outside investors, the rival makes her investment decision based on her break-even conditions between investing in the firm's equity and in the risk free asset. In both the dual class IPO equilibrium (proposition 1) and the single class IPO equilibrium (proposition 2), the rival, if she arrives, always pays a fair price for the equity she buys in the firm.

In a dual class IPO equilibrium, if the realization of the outsiders' intermediate signal about the incumbent's progress in implementing his firm's project is good, 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 the outsiders' realization of the intermediate signal about the incumbent's progress in implementing his firm's project is bad, its share price will be updated to $P_D^B = \frac{\theta(1-\delta_l)}{\theta(1-\delta_l) + (1-\theta)(1-\psi_l')}(\eta_l C_H + (1-\eta_l)C_L) + \frac{(1-\theta)(1-\psi_l')}{\theta(1-\delta_l) + (1-\theta)(1-\psi_l')}(\beta_l' C_H + (1-\beta_l')C_L)$. In this equilibrium, even if she buys shares from outside investors at these prices, the rival 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 outside investors' problem). The rival will win the control contest if the realization of the outsiders' intermediate signal is bad, and the incumbent will remain in control if the realization of the outsiders' intermediate signal is good.

In summary, for the dual class IPO equilibrium to exist, we need both the type T incumbent and the 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 and previous sections, we need the two conditions: $\Pi_D^T \geq \Pi_S^T$ (given by (6) and (9), respectively) and $\Pi_D^U \geq \Pi_S^U$ (given by (10) and (11), respectively) to hold at the same time. On the other hand, for the single

class IPO equilibrium to exist, we need both the type T incumbent and the type U incumbent to prefer a single class IPO to a dual class IPO at time 0. In other words, we need $\Pi_S^T > \Pi_D^T$ and $\Pi_S^U > \Pi_D^U$ to hold at the same time.

We now derive the comparative statics of a firm's equilibrium choice between dual class and single class IPOs.

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, the equilibrium will involve a dual class IPO for lower values of managerial reputation θ.
(ii) As the magnitude of the incumbent's control benefits, B, increases, the equilibrium will involve a dual class IPO for lower values of managerial reputation θ.
(iii) As the probability of a rival arriving, ϕ, increases, the equilibrium will involve a dual class IPO for lower values of managerial reputation θ.

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 control benefits when choosing between a dual class and a single class share structure for his firm's IPO. There are four factors affecting this objective, two affecting his security benefits and two affecting his control 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 (the long-term value creation effect): 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, it affects the talented incumbent's firm's 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 (the loss of discipline effect). 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 a single class IPO favors a dual

class IPO for lower levels of the incumbent's reputation, making it the equilibrium choice.

However, a dual class share structure also offers the talented incumbent advantages in terms of control benefits (the control benefits effect). 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 control benefits) of a dual class share structure over a single class share structure is increasing in the level of the incumbent's control benefits from the firm, B (the greater the level of control benefits, the more the incumbent has to lose if a rival takes over), and the extent of takeover activities in the firm's industry, ϕ (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).

We now will compare the IPO prices and operating performance of firms choosing dual class IPOs relative to those choosing single class IPOs.

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

(i) If the reputation of incumbent management is high or the difference in intrinsic values between long-term and short-term projects available to the firm is large, then a dual class share structure maximizes shareholder value. Further, the post-IPO operating performance of the firm will also be maximized under a dual class rather than a single class IPO share structure in this case.

(ii) If the reputation of incumbent management of a firm is low or the difference in intrinsic values between the long-term and short-term projects available to the firm is small, then a single class IPO share structure maximizes shareholder value. Further, the post-IPO operating performance of the firm will also be maximized under a single class rather than a dual class IPO share structure in this case.

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 control 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 shareholder value (and subsequent operating performance) since it may also be driven by considerations of maximizing the expected value of his control benefits (the control benefits effect). When the difference between the expected cash flows from the long-term and short-term projects available to a firm 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 (the loss of discipline effect) 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 shareholder 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 shareholder value and operating performance (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, given the incumbent's low reputation, the advantage of the single class share structure of disciplining the untalented incumbent is large (i.e., the effect of the loss of discipline under a dual class share structure on shareholder value would be large).

5   The Dynamic Model

In this section, we build upon the single-period model discussed in the 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 period project arrives at time 0 (as in the single-period model), and the second period project arrives at time 1.

At time 1, the firm implements its second period project, which requires an investment amount of I_2.[21] To implement the new project, the firm needs to issue new shares in an SEO (seasoned equity offering).[22] At time 1, the incumbent will privately observe the cash flow realization of his firm's first period project, but outside investors will only observe it later (after firms choose their second period share structures and announce them). The share structure of the firm in the second period may or may not be different from that in the first period. In other words, if a firm has a dual class share structure in the first period, its incumbent may choose to retain that share structure, 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 may choose to retain 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 period project, new shares are issued in the SEO and the second period project is implemented.

After time 1, outside investors receive a noisy intermediate signal about the incumbent's implementation of the firm's second period project (as in the basic model). After outside investors receive these intermediate signals, a new rival may arrive with probability ϕ_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 summarized in Figure 2.

An incumbent may choose to change his firm's share structure at time 1 for many reasons. We discuss three of them here. The first reason is the change in an incumbent's reputation. By the time of the SEO, the cash flow 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

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[21]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.

[22]We assume that the firm cannot raise the investment for both projects together at time 0. This assumption is justified, since, in practice, the probability of a firm receiving a project in the second period may be less than 1. In such a scenario, consider the special case where the probability of the firm receiving a project in the second period is small. In this case, if any incumbent raises money for two projects at time 0, outside investors will assess a high probability of the incumbent wasting the investment amount raised for the second period project is high, yielding a low IPO share price. Thus, no incumbent will choose to raise money for two projects at time 0 if there is a significant probability of the firm not receiving a project in the second period. While, for analytical simplicity, we assume in our dynamic model that all firms receive a project in the second period with probability 1, all our results go through qualitatively even if we assume that the probability of each firm receiving a project in the second period is less than 1.
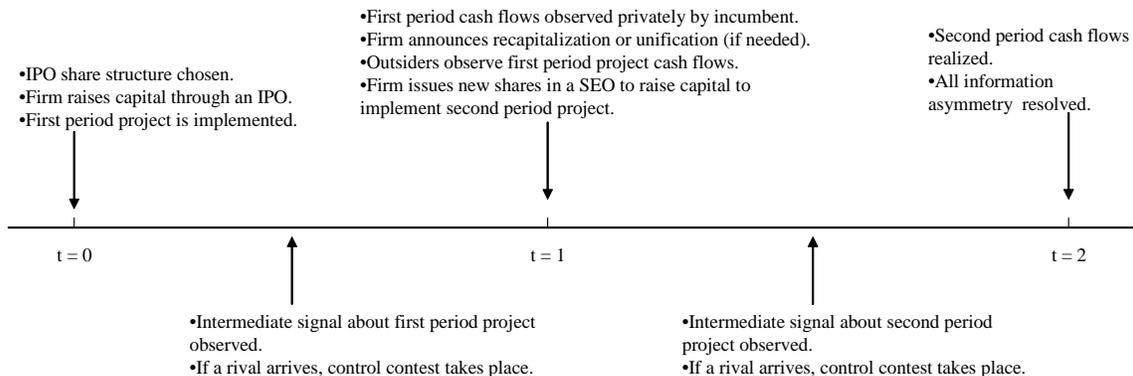
Figure 2: Sequence of events in the dynamic model

in the first period (so that the incumbent's reputation is enhanced): see proposition 5. 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: see proposition 6.

The second reason for a change in share structure is a change in the properties of the projects the firm is facing (similar to the intuition behind proposition 3(i)). When the difference in NPV between a long-term and a short-term project becomes larger, the incumbent is more likely to retain a dual class share structure or have a dual class recapitalization in the second period. If this difference in NPV between a long-term and a short-term project becomes smaller in the second period relative to that in the first period (for example, due to the firm's industry and therefore investment opportunity set, maturing), the incumbent is more likely to retain a single class share structure or have a share unification in the second period.

The third reason for a change in share structure is a change in the probability that a rival may arrive (similar to the intuition behind proposition 3(ii)). When the chance of a rival arriving (which may be a function of the level of takeover activities in the firm's industry) increases, a dual class share structure becomes more appealing to the incumbent, so that he is more likely to retain a dual class share structure or have a dual class recapitalization in the second period. If, however, the probability of the rival arriving becomes smaller, he is more likely to retain a single class share structure or have a share unification in the second period. Further, the properties of the second period intermediate signal are also very similar to the first period intermediate signal (section 3.2). Thus

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$\delta_{2s} > \psi_{2s} > \delta_{2l} > \psi_{2l} > \psi'_{2l} = \psi'_{2s}$, 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 discussed under our basic model (section 3.2). Furthermore, we assume that the ability of the second period rival is the same as that of the first period rival, and that the probability of her arrival is also the same as in the first period (i.e., $\phi_2 = \phi_1$).

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 control benefits from controlling the firm over the two periods (taking into consideration the effort cost incurred in the case of an untalented incumbent). Outside investors and the rival price the firm's equity in a competitive equity market using rational expectations.

We now analyze the equilibrium behavior of the two types of incumbents, outside investors, and the rivals in the dynamic model. We study two different equilibria in the dynamic model. In the first equilibrium (proposition 5) we describe the equilibrium evolution of share structure over time in a situation where the incumbent chooses a dual class IPO at time 0. In this equilibrium, both types of incumbents choose to have a dual class IPO at time 0, and then have a share unification at time 1 if the realization of their firms' first period project cash flow is low (they retain the dual class share structure if the first period project cash flow realization is high).

Proposition 5 *(Equilibrium Evolution of Share Structure in Dual Class IPO Firms). If the incumbent's reputation at time 0 and the difference in intrinsic values between the long-term and the short-term projects are 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, she invests all of her wealth, W_{1R}, in buying shares from outside investors,*

but she will not be able to take over the firm.

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

The intuition behind the incumbent's choice of a dual class share structure for a firm's IPO is very similar in the dynamic model to that in the basic 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. As discussed under the basic model (propositions 1 and 2), 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 long-term value creation effect of 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 discipline effect 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 control benefits effect of a dual 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 long-term value creation effect (which favors a dual class IPO share structure) is large. At the same time, when the incumbent's reputation is large, the loss of discipline 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 (recall that the control benefits effect always favors a dual class IPO share structure).

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 incumbent's trade-off between a dual class and a single class share structure for the SEO 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) he performed in implementing his 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 is significantly lower at the time of the SEO compared to that at the time of the IPO), then the loss of discipline effect becomes significantly larger, while the long-term value creation effect becomes smaller and the control benefits effect remains essentially unchanged. Therefore, the loss of discipline effect may now dominate the long-term value creation effect and the control benefits effect, in which case the talented incumbent will choose a single class share structure for his firm's SEO, and announce a share 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 outsiders' intermediate signal about his firm's second period project is bad), he will suffer even greater losses arising from a lower SEO share price (and the 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 1 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 long-term value creation effect will now be larger, and the loss of discipline effect will be smaller (since the incumbent's reputation is higher) and the control benefits effect remains unchanged, so that the combination of the long-term value creation and control benefits effects will continue to dominate the loss of discipline effect even at time 1, prompting the incumbent to retain a dual class share structure for his firm's SEO. 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 control benefits in this case compared to the case where he deviates by choosing a single class IPO, thus revealing his type with probability one).

In the above equilibrium, the payoff for a type T incumbent is:

$$\Pi_D^T = \delta_{1l}\eta_{1l}\Pi_{DGD}^T + \delta_{1l}(1-\eta_{1l})\Pi_{DGS}^T + (1-\delta_{1l})\eta_{1l}\Pi_{DBD}^T + (1-\delta_{1l})(1-\eta_{1l})\Pi_{DBS}^T, \qquad (12)$$

where Π_{DGD}^T (Π_{DBD}^T) are the type T incumbent's payoffs when his firm receives a good (bad) realization of the first period intermediate signal and a high realization for his firm's first period project cash flow; Π_{DGS}^T (Π_{DBS}^T) are his payoffs when his firm receives a good (bad) realization of the first period intermediate signal and a low realization for his firm's first period project cash flow.[23] The payoff for a type U incumbent in such an equilibrium is:

$$\Pi_D^U = \psi_{1l}'\beta_{1l}'\Pi_{DGD}^U + \psi_{1l}'(1-\beta_{1l}')\Pi_{DGS}^U + (1-\psi_{1l}')\beta_{1l}'\Pi_{DBD}^U + (1-\psi_{1l}')(1-\beta_{1l}')\Pi_{DBS}^U, \qquad (13)$$

where Π_{DGD}^U (Π_{DBD}^U) are a type U incumbent's payoffs when his firm receives a good (bad) realization of the first period intermediate signal and a high realization for his firm's first period project cash flow; Π_{DGS}^U (Π_{DBS}^U) are his payoffs when his firm receives a good (bad) realization of the first period intermediate signal and a low realization for his firm's first period project cash flow.[24]

The second equilibrium we study in the dynamic model (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. In this equilibrium, both types of incumbents choose to have a single class IPO and then have a share recapitalization at time 1 if the cash flow realization of their firm's first period project is high (they retain the single class share structure if their firm's first period project cash flow realization is low).

Proposition 6 *(Equilibrium Evolution of Share Structure in Single Class IPOs).* *If the incumbent's reputation at time 0 and the difference in intrinsic values between the long-term and the short-term projects are 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

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[23]It can be shown that the type T incumbent's payoff will be lower if he deviates from this equilibrium, either by choosing a different share structure, or by choosing a different project horizon, either in the first or in the second period. The details of Π_{DGD}^T, Π_{DGS}^T, Π_{DBD}^T, and Π_{DBS}^T are available in the proof of propositions 5 and 6, given in appendix B, available to interested readers upon request.

[24]It can be shown that the type U incumbent's payoff will be lower if he deviates from this equilibrium, either by choosing a different share structure, or by choosing a different project horizon, either in the first or in the second period. The details of Π_{DGD}^U, Π_{DGS}^U, Π_{DBD}^U, and Π_{DBS}^U are available in the proof of propositions 5 and 6, given in appendix B, available to interested readers upon request.

high. Otherwise his 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, implements a long-term project in the second period (and exerts 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, implements a short-term project in the second period, and exerts effort.*

First period rival: *If she arrives, she invests all of her wealth, W_{1R}, in buying shares from outside investors. She will take over the firm if the realization of its first period intermediate signal is bad. Otherwise she will not be able to take over the firm.*

Second period rival: *If the firm has not been taken over at time 1, and if she arrives, she invests all of her wealth, W_{2R}, in buying shares from outside investors. She will take over the firm if it has a single class share structure at the time when she arrives, and if the realization of its second period intermediate signal is bad. Otherwise she will not be able to take over the firm.*

The intuition behind the incumbent's choice of a single class share structure for his firm's IPO is very similar in the dynamic model to that in the basic model (see the discussion under proposition 2). As in the basic model, here also the equilibrium is driven by the choices made by the talented incumbent. As discussed before, there are three effects which determine a talented incumbent's choice between single class and dual class IPOs. The first (long-term value creation) 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 (loss of discipline) 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 (control benefits) effect 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 loss of discipline effect dominates the long-term value creation and the control benefits effects, so that the talented incumbent chooses a single class IPO at time 0. The untalented incumbent is better off mimicking a talented 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.[25] If the realization of the firm's first period project cash flow is low, the market updates the incumbent's reputation downward, and the incumbent retains the firm's single class share structure for its SEO as well (since, in this case, the loss of discipline effect continues to be greater than the combination of the long-term value creation effect and the control benefits effect). 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 loss of discipline effect becomes smaller while the long-term value creation effect becomes larger, and the control benefits effect is unchanged. If the combination of the long-term value creation effect and the control benefits effect (which favor a dual class share structure) dominates the loss of discipline 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.[26] 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).

In the above equilibrium, the expected payoff for a type T incumbent is:

$$\Pi_S^T = \delta_{1s}\eta_{1s}\Pi_{SGD}^T + \delta_{1s}(1-\eta_{1s})\Pi_{SGS}^T + (1-\phi_1)(1-\delta_{1s})\eta_{1s}\Pi_{SBD}^T +$$
$$(1-\phi_1)(1-\delta_{1s})(1-\eta_{1s})\Pi_{SBS}^T + \phi_1(1-\delta_{1s})\Pi^R, \tag{14}$$

[25]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.

[26]Recall that, while the amount of control benefits obtained by incumbent management in each period is the same, the expected value of the incumbent's control benefits is higher under a dual class rather than a single class share structure (since the former share structure allows him to retain control with probability 1). This means that the control benefits effect may also play a crucial role in triggering a recapitalization in situations where the increases in the long term value creation effect and the decrease in the loss of descipline effect associated with an increase in incumbent reputation may not by itself be enough to motivate the incumbent to undertake a recapitalization.

where Π^T_{SGD} (Π^T_{SBD}) are the type T incumbent's payoffs when his firm receives a good (bad) realization of the first period intermediate signal and a high realization of his firm's first period project cash flow; Π^T_{SGS} (Π^T_{SBS}) are his payoffs when his firm receives a good (bad) realization of the first period intermediate signal and a low realization of his firm's first period project cash flow.[27] Π^R is the incumbent's payoff when his firm is taken over by a rival in the first period. Similarly, the payoff for a type U incumbent in the above equilibrium is:

$$
\begin{aligned}
\Pi^U_S &= \psi_{1s}\beta_{1s}\Pi^U_{SGD} + \psi_{1s}(1-\beta_{1s})\Pi^U_{SGS} + (1-\phi_1)(1-\psi_{1s})\beta_{1s}\Pi^U_{SBD} + \\
&\quad (1-\phi_1)(1-\psi_{1s})(1-\beta_{1s})\Pi^U_{SBS} + \phi_1(1-\psi_{1s})\Pi^R,
\end{aligned} \tag{15}
$$

where Π^U_{SGD} (Π^U_{SBD}) are a type U incumbent's payoffs when his firm receives a good (bad) realization of the first period intermediate signal and a high realization of his firm's first period project cash flow; Π^U_{SGS} (Π^U_{SBS}) are his payoffs when his firm receives a good (bad) realization of the first period intermediate signal and a low realization of his firm's first period project cash flow.[28]

We now study the announcement effects and post-event operating performance of firms undergoing share unifications and recapitalizations.

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 so that the condition (B73) in appendix B is satisfied, the announcement effect of a share unification will be positive. (ii) If the incumbent management's reputation is high so that the converse of (B73) holds, the announcement effect of a share unification will be negative. (iii) Regardless of incumbent reputation, 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 long-term value creation 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 loss of discipline effect, arising from the discipline effect of a single class share structure; and the control benefits effect, arising from the lower expected

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[27]It can be shown that the type T incumbent's payoff will be lower if he deviates from this equilibrium, either by choosing a different share structure, or by choosing a different project horizon, either in the first or in the second period. The details of Π^T_{SGD}, Π^T_{SGS}, Π^T_{SBD}, Π^T_{SBS}, and Π^R are available in the proof of propositions 5 and 6, given in appendix B, available to interested readers upon request.

[28]It can be shown that the type U incumbent's payoff will be lower if he deviates from this equilibrium, either by choosing a different share structure, or by choosing a different project horizon, either in the first or in the second period. The details of Π^U_{SGD}, Π^U_{SGS}, Π^U_{SBD}, and Π^U_{SBS} are available in the proof of propositions 5 and 6, given in appendix B, available to interested readers upon request.

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 loss of discipline effect dominates the long-term value creation effect and the control benefits effect, only the long-term value creation effect and the loss of discipline effect affect the firm's share price (since the control benefits effect affects only the incumbent's personal objective). There is, however, a fourth effect, which we will refer to as "the revelation of prior performance" effect, which affects the equity market reaction to a share unification: given that there is information asymmetry between the incumbent and outside investors about the realization of the firm's first period project cash flow, outside investors infer from the announcement of a unification that the firm's first period cash flow was low, and consequently update the incumbent's reputation accordingly.[29] Thus, if the loss of discipline effect dominates the long-term value creation effect and the revelation of prior performance effect (which also results in the share price being lower, since the market infers that the firm's first period cash flow realization was low), then the announcement effect of a share unification will be positive. Conversely, if the combination of the long-term value creation effect and the revelation of prior performance effect dominates the loss of discipline effect, then the announcement effect will be negative. Since the long-term value creation effect is lower with lower incumbent reputation and the loss of discipline effect is higher with lower incumbent reputation, and the revelation of prior performance effect is unaffected by incumbent reputation, this implies that, in a sample of firms announcing a share unification, the subsample of firms having incumbents with lower reputation will have positive announcement effects; firms having incumbents with higher reputation will have negative announcement effects.

Finally, since the revelation of prior performance effect does not affect a firm's *future* operating performance, the loss of discipline effect discussed above dominates the long-term value creation effect for all firms which choose a share unification, so that the operating performance improves subsequent to a share unification regardless of incumbent reputation. A firm will undertake a unification only if it has performed poorly in the prior period (so that outsiders update incumbent management's reputation downward). Further, it will undertake a unification only if the improvement in expected operating performance under a single class share structure arising from the stronger disciplining effect of this share structure on firm management substantially dominates any reduction in operating

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[29]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 his firm's SEO.

performance arising from a reduction in long term value creation under this share structure (since the expected value of the incumbent's control benefits under a single class share structure will be smaller than that under a dual class share structure in any case). Thus, it can be shown that a firm's operating performance will improve upon unification regardless of incumbent reputation.

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 so that the condition (B79) in appendix B is satisfied, the announcement effect of a share recapitalization will be positive. (ii) If the incumbent management's reputation is low so that the converse of (B79) holds, the announcement effect of a share recapitalization will be negative.*

The announcement effect of a share recapitalization on the firm's equity will be positive if investors revise their expectation about the firm's future cash flows upward upon hearing the announcement; the announcement effect will be negative if investors revise this expectation downward. As discussed under proposition 6, a firm's decision whether or not to undertake a recapitalization depends on three effects, namely, the long-term value creation effect, which favors recapitalization; the loss of discipline effect, which favors retaining a single class share structure; and the control benefits effect, which favors recapitalization: recapitalization occurs when the long-term value creation effect and control benefits effect together dominate the loss of discipline effect. However, the announcement effect of a share recapitalization depends only on the long-term value creation effect and the loss of discipline effect (since the control benefits effect does not affect share price), plus a revelation of prior performance effect similar to that discussed under proposition 7: 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 long-term value creation effect and the revelation of prior performance effect dominates the loss of discipline effect, the net effect of the recapitalization announcement on the firm's share price will be positive. If, however, the loss of discipline effect dominates the combination of the long-term value creation effect and the revelation of prior performance effect, then the announcement effect of a recapitalization will be negative.

The effect of a share recapitalization on operating performance in the general setting of our model (if we allow for a continuous realization of project cash flow in each period) can be positive or negative (while the effect of a unification on operating performance will be unambiguously positive, as we discussed under the last proposition).

Whether the operating performance of a firm improves or declines upon a recapitalization depends on three effects. On the one hand, a firm will undertake a recapitalization only if they realized a high operating performance (cash flow) in the first period, so that outsiders update the incumbent's reputation upward. Under these circumstances, if the increase in operating performance due to the long term value creation effect under a dual class share structure dominates any reduction in operating performance due to the loss of discipline effect also associated with this share structure, then the firm's operating performance will improve on average upon a recapitalization. However, if the above increase in future operating performance due to the long term value creation effect is not large enough to dominate the effect of the loss of discipline effect on operating performance as well as the fact that firms undertake recapitalization only if they have performed well in the prior period, then the firm's operating performance will decline on average upon recapitalization.[30]

6 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 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 three 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

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[30]However, under the specific structure we assume in our formal model, where a firm's project can realize only a high or a low cash flow, a firm's performance will unambiguously deteriorate upon recapitalization: since a firm will undertake a recapitalization only if it realizes a high cash flow, its expected operating performance in the subsequent period has to be lower, since it will be a weighted average of a high and a low cash flow realization. This unambiguous result is clearly driven by the specifics of our model structure, so that the effect of a recapitalization on operating performance will be ambiguous in a more general setting, and will be driven by the factors discussed in the main text.

is ϕ; that of a low ability rival arriving is ϕ'; and that of no rival arriving is $(1 - \phi - \phi')$. As in the basic model, the ability of the rival is observable by all agents once she arrives. 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. Third, unlike in the basic model, we now assume that the fraction of outsiders voting for the incumbent in a control contest (denoted by υ) is not only a function of the intermediate signal received by outsiders, but is also an increasing function of the ratio between the incumbent's and the rival's abilities. This latter assumption implies that for a given intermediate signal received by outside investors, the incumbent will receive a larger proportion of outsiders' votes in a control contest against a low ability rival compared to the proportion of votes that he would receive against a high ability rival.

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 control benefits 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 control benefits 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 she 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 she arrives). It will be taken over by a low ability rival (if she 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 equilibrium, 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 the "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).[31] 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 discipline effect), and the incumbent chooses a dual class share structure

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[31]However, this difference in long-term value creation effect between a high voting ratio and a low voting ratio dual class share structure is smaller than the corresponding difference between a dual class and a single class share structures (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 sort-term project under a single 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.

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 $t_H > \hat{t} \geq t_L$), 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 long-term 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.

7   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 an 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 benefits) may be important: e.g., politically liberal readers in the case of the New York Times Co. and politically conservative 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 expensive 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 (R&D) in the hope of achieving greater 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, the greater the reputation of firm management, the greater the likelihood of the firm choosing a dual class share structure.[32] 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 with large private benefits of control. However, in our setting, such control benefits are only one among the many factors which drive firms to adopt a dual class share structure 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.[33] 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 other 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 in which incumbent managements have maintained a high reputation, so that they are 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

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[32]Chemmanur and Paeglis (2005) develop several proxies for the perceived quality and reputation of a firm's management which can be used in testing our model predictions relating management reputation and dual class share structures. See also Chemmanur, Paeglis, and Simonyan (2005).

[33]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.

more prevalent in industries where 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 investments with no guarantees of high short-term returns) may also undergo recapitalization to provide management with some degree of insulation from the takeover market while they make these long-term investments.

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.[34] 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 (1996) 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

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[34]Our results provide an explanation for the finding of Smart and Zutter (2003) that dual class IPO firms sell at lower valuations (price to earnings and price to sales ratios) than single class IPO firms. In our setting, such a lower valuation for dual class IPO firms relative to single class IPO firms arises due to the loss of discipline effect associated with dual class share structures. Our analysis also explains why firms may choose dual class share structures despite such lower valuations: in our setting, managers choose dual class share structures when the combination of the long-term value creation and the control benefits effects dominate the loss of discipline effect. Thus, while in some cases, firm managers may choose a dual class share structure purely driven by large control benefits, in other cases, the choice of such a share structure may indeed be driven by considerations of long-term shareholder value maximization (since incumbent managements are confident that they can create greater long-term value under a dual class share structure despite a lower equity valuation at the time of IPO).

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 will be shareholder value improving, so that the announcement effect is positive and the firm's operating performance will improve subsequent to the recapitalization. Second, in the subsample of firms with low incumbent management reputation, the recapitalization will be shareholder value reducing, so that the announcement effect will be negative, and operating performance will deteriorate subsequent to the recapitalization. The existing empirical evidence on dual class recapitalizations is mixed: while Partch (1987) and Millon-Cornett and Vetsuypens (1989) found a positive effect of recapitalization announcements on shareholder wealth, Jarrell and Poulsen (1988) found a negative effect. 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.[35] Our predictions help us interpret the above empirical evidence, and design sharper empirical tests: our analysis indicates that, depending on incumbent management reputation, dual class recapitalizations can be either value enhancing or value destroying.

7. *Implications for antitakeover provisions in corporate charters:* Our model generates two testable predictions regarding the relationship between the quality and reputation of a firm's management and various antitakeover provisions in its charter. The first prediction is that the charters of firms with higher perceived management quality and reputation are likely to be characterized by stronger antitakeover provisions (provided that the control benefits from managing those firms are not too large). Further, within this group, firms with greater growth options (associated with long-term projects) will have stronger antitakeover provisions associated with their corporate charters. The second prediction is that if we split a sample of firms going public along two dimensions: first, based on perceived management quality and reputation; and second, based on the strength of the antitakeover provisions in their corporate charter, the group of firms simultaneously having the highest management quality and reputation as well as

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[35]See, also, 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).

the strongest antitakeover provisions in their charters will outperform the other three groups in terms of post-IPO operating performance. Evidence strongly consistent with both of the above predictions of our model is provided by Chemmanur, Paeglis, and Simonyan (2005), who test these predictions on a sample of IPO firms using various proxies for perceived management quality and reputation developed by them.[36]

8. *Implication for the regulation of dual class share structures:* 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.[37] Further, our analysis of section 6 indicates that weaker restrictions on dual class share structures such as imposing a maximum voting ratio between supervoting and ordinary (one vote) shares may contribute 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 listing of dual classes of shares is disallowed.[38] Finally, our analysis suggests that the best way of regulating dual class shares would be more direct regulation aimed at managements using the dual class share structures only to entrench themselves and to extract private benefits while sparing managements which use this structure to create long-term shareholder value.[39] One such direct regulation might involve requiring supervoting shares in firms consistently underperforming their industry peers over a long period (say five or ten years) to lose some of their superiority over ordinary shares in terms of voting power (that is, having the voting ratio shrink in such underperforming firms).

8   Conclusion

In this paper, we have analyzed 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

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[36]See also Baranchuk, Kieschnick, Moussawi, and Radhakrishnan (2005), who document that firms with greater growth options are associated with stronger antitakeover provisions in their corporate charters.

[37]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.

[38]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.

[39]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 structures (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. 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).

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 has a greater chance of losing control to potential rivals if he undertakes 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 firms' 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 characterized 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. Finally, our model provides testable predictions for the conditions under which firms will include stronger antitakeover provisions in their corporate charters and the relationship between the prevalence of such provisions in a firm's charter and its post-IPO operating performance.

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Appendix

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

$$\alpha_D = \frac{P_D - I}{P_D} = \frac{\theta[\eta_l C_H + (1 - \eta_l)C_L] + (1 - \theta)[\beta_l' C_H + (1 - \beta_l') C_L] - I}{\theta[\eta_l C_H + (1 - \eta_l)C_L] + (1 - \theta)[\beta_l' C_H + (1 - \beta_l') C_L]}. \tag{A1}$$

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

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

and the expected payoff for a type U incumbent is:

$$\Pi_D^U = \alpha_D[\beta_l' C_H + (1 - \beta_l')C_L] + B, \tag{A3}$$

where α_D in both (A2) and (A3) is as specified in (A1).

In the dual class IPO equilibrium, we also need the equilibrium payoffs for each type of incumbent to be greater than the payoffs they can get from any off-equilibrium moves. Given the out of equilibrium beliefs specified, if any incumbent chooses to have a single class IPO, outside investors infer that the incumbent of this firm is of type U with probability 1, 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 control of the firm. The market price for such a firm's IPO shares is $P = \phi C_R + (1 - \phi)[\beta_l' C_H + (1 - \beta_l') C_L]$. The first condition required for a DIE to exist is given by

$$\phi C_R + (1 - \phi)[\beta_l' C_H + (1 - \beta_l') C_L] \le P_D. \tag{A4}$$

Given (A4), 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

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implementing the project. The market price for such a firm is $P = \beta'_s C_H + \left(1 - \beta'_s\right) C_L$. The second condition required for a DIE to exist is

$$\beta'_s C_H + \left(1 - \beta'_s\right) C_L \leq P_D. \tag{A5}$$

Given (A5), no type T incumbent will choose to implement a short-term project in a dual class IPO equilibrium. Furthermore, we also require (A6) to (A10) to hold for a DIE:

$$\phi C_R + (1 - \phi)[\beta'_l C_H + \left(1 - \beta'_l\right) C_L] - I + (1 - \phi)B \leq \Pi^U_D, \tag{A6}$$

$$\frac{\phi C_R + (1 - \phi)[\beta'_l C_H + \left(1 - \beta'_l\right) C_L] - I}{\phi C_R + (1 - \phi)[\beta'_l C_H + \left(1 - \beta'_l\right) C_L]}[\beta_s C_H + (1 - \beta_s)C_L] - e + (1 - \phi)B \leq \Pi^U_D, \tag{A7}$$

$$\frac{\phi C_R + (1 - \phi)[\beta'_l C_H + \left(1 - \beta'_l\right) C_L] - I}{\phi C_R + (1 - \phi)[\beta'_l C_H + \left(1 - \beta'_l\right) C_L]}[\beta'_s C_H + (1 - \beta'_s)C_L] + (1 - \phi)B \leq \Pi^U_D, \tag{A8}$$

$$\beta'_s C_H + \left(1 - \beta'_s\right) C_L - I + B \leq \Pi^U_D, \tag{A9}$$

and

$$\frac{\beta'_s C_H + \left(1 - \beta'_s\right) C_L - I}{\beta'_s C_H + \left(1 - \beta'_s\right) C_L}[\beta_s C_H + (1 - \beta_s)C_L] - e + B \leq \Pi^U_D. \tag{A10}$$

Given (A6) to (A10), 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 (SIE from now on, proposition 2), the IPO price for a firm in such an equilibrium is:

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

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

$$\alpha_S = \frac{P_S - I}{P_S}, \tag{A12}$$

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:

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

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and the expected payoff for a type U incumbent is:

$$\Pi_S^U = \alpha_S[(\psi_s + (1 - \psi_s)(1 - \phi))(\beta_s C_H + (1 - \beta_s)C_L) + (1 - \psi_s)(1 - \phi)C_R]$$

$$+(\psi_s + (1 - \psi_s)(1 - \phi))B - e. \tag{A14}$$

where α_S in both (A13) and (A14) is as specified in (A12).

In an SIE, given the out of equilibrium beliefs specified, if any incumbent chooses to have a dual class share structure when his firm goes public, outside investors infer with probability 1 that the incumbent of this firm is of type U, he will implement a long-term project, and he will exert no effort in implementing the firm's project. In this case, the market price for the firm is $P = \beta_l' C_H + \left(1 - \beta_l'\right) C_L$. The first condition required for an SIE to hold is:

$$\beta_l' C_H + \left(1 - \beta_l'\right) C_L \leq P_S. \tag{A15}$$

Given (A15), no type T incumbent will choose to have a dual class IPO in an SIE.

Further, if a firm chooses to implement a long-term project in an SIE, outside investors infer with probability 1 that the incumbent is of type U, and he will exert no effort in implementing the project. Furthermore, if a rival arrives, in this case, 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 $P = \phi C_R + (1-\phi)[\beta_l' C_H + \left(1 - \beta_l'\right) C_L]$. We therefore need (A16) and (A17) to hold for an SIE to exist:

$$\phi C_R + (1 - \phi)[\beta_l' C_H + \left(1 - \beta_l'\right) C_L] \leq P_S, \tag{A16}$$

$$\frac{\phi C_R + (1 - \phi)[\beta_l' C_H + \left(1 - \beta_l'\right) C_L] - I}{\phi C_R + (1 - \phi)[\beta_l' C_H + \left(1 - \beta_l'\right) C_L]}[\phi C_R + (1 - \phi)(\eta_l C_H + \left(1 - \eta_l\right) C_L)] + (1 - \phi)B \leq \Pi_S^T. \tag{A17}$$

Given (A16) and (A17), no incumbent (either type T or type U) will choose to implement a long-term project in an SIE.

If a firm chooses a dual class IPO in an SIE, outside investors infer with probability 1 that the incumbent is of type U, and he will exert no effort in implementing the firm's project (be it long-term project or short-term project). For a type U incumbent not to choose a dual class IPO in an SIE, we need (A18) to (A20) to hold:

$$\frac{\beta_l' C_H + \left(1 - \beta_l'\right) C_L - I}{\beta_l' C_H + \left(1 - \beta_l'\right) C_L}[\beta_s C_H + (1 - \beta_s)C_L] + B - e \leq \Pi_S^U, \tag{A18}$$

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$$\frac{\beta'_l C_H + \left(1 - \beta'_l\right) C_L - I}{\beta'_l C_H + \left(1 - \beta'_l\right) C_L} [\beta'_s C_H + (1 - \beta'_s) C_L] + B \leq \Pi^U_S, \tag{A19}$$

and

$$\beta_l C_H + (1 - \beta_l) C_L - I + B \leq \Pi^U_S. \tag{A20}$$

In the dual class IPO equilibrium, one sufficient condition for incumbent to remain in control in the situation where a rival arrives is that the incumbent retains more than 50% of voting rights when his firm goes public, i.e., $\frac{\alpha_D t}{\alpha_D t + 1 - \alpha_D} > \frac{1}{2}$, which is equivalent to:

$$t > \frac{1 - \alpha_D}{\alpha_D}. \tag{A21}$$

In the single class IPO equilibrium, between time 0 and 1, the share price of the firms will be updated by the investors, after observing their intermediate signals. If a good signal arrives for a firm, its share price will be updated to $P^G_S = \frac{\theta \delta_s}{\theta \delta_s + (1-\theta) \psi_s} (\eta_s C_H + (1 - \eta_s) C_L) + \frac{(1-\theta) \psi_s}{\theta \delta_s + (1-\theta) \psi_s} (\beta_s C_H + (1 - \beta_s) C_L)$. If a bad signal arrives for a firm, its share price will be updated to $P^B_S = C_R$. For an SIE to exist, we also require:

$$\alpha_S C_R \leq \Pi^U_S. \tag{A22}$$

(A22) ensures that an incumbent will always vote for himself in any control contest. Given (1) and (2), 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.

A dual class IPO equilibrium will exist, when in addition to (A4), (A5), (A6), (A7), (A8), (A9), (A10), and (A21), the value of the type T incumbent's objective is such that:

$$\Pi^T_D \geq \Pi^T_S, \tag{A23}$$

where Π^T_D is given by (A2) and Π^T_S is given by (A3). The value of the type U incumbent's objective is such that:

$$\Pi^U_D \geq \Pi^U_S, \tag{A24}$$

where Π^U_D is given by (A13) and Π^U_S is given by (A14).

On the other hand, a single class IPO equilibrium will exist if, in addition to (A15), (A16), (A17), (A18),

(A19), (A20), and (A22), the value of they type T incumbent's objective is such that:

$$\Pi_D^T \geq \Pi_S^T, \tag{A25}$$

where Π_D^T is given by (A2) and Π_S^T is given by (A3). The value of the type U incumbent's objective is such that:

$$\Pi_D^U \geq \Pi_S^U, \tag{A26}$$

where Π_D^U is given by (A13) and Π_S^U is given by (A14). ∎

Proof of Proposition 3. (i) For a given $[\eta_s C_H + (1 - \eta_s)C_L]$, the expected cash flow from a short-term project implemented by a talented incumbent, we take the derivative of Π_D^T, Π_D^U, Π_S^T, and Π_S^U. These are given by $\frac{\partial}{\partial[\eta_l C_H + (1-\eta_l)C_L]}\Pi_D^T > 0$, $\frac{\partial}{\partial[\eta_l C_H + (1-\eta_l)C_L]}\Pi_D^U > 0$, $\frac{\partial}{\partial[\eta_l C_H + (1-\eta_l)C_L]}\Pi_S^T = 0$, and $\frac{\partial}{\partial[\eta_l C_H + (1-\eta_l)C_L]}\Pi_S^U = 0$. Thus, when the difference in value between the long-term project and the short-term project increases, the payoffs for both types of incumbents under a dual class share structure increase, while the payoffs for both types of incumbents under a single class share structure do not change. This 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 $[\eta_l C_h + (1 - \eta_l)C_l]$, and $\{(A25) \cap (A26)\}_{new}$ is the intersection of (A25) and (A26) with a bigger $[\eta_l C_H + (1-\eta_l)C_L]$. Therefore, when the difference between the long-term project and the short-term project increases, the equilibrium will involve a dual class IPO rather than a single class IPO for lower value of θ.

(ii) 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 arriving increases, the payoffs for both types of incumbents under a dual class share structure do not change, while the payoffs for both types of incumbents under a single class structure decreases. This 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 ϕ, and $\{(A25) \cap (A26)\}_{new}$ is the intersection of (A25) and (A26) with a bigger ϕ. Therefore, when the chance of a rival arriving at time 1 increases, the equilibrium will involve a dual class IPO rather than a single class IPO for lower values of θ.

(iii) 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 B increases, the payoffs for both types of incumbents increase under both a dual class share structure and a single class share structure, but they increase faster under a dual class share structure. This

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, the equilibrium will involve a dual class IPO rather than a single class IPO for smaller value of θ. ∎

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). It can be shown with some algebra that if $\theta \geq [((\delta_s + (1 - \delta_s)(1 - \phi))(\beta_s C_H + (1 - \beta_s)C_L) + (1 - \psi_s)\phi C_R) - (\beta_l' C_H + (1 - \beta_l') C_L)]/[(\eta_l C_H + (1 - \eta_l)C_L) - (\beta_l' C_H + (1 - \beta_l') C_L) - ((\delta_s + (1 - \delta_s)(1 - \phi))(\eta_s C_H + (1 - \eta_s)C_L) + (1 - \delta_s)\phi C_R) + ((\psi_s + (1 - \psi_s)(1 - \phi))(\beta_s C_H + (1 - \beta_s)C_L) + (1 - \psi_s)\phi C_R)]$, $P_D \geq P_S$, so that a dual class share structure is value maximizing.

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 $\beta_l' C_H + (1 - \beta_l') C_L < (\psi_s + (1 - \psi_s)(1 - \phi))(\beta_s C_H + (1 - \beta)C_L) + (1 - \psi_s)\phi C_R$. Therefore, $\eta_l C_H + (1 - \eta_l)C_L > \frac{P_S - (1 - \theta')[\beta_l' C_H + (1 - \beta_l')C_L]}{\theta'}$ implies that $P_D \geq P_S$, so that the dual class share structure is value maximizing if the intrinsic value of the long-term project is sufficiently greater than that of the short-term project. ∎

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