Control versus Innovation: Governance and Innovation Trade-Offs under Dual-Class Share Structures in U.S. Technology Firms

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An Empirical Study on the Trade-Offs between Voting Power separation, Innovation Outcomes and Governance Quality

Abstract

This thesis is an empirical study focussing on the impact of dual-class share structures in U.S. technology firms. The research investigates the trade-offs between control separation (the "wedge") and firm outcomes, specifically innovation and corporate governance. Employing a Heckman two-stage procedure, the study analyses how the degree of voting power separation affects firm innovation (patent output, R&D intensity, R&D efficiency) and governance outcomes (board independence, CEO compensation, CEO turnover). While findings regarding innovation are inconclusive and sensitive to the first-stage model being used, the results consistently indicate that a large wedge weakens corporate governance, leading to less independent boards and higher CEO compensation. Notably, this thesis finds that the presence of a time-based sunset provision in the dual-class structure is able to partially mitigate the negative effects on board independence.

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1 Introduction

Over the last two decades, popularity of dual-class share structures has skyrocketed, with technology firms leading the way. These capital structures allow founders, corporate insiders or venture capital firms to maintain control of the firm, while holding a minority of the firm's economic interest. This decoupling of voting rights and economic interest goes against the typical one-share-one-vote structure, and has ignited fierce debate since its inception in the late 19th and early 20th century, first among policy makers and now also academics. On one side, proponents emphasise that shielding a visionary founder from short-term market pressures enables them to take on bold, long-term strategies that are particularly important in innovation driven sectors. On the other side, critics argue that dual-class structures erode corporate governance by insulating management from shareholder oversight, thus introducing significant agency costs. As these structures become more common, the debate over their legitimacy and long-term effects has only intensified.

In the technology sector, where innovation is essential to firm performance and growth, the appeal of dual-class structures has grown substantially. Innovation takes time and is inherently risky in terms of its payoff, thus firms require capital in order to finance these projects. Firms often choose to raise capital from public markets to support innovation, however, this exposes them to the threat of losing control. This dichotomy between financing needs and founder autonomy is exactly what makes dual-class structures so appealing. As a result, adoption rate of dual-class share structures among U.S. tech firms has risen sharply in recent years. Data from Ritter (2025) shows that the rate of dual-class IPOs in this sector increased from 5.2% to 24.7% between the early 2000s and the early 2020s. However, despite this trend the academic literature remains divided regarding the impact of these structures in the sector.

This thesis aims to address a critical gap in the literature by focussing exclusively on the U.S. technology sector, and using up-to-date data in the process. It seeks to empirically examine the effects of dual-class structures on the two main arguments being made by proponents and opponents of the structure: innovation and governance. Prior studies that aggregate firms across all sectors, generally find that dual-class structures are associated with both governance risks (see Masulis, et al (2009) and Smart & Zutter (2003)) and, in some cases, increased innovation output (see Baran, et al. (2022)). While these results are valuable, sectoral differences may play a key role in determining these effects. This thesis therefore focuses on technology firms as a

unique subsample, where rapid innovation cycles and reliance on intangible assets make the governance-innovation trade-off more pronounced. Isolating the tech sector strengthens the policy relevance of these findings, as technology firms represent a growing share of capital markets, with an increasing number choosing to adopt dual-class structures in the process. The central question in guiding this thesis is: "*What is the effect of dual-class share structures on innovation and governance in the technology sector?*". On one hand, the *visionary founder hypothesis* states that dual-class structures allow founders to pursue long-term innovation strategies without interference from short-term market pressures. On the other hand, the *agency cost hypothesis* warns that decoupling ownership from control can weaken internal monitoring and lead to inefficient managerial behaviour.

To empirically examine these competing views, the thesis investigates two sub-questions. First, does the separation of voting control and economic interest stimulate innovation in technology firms, as the visionary founder hypothesis suggests? Second, does this same separation weaken corporate governance, as predicted by the agency cost hypothesis? These questions are addressed using three firm-level measures for both innovation and governance. For innovation, the three metrics will be: patent output, R&D intensity and R&D efficiency. For governance the three metrics will be: board independence, CEO compensation and CEO turnover. By framing the analysis around these core questions, the thesis captures the central trade-off that lies at the heart of the dual-class debate.

To answer these questions, this thesis draws on a hand-collected sample. The sample consists of 129 U.S.-listed technology firms with dual-class structure, 48 of which include a time-based sunset provision. These firms were identified through the CRSP database and the Council of Institutional Investors' dual-class registry. A manual review of SEC filings (Form S-1 and 10-K) to verify structure and sunset details. Tech firm classification was done based on SIC codes as specified by Kile & Phillips (2009), and Loughran & Ritter (2004). Patent output data was retrieved using Google Patents' advanced search and matched to firm-assignee names, while R&D data and firm financial control variables were obtained from Compustat. Governance metrics such as CEO compensation and CEO turnover were retrieved from ExecuComp, and board independence was constructed using BoardEx. A control group of more than 400 single-class tech firms was compiled using the same SIC-code filter. All these firms resulted in more than 7,000 firm-year observations on the high end, and around 4,000 on the low end.

To address endogeneity concerns inherent in governance research, this thesis employs a two-stage empirical model based on Heckman's (1979) two-step procedure. In the first-stage, a Tobit model estimates the firm's wedge, as defined by the separation between voting control and economic interest. This model will make use of three instrumental variables: the dual-class IPO adoption rate in the firm's industry, the State anti-takeover law index as constructed by Bebchuk and Cohen (2003) and a variable indicating founder involvement at IPO, either as an executive or a board position. The fitted wedge out of the first stage and the Inverse Mills Ratio, a correction term used to control for selection bias and also derived per firm from the first stage, are then used in the second-stage regressions to estimate the effect of control separation on innovation and governance outcomes. Pooled OLS regressions with year fixed effects are used for the continuous variables, while a logit model is applied to the CEO turnover binary variable, both use firm-clustered standard errors. This two-stage approach is chosen to address endogeneity arising from the non-random adopting of dual-class structures, as firms that opt for this governance model may differ systematically from those that do not opt in. By correcting for this selection bias, the approach improves the validity of the analysis and enables more credible estimation of the causal impact of control separation on innovation and governance outcomes.

The empirical analysis yields more conclusive evidence for governance outcomes than for innovation. While the innovation results suggest some negative associations between control separation and both patent output and R&D intensity, these findings are not robust across first-stage models. This indicates that the relationship between dual-class structures and innovation might be more nuanced than just dual-class status, but is dependent on the degree of separation. R&D efficiency shows no relationship with the wedge in either model. As a result, the evidence does not provide strong support for the visionary founder hypothesis within the U.S. technology sector. Rather than indicating a clear innovation benefit from dual-class structures, the findings cast doubt on their effectiveness in stimulating innovative output when voting rights are separated from economic interest.

In contrast, the governance outcomes are more conclusive and align closely with the agency cost hypothesis. A larger wedge is significantly associated with lower board independence and higher CEO compensation, both of which point to weakened monitoring and increased managerial entrenchment. These patterns suggest that dual-class structures may reduce external accountability and compromise governance quality in tech firms. CEO

turnover, however, does not show a statistically significant relationship with the wedge, which may be due to data limitations.

Importantly, the presence of a sunset provision appears to moderate the adverse governance effects partially. Firms with a time-based sunset clause included in their capital structure exhibit notably higher board independence than dual-class firms who do not include such clause, indicating that time-bound reversing of these structures can partially mitigate governance issues. These findings contribute to the growing literature emphasising the importance specific provisions bounding dual-class structures, and highlighting the role of sunset provisions as a potential governance corrective tool. In sum, these results suggest that while the innovation effects of separation of voting control and economic interest remain uncertain, the governance risks are more clearly observable with sunsets provisions offering a policy relevant solution.

The academic literature on dual-class structures has expanded significantly over the last two decades, yet findings remain mixed, particularly concerning innovation and governance. One of the foundational studies in this space is Masulis, et al. (2009), who show that a greater divergence between voting control and economic interest leads to higher CEO compensation, lower firm value, and poorer acquisition decisions. Their findings support the agency cost hypothesis by demonstrating that insiders with excess control tend to extract private benefits at the expense of shareholders. This thesis takes on a similar approach to this paper, with a two-stage model where the wedge is used as the variable of interest, however, with different instrumental variables in the first stage, and objectives in the second stage.

Another foundational study in the context of this thesis is the work of Cao, et al. (2020). They investigate the relationship between dual-class structures and innovation, finding that firms with such structures produce more patents and more valuable innovation than their single-class counterparts, especially in high-tech industries. They take on a similar approach as this thesis in that they use a two-stage approach, however, they use dual-class status as the variable of interest in the first stage. Dual-class adoption and magnitude of the separation between voting control and economic interest are different metrics and thus, the inference of this paper onto this thesis should be done carefully.

Baran, et al. (2022) also employ a similar two-stage approach, and find that dual-class structures have a positive effect on overall innovation output. They therefore argue in favour of the visionary founder hypothesis. However, they do not differentiate between sectors,

meaning that specific effects on tech-firms cannot be inferred. Finally, Smart and Zutter's early work (Smart & Zutter, 2003) found evidence of dual-class firms exhibiting characteristics of managerial entrenchment, such as weaker sensitivity of CEO turnover to firm performance and higher CEO compensation.

This thesis finds that the primary cost of dual-class structures in U.S. technology firms lies in weakened corporate governance rather than suppressed innovation. While the relationship between dual-class status and innovation remains inconclusive, with results sensitive to model specification, board independence and CEO compensation are robust and statistically significant. Results are in line with Cao, et al. (2020), meaning positive effect on patent count, when first-stage specifications are matched. These findings suggest that the degree of separation between voting control and economic interest, rather than dual-class status alone, may drive the observed effects. A time-based sunset horizon is found to be effective in mitigating some of these governance concerns. Therefore, the thesis contributes to policy debates by emphasising the importance of structural balancing mechanisms. Limitations include restricted sample size for some governance variables, the scope being limited to the U.S., and timing mismatches between R&D inputs and patents granted. Future research could explore patent quality using citations, analyse event-based sunsets, assess post-sunset firm performance or look at the role of founder shareholdings.

The rest of this thesis is structured as follows. Section 2 explores the current body of literature. Section 3 establishes the research questions and formulates hypotheses. Section 4 talks about the data, and section 5 establishes the methodology. Section 6 presents the empirical findings. Finally, section 7 concludes.

2 Literature Review

The following chapter establishes the current literature regarding theoretical and legal foundations around dual-class structures. Furthermore, it delves deeper into the current literature regarding the effect of dual-class share structures on both innovation and governance. From this, gaps in the current body of literature are identified.

2.1 Theoretical foundations for dual-class share structures

2.1.1 Foundational grounds and the debate around corporate ownership and control

In the traditional sense of an organisation, shareholders are provided with directly proportional voting rights to cash flow rights. Dual-class share structures on the other hand are capital structures where a firm issues multiple classes of shares that differ in at least one key aspect, most commonly voting rights, economic rights or conversion rights. These structures allow certain shareholders, typically corporate insiders, venture investors or founders to retain a disproportionate control relative to their economic interest. Dual-class share structures can be seen as a form of antitakeover protection. When the superior class holds more than 50% of the total voting power, hostile takeovers become virtually impossible. This is because these high-voting shares are typically held by insiders and are not freely traded on public markets. Even in cases where they are traded, an acquiring party would face substantial barriers, as gaining a majority control would require acquiring an impractically large number of shares to overcome the superior voting bloc (Adams & Ferreira, 2008).

The debate around corporate ownership and control started early in the 20th century with a book written by Adolf Berle and Gardiner Means (1932) called “The modern corporation and private property”. Berle and Means were the first to highlight how managers may not always act in the best interest of the shareholders, but rather pursue personal benefits. This paved the foundation of what was later formalised in the corporate finance context by Jensen and Meckling (1976) as Principal-Agent problem. This lies at the heart of the criticisms around dual-class share structures.

Dual-class structures first emerged in 1898, when the International Silver Company issued the first shares without voting rights, effectively opening the door for firms to decouple voting rights from economic interest. Around 200 firms adopted a dual-class structure in the late 19th and early 20th centuries. However, popularity declined sharply in 1926 after the New York Stock Exchange banned firms with unequal voting rights from listing. This ban remained in place until it was lifted by the New York Stock Exchange (NYSE) in 1985 (Howell, 2017). Since then, dual-class share structures have regained popularity, particularly over the last two decades. Ritter (2025) reports that 17.7% of firms going public during this period adopted a dual-class share structure at their Initial Public Offering (IPO), compared to only 8.4% in the two decades prior. Notably, much of this increase is driven by one specific group: Technology firms. Among these, the rate of dual-class adoption rose from 5.2% to 24.7%, reflecting a

pronounced shift in capital structure preferences amongst these firms. Appendix A reflects this trend among tech firms.

2.1.2 Two opposing hypotheses

This resurgence in popularity is supported by a growing belief that dual-class structures can enable visionary founders to pursue long-term strategies without the constraints of short-term market pressures (DeAngelo & DeAngelo, 1985), a view commonly referred to in literature as the *Visionary founder hypothesis*. Porter (1992) argued that the highly developed capital markets in the United States may actually hinder innovation by pressuring firms to prioritise short-term performance and not providing the failure tolerance necessary to innovate in the long-term. Proponents of the view therefore argued that in innovation driven industries such as technology, dual-class share structures enable a more tolerant capital allocation strategy and resistance to short-term market demands that may hinder innovation. DeAngelo and DeAngelo (1985) stated the following regarding dual-class share structures: "Dual-class firms may be best viewed as an intermediate organisational form which fits somewhere between the polar cases of the dispersed-ownership public corporation and the closely-held private firm".

In contrast, the *Agency cost hypothesis* provides a more sceptical perspective on dual-class share structures by emphasising the risks that arise when voting control is decoupled from economic rights. This view argues that when managers or founders hold disproportionate voting power, without bearing a proportionate amount of the economic consequences, they may be incentivised to act in their own interest rather than that of the shareholders (Jensen & Meckeling, 1976). The fundamental concern is that such imbalance weakens the disciplining effect of the market for corporate control. From a theoretical standpoint, dual-class structures reduce the effectiveness of shareholder monitoring by undermining the traditional alignment between voting control and economic ownership, which creates directly proportional economic consequences to decision making. This perspective sees dual-class firms not as a tool for long-term vision, but as an institutional arrangement that fosters entrenchment and limits managerial accountability over time.

These contrasting theoretical perspectives have motivated empirical research into whether dual-class structures ultimately support or hinder firm performance, especially in industries where innovation and governance quality are central to long-term success.

2.1.3 Sunset provisions

To mitigate long-term governance risks associated with dual-class share structures, scholars and shareholder advocacy organisations advocate for *sunset provisions*: mechanisms that automatically convert dual-class shares into a single class after a set period or a specific event. Bebchuk and Kastiel (2017) argue that while dual-class structures may initially protect visionary leadership, their benefits diminish over time, increasing agency costs. They recommend time-based sunsets, typically 10 to 15 years, unless extension is desired by the subordinate class. Winden (2018), however, caution against rigid time-based sunset provisions, arguing that their effectiveness depends on firm-specific circumstances and that event-based or tailor-made mechanisms may be a better solution for certain firms. The Council of Institutional Investors (CII), a U.S. based shareholder advocacy group, supports mandatory time-based sunsets, recommending a maximum duration of seven years post-IPO (Council of Institutional Investors, 2025). These provisions aim to strike a middle road between the initial value premium observed after dual-class IPO (see Smart, et al. (2008) and Cremers, et al. (2024)), and governance issues worsening as time goes on (see Masulis, et al. (2009)).

2.2 Dual-class structures in law and regulation

The legal treatment and regulations regarding dual-class share structures have evolved significantly over time, particularly in the U.S. where the structures are most prevalent. Historically, the NYSE banned companies with unequal voting rights from listing in 1926, responding to investor demands. This prohibition remained until 1985 when the NYSE reversed course under pressure from competition with other exchanges, like the Nasdaq, who did not have such restrictions. The SEC attempted to mandate a one-share-one-vote by law in 1988, but federal courts deemed it out of the SEC's authority (Howell, 2017). Today, U.S. regulation continues to allow firms to use a dual-class structure, provided that the firm is transparent at the time of IPO (Fisch & Davidoff Solomon, 2023).

A turning point in the policy debate came in 2017, when high-profile IPOs such as Snap and Lyft went public under two separate classes of stock. In response, FTSE Russel, MSCI and S&P Dow Jones announced restrictions on the inclusion of dual-class firms in their benchmark indices. These changes were driven by concerns about long-term accountability. As established before, the CII actively supports these measures. Conversely, Nasdaq issued a report in the same year defending dual-class listings, arguing that they offer long-term value creation opportunities, particularly in innovation-driven sectors such as technology (Baran, et al., 2022).

Looking internationally, the U.K. historically rejected dual-class listings, only introducing a limited exception in 2021 with strict conditions such as a five-year sunset clause. Asian capital markets like Hong Kong and Singapore have recently also started allowing dual-class listings, again, there are strict restrictions in place like a maximum wedge (Chen, 2023).

2.3 Dual-class share structures and Innovation

Although the academic literature has primarily focussed on governance, dual-class structures affect firm-level outcomes in several ways. One of the consequences is their effect on innovation, particularly in context where long-term vision and failure tolerance are crucial. While much of the early debate around dual-class structures focussed on governance risks, more recent research has turned toward understanding how these structures influence firms' innovation capacity and quality.

2.3.1 Innovation outputs

There are several studies examining the relationship between general antitakeover defences and innovation, however, results are mixed. Baran, et al. (2022), using U.S. firm-level patent data, find that dual-class firms generate more patents and that these patents are both more novel and more influential, however, they found the effect to dissipate 10 years after IPO. Cao, et al. (2020) provide further evidence supporting this positive association, however, they did not research dissipating effects. They make use of a similar two-stage approach with a first-stage probit model that they use to address the problem of endogeneity, more on this later. They find that dual-class firms are more innovative in terms of patent quality, as measured by patent citations. The study highlights that results vary across industries, with high-tech and hard-to-innovate industries showing the most significant effect. Additionally, they find that firms facing higher external takeover threats and those heavily dependent on external equity financing exhibit a stronger positive relationship between dual-class structures and innovation. Interestingly, the authors do not find evidence of dual-class firms exhibiting a higher innovation output. Private firms have been shown to exhibit more innovation than public firms, suggesting some form of managerial protection from market forces may be beneficial for innovation (Bernstein, 2015). Literature on the effect of antitakeover provisions on innovation is divided. Chemmanur and Tian (2018) found that firms passing antitakeover provisions have a positive effect on innovation by shielding management from short-term market pressures. Atanassov (2013), however, found that firms passing anti-takeover protections have a decrease in innovation output and citations. Manso (2011) suggests that managerial entrenchment can only

be an effective facilitator for innovation if it is coupled with other incentives that promote firm value creation.

2.3.2 R&D intensity

Literature regarding the relationship between R&D investments and dual-class share structures is scarcest. R&D expenditures have been positively linked to the amount of shareholder protections a firm has implemented (Brown, et al., 2013). Smart and Zutter (2003) found that dual-class firms tend to underinvest in shareholder value enhancing projects. In a sample ranging from 1994 to 2011, Jordan, et al. (2016) found evidence of dual-class firms exhibiting higher R&D intensity than single-class firms.

2.4 Dual-class share structures and Corporate Governance

In absence of other constraints, a one-share one-vote structure is considered to be the most democratic ownership structure. The principle concern regarding dual-class share structures are related to governance issues, centred around the concern of a lack of checks and balances (Gompers, et al., 2010).

2.4.1 CEO compensation

Smart and Zutter (2003) showed that dual-class firms are not immune to agency issues. They found that dual-class CEOs enjoy a higher compensation compared to single-class CEOs. Besides finding that dual-class firms have less efficient capital allocation and engage in more value destroying acquisitions, Masulis, et al. (2009) also find that dual-class CEOs receive a higher compensation than single-class CEOs. They add to this literature by establishing that the effect is even stronger when the CEO is affiliated with the controlling shareholder group. Amoako-Abu, et al. (2011) did research comparing dual-class firms with single-class firm that have concentrated ownership. Although they found that both groups suffer from agency costs, executives from the dual-class firm affiliated with the controlling shareholder group are paid significantly more than equals in the single-class firms. This finding is consistent with the notion that misalignment of economic rights and voting power being a large driver of higher CEO compensation in dual-class firms.

2.4.2 CEO turnover

Smart, et al. (2008) find evidence of CEO turnover being slightly less frequent in dual-class firms than single-class firms. Importantly, they show that CEO turnover is only sensitive to performance for single-class firms and not for dual-class firms. A lack of responsiveness to

performance suggests weak board oversight, potentially reflecting reluctance or delay in acting on poor performance (Weisbach, 1988). This is consistent with findings by Fisman, et al. (2013), who argue that when shareholders lack control over the board, indicating bad governance, boards are more likely to retain underperforming CEOs. These dynamics underscore the broader importance of board composition and functioning as critical components of corporate governance.

2.4.3 Board Independence

A central determinant of board effectiveness in corporate governance research is the degree of board independence, particularly its capacity to exercise oversight without excessive influence from management. However, research that specifically examines how dual-class share structures affect board independence and overall board functioning remains largely absent from the literature. Li and Zaiats (2017) found some evidence of dual-class firms exhibiting lower board and board committee independence. Board independence has been shown to be less when ownership is concentrated in the hands of a few (Desender, et al., 2013). A well-functioning board has been established to enhance firm value by multiple studies in literature (see (Dahya, et al., 2008) and (Bebchuk & Cohen, 2005)).

2.5 Literature gaps and contributions

2.5.1 Limited research on Dual-class structures in technology firms

While dual-class share structures are prevalent among technology companies, there is a notable scarcity of studies focussing specifically on this sector. For instance, Baran, et al. (2022) examine the relationship between dual-class structures and innovation but do not isolate technology firms in their analysis. Cao, et al. (2020) explore the innovation effects of dual-class shares across various industries, including high-tech sectors, but their findings are not exclusive to the technology sector at large. This general approach limits the applicability of their conclusions to the unique dynamics of the tech industry.

2.5.2 Outdated data in foundational studies

Another key limitation in the current body of literature is that many of the influential empirical studies rely on datasets that have turned outdated. For instance, Smart and Zutter (2003) use data up to 1998, Masulis, et al. (2009) cover a period from 1995 to 2003, Cao, et al. (2020) examine data ending in 2006, and Jordan, et al. (2016) use data up until 2011. These time frames precede the substantial increase in dual-class IPOs, particularly in the technology

sector, during the 2010s and early 2020s. As a result, much of the existing literature does not capture the recent wave of dual-class adoption or their implications in today's world.

2.5.3 Insufficient analysis of board independence in Dual-class Tech firms

The impact of dual-class structures on board independence, particularly within technology firms, remains unexplored. Li and Zaiats (2017) find that dual-class firms generally exhibit lower board and committee independence. However, their study does not specifically address technology companies, leaving a gap in understanding how these capital structures influence a key determinant of a well governed firm.

2.5.4 Underrepresentation of R&D Investment Analysis

Research on how dual-class structures influence R&D investment, especially in technology firms, is limited. While Baran, et al. (2022) caution that innovation inputs such as R&D intensity may not fully capture realised innovation outcomes, these inputs nonetheless signal a firm's intent and capacity to innovate. Earlier evidence from Smart and Zutter (2003) suggests that dual-class firms may underinvest in shareholder value-enhancing projects, raising concerns about their commitment to long-term innovation. This underscores the need for more research that specifically examines how dual-class capital structures influence R&D strategies and expenditures in the tech sector.

3 Research Question and Hypotheses Development

While research has been done on the impact of dual-class share structures on innovation (see Cao, et al. (2020), Baran, et al. (2022) and Brown, et al. (2013)) and governance (see Masulis, et al. (2009), Cremers, et al. (2024) and Li & Zaiats (2017)), relatively little attention has been paid to technology firms specifically. The technology sector is a particularly interesting case in the dual-class context. Often, technology firms are fast-growing, innovation driven and therefore capital-intensive firms. This thesis aims to fill the gap in the literature by isolating the effect of dual-class share structures in the technology sector and therein looking at multiple dimensions. Quantifying the positive and the negative aspects allows us to form a well-informed opinion regarding the use of dual-class share structures in investment decision making, government's or stock exchange's policy setting and empirical analysis.

3.1 Research questions

The aim of this thesis is to investigate whether dual-class share structures in the tech sector lead to better or worse outcomes when compared to single-class tech-firms in terms of innovation and governance. These two aspects can be seen as the main incentive and disincentive of adopting a dual-class share structure respectively, particularly in technology firms. There has long been argued that dual-class share structures give firms the failure tolerance and autonomy to pursue innovation without the constraint of short-term market pressure (see Porter (1992) and DeAngelo & DeAngelo (1985)). At the same time, concerns persist that separating voting rights from economic interest can weaken corporate governance, increase agency costs and diminish board oversight (see Masulis, et al. (2009) and Bebchuk, et al. (2009)). In a capital-intensive and innovation-reliant sector like the technology sector, these trade-offs are likely to be particularly pronounced (see Brown, et al. (2013) and Cao, et al. (2020)). Therefore, studying these effects, specifically within the technology sector, is essential for understanding whether dual-class structures ultimately promote or hinder long-term firm success. This leads me to the following research question:

What is the effect of dual-class share structures on innovation and governance in the technology sector?

Answering this question empirically quantifies the debate around dual-class share structures in a way where we can disentangle the main advantages and disadvantages in different metrics of firm performance specifically for tech-firms. This will allow investors and firms considering going public, to make a decision based on empirical evidence rather than on feeling.

Innovation is of particular interest in the context of dual-class share structures, particularly in technology firms. Technology firms often rely on long-term research and development investments that take years to start paying off. Dual-class share structures should give a firm the failure tolerance it needs to eventually materialise these investments, without short-term market pressures (Porter, 1992). Prior literature has suggested that dual-class share structures may be a good way to provide a firm with stability necessary to invest in ambitious innovation projects (Brown, et al., 2013). Research like that done by Baran, et al. (2022) suggest that as innovation starts to materialise, entrenchment effects in dual-class firms can have the potential to start outweighing innovation tolerance. These dynamics make it important to investigate how dual-class share structures influence the innovation outcomes, leading to the

following sub-question: "*What is the impact of dual-class share structure on technology firms' innovation?*".

Dual-class share structures raise important concerns about corporate governance, especially in firms where control remains in the hands of founders post-IPO. Governance mechanisms are designed to balance management incentives with those of the shareholders, and thus protect the shareholders' interest. However, separation of the economic interest and voting control challenges this balance. Smart, et al. (2008) and Masulis, et al. (2009) emphasise that separation of voting rights and economic interest may result in problems concerning board oversight and managerial accountability. Cremers, et al. (2024) further suggest that the governance implications of dual-class share structures may not be static, but could evolve over the firm's life cycle, depending on firm performance and investor tolerance. These conditions underline the importance of examining how governance structures function within dual-class tech-firms. The following sub-question leads out of this: "*What is the impact of dual-class share structure on technology firms' governance?*".

3.2 Hypothesis Development

As stated before, this thesis will attempt to disentangle the benefits of dual-class share structures from the downsides, particularly looking at tech-firms. Dual-class share structures are controversial capital structures that spark debate as of the impact on the firm and its performance. Proponents argue that dual-class share structures allow founders and insiders to maintain control and to execute the company's vision without market pressures. DeAngelo and DeAngelo (1985) stated that it is a way of benefitting from the access to capital of a publicly listed company, without sacrificing the autonomy and the failure tolerance of a private company. There are many instances of where this worked out well, think of Nike, Berkshire Hathaway, Google (Alphabet) and Facebook (Meta). Opponents of these structures argue that it leads to entrenchment of managers and that it brings agency costs to the firm because of voting rights not being in line with the economic consequences. WeWork is a good example of where a dual-class share structure can go wrong, where the founder made questionable strategic and governance decisions, resulting in the firm losing its initial $47 billion dollar valuation and filing for bankruptcy (Zahn, 2023). As laid out before in section 2.1.2, these opposing views are often referred to in the literature as the '*Visionary Founder Hypothesis*', which emphasises long-term strategic autonomy, and the '*Agency Costs Hypothesis*', which highlights the risks of managerial entrenchment and misaligned incentives.

For tech-firms in particular, long-term goals often centre around innovation. Innovation is a large part of the motivation for adopting a dual-class share structure. Cao, et al. (2020) find that dual-class firms exhibit higher patent quality than single-class firms. Baran, et al. (2022) confirm this effect in tech-firms, and find that dual-class firms have a higher patent output, but find the effect to dissipate 10 years after IPO. Brown, et al. (2013) found that dual-class firms tend to be more efficient in their R&D expenditure. Jordan, et al. (2016) found dual-class firms to have a higher R&D intensity than single-class counterparts. This previously conducted research leads me to establish the following hypothesis:

Hypothesis 1: Dual-class tech-firms display more output, a higher R&D intensity and a more efficient patent output than single-class tech-firms.

While innovation is central in capturing potential benefits from dual-class share structures, governance is where the main concern with dual-class share structures lies. When we look at the literature for non-tech firms, Masulis, et al. (2009) provide evidence of a greater wedge between voting rights and economic interest resulting in higher CEO compensation. CEO turnover is also lower in dual-class firms (Smart, et al., 2008). Descriptively, only 48% of dual-class firms have an independent chair of the board, compared to 82% of single-class firms (Papadopoulos, 2019). Looking empirically, Li and Zaiats (2017) found that dual-class firms are more likely to display less board and board committee independence. Bebchuk and Kastiel (2017) argue that the case for perpetual dual-class structures is indefensible and suggest every dual-class structure should revert to a single class at some point in the future by including a time-based sunset provision. This leads to the following hypotheses:

Hypothesis 2: Dual-class tech-firms' CEOs have higher compensation than single-class tech-firms' CEOs

Hypothesis 3: Dual-class tech-firms exhibit lower CEO turnover than single-class tech-firms.

Hypothesis 4: Dual-class tech-firms have a lower board independence than single-class tech-firms.

Hypothesis 5: Dual-class tech-firm including a time-based sunset provision, mitigate some of the negative effects on governance due to separation of voting control and economic rights.

4 Data

4.1 Dual-class tech-firms sample

In order to construct a comprehensive set of tech-firms that have a dual-class share structure, I initially construct an all-encompassing set of dual-class firms using two sources. I then examine each company's SEC filings to check whether the company actually has multiple share classes. The main filings that were used for this are the S-1 filing and 10-K filing. The sample was constructed using data from the Council of Institutional Investors (CII), and the CRSP database. In order to fill the gap left by the literature, this paper will use data up to the end of 2024.

The CII has been a vocal in addressing governance issues in all forms for since 1985. They maintain a comprehensive list of companies that currently have a dual-class share structure of any form (Council of Institutional Investors, 2025). In this list, they include US listed companies with a market cap larger than $200 million, excluding publicly listed Foreign Private Issuers (FPIs) and Special Purpose Acquisition Companies (SPACs). I supplemented the list of the CII with data collected from CRSP as suggested by Gompers, et al. (2010). This entails searching the CSRP database for CUSIP codes that have the same first 6 digits, but have different two-digit extensions. The latter two digits indicate a firm has had multiple shares listed on the stock exchange. From this list I exclude FPIs, as they fall outside of the scope of this research. I also filter out firms that did not have a dual-class structure but rather changed their name or ticker and thus had a double CUSIP in CSRP.

For the remaining firms, I checked the S-1 filling (registration statement by the Securities Act of 1933) to verify whether or not the firm went public under a dual class structure or if it acquired dual-class status through a dual-class recapitalisation later in the firm's life cycle. Dual-class share structures introduced through recapitalisation represent an alteration of the governance conditions outside of the terms shareholders originally committed capital to the firm, undermining initial shareholder expectations and potentially exacerbating agency conflicts (Bebchuk, et al., 2000). I also examined the firm's S-1 filing for an inclusion of a dual-class horizon including for what date this horizon is set and the 10-K, 10-Q or 8-K filing if the firm converted to a single class structure at the set date. I then examine each firm's 10-K filing (annual report) to see if the split in share classes is still in use as of 2021 or as of the latest available report. Finally, I check the nature of the dual-class shares. In this study, I am

specifically examining dual-class share structures where the difference between classes lies within the voting rights and conversion rights. I then get a total list of potential firms for the sample of 402 dual-class firms. Out of these 402 firms, 90 have included a sunset horizon in their share structure.

I then classified firms into 'tech-firms' and 'non-tech-firms'. To do this, I employed SIC-codes as classified on the S-1 fillings. Some firms went public using a Special Purpose Acquisition Company (SPAC) structure, thus resulting in incorrect SIC codes in the S-1 filings. These firms were adjusted using the SIC code as given by the company's SEC filings page on EDGAR. This results in the 402 firms being classified in 163 different industry classifications. I took to the literature for tech-industry classification. There are critics of the usage of SIC codes as industry classifiers, with Fan and Lang (2000) arguing that it focusses too much on product- and production-based firms, and Raphael and Josua (1990) arguing conglomerates do not get properly characterised. Kile and Phillips (2009), however, found SIC codes to work better than NAICS codes for sampling tech firms. I alter the suggested SIC codes in the later study to exclude pharmaceutical companies, as they have a vastly different regulatory environment, revenue models and commercialisation process. Biotechnology-firms, in contrast, have a more similar business environment and business model as tech-firms have, aligning more with the scope of this research. Additionally, I incorporated tech companies as classified by Loughran and Ritter (2004). I supplemented this list with two last SIC codes: 3676 and 4911, Electronic resistors and Electric services respectively, as firms in these industries develop foundational technologies and operate within the R&D-driven segments of the broader tech landscape. This gets results in the selection of SIC-codes as is seen in appendix B. Applying these SIC-codes to the dual-class sample results in 120 tech-firms with a dual-class share structure, of which 48 have a sunset horizon included in their share structure.

In the typical dual-class firm, there is a non-publicly traded 'superior' share class and a publicly traded 'inferior' share class. This superior voting class is usually owned by either insiders of the firm like founders and managers, or by previous capital providers like venture capital and private equity. This superior-inferior structure causes a so called '*wedge*' between economic rights and voting rights, which is often enough for the insiders to maintain more than 50% of the voting right despite having less than 50% of the economic rights (71 out of 120 firms in this paper's sample). The wedge is calculated as the difference between the percentage of total voting rights and the percentage of total economic rights held by the superior share class. In cases where a firm has three or more share classes, any classes with more than one

vote per share is classified as superior. For these firms, the wedge is computed using the aggregate voting and economic rights of the superior class(es) following the same methodology. In cases where the superior class has one vote per share and the inferior class has less than one vote per share, the wedge is calculated accordingly to reflect relative voting power. Firms having so called 'Time Phased Voting'[1] structure are left out of the sample, as their wedge is unable to be calculated.

4.2 Single-class tech-firms

For meaningful research, a sample of single-class firms is required. I made use of the Compustat historical database, which provided 12,132 firms. This list includes a lot of firms outside of the scope of this thesis. I filtered out firms not listed in the US, ETFs, Trusts, and firms listed after 2021. To get the tech-firms, I used the same classification as provided before. Furthermore, I filtered out firms that are in the non-filtered list of dual-class firms that was established before. This results in 436 single-class tech-firms. 100 firms out of this selection were randomly selected to check their SEC filings for their dual-class status, of which none were found to have dual-class status. Appendix B shows an overview of the total number of firms with a dual-class share structure and a single-class share structure in all SIC-codes previously established as tech-firms.

4.3 Innovation data

To measure firm-level innovation data, I collect patent data using Google Patents' 'Advanced search' interface. For each firm in the sample, I search by 'Assignee name', which Google Patents consolidates under a standardised assignee entity, allowing me to retrieve annual patent grant counts without name matching. If we take Meta Platforms, Inc. for example, Google Patents includes patents granted under its former legal name (Facebook, Inc.) and patents of one of its many subsidiaries. The date the patent was granted is turned into a year date to get a total count of patents granted per year. This method follows prior research that measures firm-level innovation using the number of patents granted to each firm each year (see Kogan, et al. (2017)). R&D intensity is defined as R&D expenditures as a fraction of total assets for each firm-year observation, both of these are retrieved from Compustat. The patent per year data is then merged with the R&D expenditure on a firm-year level to construct a

[1] Time Phased Voting structure entails the shareholder only getting the right to vote after an x number of years after acquiring the share.

measure of innovation efficiency, defined as the number of granted patents per dollar R&D spending.

4.4 Governance data

To measure governance, I focus on three key indicators, namely board independence, CEO compensation and CEO turnover. CEO compensation data is obtained from Compustat ExecuComp, which provides detailed annual compensation components for top executives of publicly listed U.S. firms. I use total CEO compensation, which includes base salary, bonuses, stock awards, option awards, and 'other incentives' which includes severance, 401K contributions and insurances. CEO turnover can similarly be constructed from the Compustat database, by making a dummy variable when Compustat gave two observations for CEO in any given year. For board independence, I use BoardEx, which provides individual-level board data across firms and years. For each firm-year, I calculate the percentage of board members classified as independent based by BoardEx's 'Director Type (NED)' variable, which identifies whether a director holds an executive or supervisory role. This information can then be aggregated to the firm-year level to construct a continuous measure of board independence.

5 Methodology

5.1 Empirical method

Empirical research in corporate governance frequently struggles with the challenges of endogeneity, which can arise from omitted variable bias, reverse causality, simultaneity, and measurement errors. As Wooldridge (2020) emphasises, endogeneity can lead to biased and inconsistent parameter estimates, undermining the reliability of inference in corporate finance studies. In the context of dual-class share structures, endogeneity is of particular concern. While reverse causality is a common concern when researching insider control rights (Masulis, et al., 2009), it is less relevant here, as the wedge is defined by the structure of the share classes, which is typically set at IPO, rather than changes in ownership made by individual shareholders. Simultaneity, on the other hand, can be of concern for this study. If the wedge is consciously set at IPO based on expectations about future innovation needs or governance preferences, but the wedge itself also influences innovation outcomes or governance quality, a simultaneity problem arises. In that case, the causality runs both directions, making it difficult to determine whether the wedge is driving firm outcomes or simply reflects pre-existing

intentions. In addition to simultaneity, omitted variable bias poses a challenge to causal inference in this study. Unobservable firm characteristics such as founder characteristics, long-term innovation strategy and innovation risk tolerance may influence both the firm's decision to adopt a dual-class structure with a particular wedge and the firm's future performance in terms of innovation and governance.

This two-stage approach addresses the core problem that the decision to adopt a dual-class structure and set a specific wedge is not random but likely influenced by observable and unobservable firm characteristics. If these characteristics also affect innovation and governance outcomes, simple OLS estimates would conflate the true effect of control separation. The first-stage model therefore explicitly models the firm's choice of wedge, producing both a fitted wedge and an Inverse Mills Ratio (IMR). The IMR captures the influence of selection bias arising from self-selection: firms with certain characteristics, such as founder vision, innovation risk tolerance or long-term strategy, are more likely to adopt a dual-class structure with a particular wedge, and these characteristics may also shape firm outcomes like innovation and governance. By including the IMR in the second-stage regressions, this procedure accounts for potential selection bias and enables a more credible identification of the causal relationship between control separation and firm outcomes. This method builds on the well-established Heckman (1979) correction, and was initially developed in the field of labour economics to control for non-random selection in employment among the population. A statistically significant IMR coefficient in the second stage would indicate that correcting for selection bias was indeed necessary to obtain unbiased estimation results.

5.2 First-stage model

The first stage involves estimating the wedge using a Tobit model, drawing on three instrumental variables. The first two are dual-class adoption rate in the industry (Masulis, et al. (2009); Cao, et al. (2020)) and state anti-takeover law index constructed by Bebchuk and Cohen (2003) (Cao, et al., 2020). The third instrument will be added, which is a dummy variable equal to 1 if a founder is actively involved in the executive team or serves on the board of directors, and 0 otherwise. In this sample, 81% of dual-class firms have an active founder, compared to 52% of single-class firms. Cao, et al. (2020) uses a Probit first stage, as their outcome variable is a dummy that takes on 1 if the firm is dual-class and 0 otherwise. Although this approach will be used as a robustness check, this thesis makes use of a Tobit regression as the main model, as the main objective variable, the wedge, is not binary but continuous. The Tobit model

has a corner solution at zero, with zero wedge indicating the firm has a single-class share structure.

From this model, both the fitted values and a correction term called the Inverse Mills Ratio (IMR) (Cao, et al., 2020), are derived. The IMR is calculated as the ratio of the standard normal probability density function to the cumulative distribution function, evaluated at the firm's fitted wedge, which formally looks like:

$$\lambda_i = \frac{\phi(\widehat{Wedge}_\iota)}{\Phi(\widehat{Wedge}_\iota)}.$$

$\widehat{Wedge}_\iota$ here is the predicted wedge for firm i, based on observable characteristics. The IMR captures the likelihood that a firm with those characteristics selects into having a dual-class share structure and a positive wedge. In other words, we can say: given this firm's characteristics, how unusual is it that we observe a wedge? Including the IMR in the second-stage regression helps control for the fact that wedge values are only observed for dual-class firms, thereby correcting for potential selection bias due to the fact that only dual-class firms exhibit a positive wedge.

The wedge is assumed to be constant over time for each firm, reflecting the stable nature of share structures, which is typically established at IPO and rarely modified thereafter. Accordingly, the first-stage Tobit regression is estimated as a cross-sectional model, and the resulting fitted values and IMR are assigned to all firm-year observations. Standard errors are clustered at the industry level. The first stage looks as follows:

$$Wedge_i^* = \beta_0 + \beta_1 IndDC_i + \beta_2 SATLaw_i + \beta_3 FounerInv_i + \psi' X_i + \epsilon_i$$

$$Wedge_i = \begin{cases} Wedge_i^*, & if\ firm\ is\ dual\ class \\ 0, & if\ firm\ is\ single\ class \end{cases}$$

Where:

- $Wedge_i^*$: Latent control wedge of firm i.
- $Wedge_i$: Observed wedge.
- $IndDC_i$: Industry-level dual-class adoption rate.
- $SATLaw_i$: State Anti-Takeover Law index from Bebchuk and Cohen (2003).
- $FounerInv_i$: Dummy equal to 1 if the founder is still actively involved in the company, either as executive or board member
- X_i: Vector of firm control variables (e.g. lagged log(total assets), lagged ROA, M/B)

The fitted values and the IMR are then incorporated into the second stage regressions. A statistically significant IMR coefficient indicates that there is indeed sample selection bias and thus confirms the validity of the two-stage approach.

5.3 Second-stage model

In the second stage, I estimate pooled OLS regressions with year fixed effects to control for common time shocks across firms. Firm fixed effects are not included, as they would absorb the time-invariant fitted wedge, which is constructed by the first stage, as it would be perfectly colinear with the fixed effects. Pooled OLS is thus necessary to exploit the cross-sectional variation in the wedge across firms. Random effects are likewise inappropriate, as the fitted wedge is likely correlated with unobserved firm characteristics, making the random effects estimator inconsistent. Standard errors are clustered at the firm level to account for within-firm correlation over time, as suggested by Petersen (2008). We then get the following second stage for the innovation regressions:

$$Y_{i,t} = \alpha + \delta_1 \widehat{Wedge}_\iota + \rho\lambda_i + \phi' Z_{i,t} + \tau_t + \epsilon_i$$

And the following second stage for the governance regressions:

$$Y_{i,t} = \alpha + \delta_1 \widehat{Wedge}_\iota + \delta_2 Horizon_i + \delta_3\left(\widehat{Wedge}_\iota \times Horizon_i\right) + \rho\lambda_i + \phi' Z_{i,t} + \tau_t + \epsilon_i$$

Where:

- $Y_{i,t}$: Outcome variable (e.g. Patent output, R&D intensity, Innovation efficiency, Board independence, CEO compensation and CEO turnover) for firm i in year t
- $\widehat{Wedge}_\iota$: Fitted wedge from the first-stage Tobit model
- $Horizon_i$: Dummy variable = 1 if dual-class firm includes a sunset horizon provision in their share structure, 0 otherwise.
- $\widehat{Wedge}_\iota \times Horizon_i$: Interaction term capturing how the effect of the wedge varies with the presence of a sunset horizon provision.
- λ_i: Inverse Mills Ratio derived from the first-stage Tobit, correcting for sample bias
- $Z_{i,t}$: Vector of time-varying control variables (e.g. Log(total assets), Leverage and lagged ROA)
- τ_t: Time-fixed effects

6 Empirical Findings

This section presents the empirical findings on the effect of dual-class share structures on innovation and governance in the technology sector. Building on the two-stage regression framework outlined in the methodology section, the results are presented separately for innovation and governance outcomes, namely R&D expenditure, number of granted patents, innovation efficiency, board independence, CEO compensation and CEO turnover. Tables with summary statistics, tables with the main regression outputs, and robustness checks will aid in supporting and interpretation of the findings.

6.1 Descriptive statistics

6.1.1 Firm characteristics

Table 1 gives descriptive statistics of the characteristics of all firms used in this sample. First numbers in every row indicates the mean, values in square brackets are medians and values in parentheses are standard deviations. The dual-class sample consists of 120 firms, of which 48 have included a sunset horizon clause in their share structure as previously described. Interesting to note in this data is that, on average, the superior voting class holds 78.7% of the voting control, while only having 37.1% of the economic rights. The median voting structure for dual-class tech-firms is 10 votes to the superior class and 1 vote to the inferior class. The single-class sample contains 436 firms.

When we compare the two samples based on foundational characteristics, we can address some differences. Dual-class firms in this sample are on average 9.72 years old, with the single-class firms being 18.4 years old on average[2]. This pattern is in line with expectations, as we have seen a substantial increase in tech-firm going public under a dual-class share structure as shown in appendix A made with data provided by Jay Ritter (2025). Logically, this means that dual-class tech-firms will on average be younger compared to single-class equivalents. Dual-class firms are also larger than single-class firms with the average dual-class firm having $5.251 billion in total assets and single-class firms having $2.128 billion in assets. This difference may reflect structural differences between the groups, further underscoring the importance of controlling for firm size in the regressions to isolate the effect of ownership structure. Dual-class firms in this sample also have a slightly higher leverage, reflecting either

[2] Note that the firms age in this thesis is defined as the number of years since it has had its Initial Public Offering.

hesitancy to dilute control therefore choosing to raise debt rather than seasoned equity offers (SEOs), or usage of debt as a discipline mechanism (Gompers, et al., 2010). Dual-class firms also show a higher average profitability, with an ROA of 5.06% compared to 3.74% for single-class firms, and growth expectations, as measured by market-to-book ratio with 24.75 and 8.76 respectively. The later likely reflect the market's anticipation of stronger long-term performance in firms with visionary founder control (DeAngelo & DeAngelo, 1985). As both ROA and market-to-book are likely influenced by the outcomes this study aims to explain, they are treated as endogenous. ROA is included in lagged form to reduce reverse causality, while market-to-book is solely used in the first-stage regression to predict the wedge, as applied by Masulis, et al. (2009).

	Dual-class firms	Single-class firms	Difference
Superior class voting rights	12.2 [10] (8.74)	- - -	
Inferior-class voting rights	0.877 [1] (0.327)	- - -	
Superior class voting control	78.70% [83.5%] (19.8%)	- - -	
Superior class equity control	37.10% [30.1%] (27.5%)	- - -	
Wedge	41.6% [53.4%] (24.0%)	- - -	
Firm age	9.72 [6] (8.72)	18.4 [18] (11.5)	-8.68*** [-12] (0.97)
Size (total assets in $ millions)	5251 [910.6] (18018)	2128 [425.5] (8190)	3123 [485.1] (6017)
Leverage	0.507 [0.5] (0.214)	0.47 [0.448] (0.205)	0.037* [0.052] (0.022)
Return on Assets	5.06% [9.13%] (19.49%)	3.74% [9.64%] (29.77%)	1.32% [-0.51%] (2.28%)
Market to Book-ratio	24.75 [7.36] (155)	8.76 [4.24] (26.73)	15.99 [3.12] (14.21)
Number of firms	120	436	
Number of firms with a sunset	48	0	

The table presents summary statistics comparing key ownership, control and firm characteristics between dual-class and single-class firms in the sample. Reported are the means, with standard deviations between parentheses and medians in brackets where applicable. The final column shows the difference between dual-class and single-class firms for the variables where such a comparison is applicable. The variables include voting rights, control and equity stakes, the wedge, firm age, firm size (total assets), leverage, return on assets and market-to-book ratio. "***", "**" and "*"indicate significance at the 1%-, 5%- and 10%-levels respectively.

Table 1: Descriptive Statistics Firm Characteristics

6.1.2 Innovation and Governance statistics

Table 2 presents descriptive statistics for the key governance and innovation variables. The first number in each row again denotes the mean, followed by the standard deviation in

parenthesis. Dual-class firms in the sample show lower average R&D intensity compared to single-class firms, offering preliminary descriptive support for the agency cost hypothesis. A similar pattern holds for innovation output, as single-class firms also register a higher average number of patents. While these patterns are consistent with the idea that dual-class firms may underinvest in innovation, we need to be cautious in drawing conclusions given the lack of control variables. Single-class firms in this sample also have a higher share of independent directors on their board, suggesting stronger monitoring mechanisms and reinforcing the governance concerns commonly associated with dual-class structures. Similarly, average CEO compensation is notably higher in dual-class firms. While this also aligns with the agency cost hypothesis, CEO compensation is highly sensitive to firm size (Gabaix & Landier, 2008), complicating interpretation based solely on plain averages. Although these descriptive statistics provide some initial evidence in support of the agency cost hypothesis, regression analysis is needed to draw stronger conclusions.

	Dual-class firms	**Single-class firms**	**Difference**
R&D intensity	0.1390	0.1622	-0.0232
	(0.0959)	(0.2468)	(0.0149)
Average patents per firm	354.51	559.70	-205.19
	(1306.76)	(1881.78)	(149.51)
Percentage independent directors	72.43%	75.61%	-3.18%
	(26.99%)	(24.91%)	(2.72%)
CEO compensation (in $ thousands)	11,526.49	6,852.95	4,673.54
	(53,368.35)	(14,520.83)	(8,719.40)

The table presents summary statistics comparing key innovation and governance variables between dual-class and single-class firms in the sample. Reported are the means and standard deviations in parentheses for R&D intensity, average patents per firm, percentage of independent directors and CEO compensation. The final column shows the difference in means between dual-class and single-class firms. All variables are averages of firm-level averages.

Table 2: Summary Statistics Innovation and Governance Variables

6.2 First stage model

Table 3 presents the first-stage estimation results used to address potential endogeneity in the relationship between dual-class share structures and, innovation and governance outcomes. Column (1) reports the results of a Tobit model where the dependent variable is the *Wedge*, which is the difference between voting control and economic interest for the superior class of shares. The model is left-censored at zero, as only dual-class firms exhibit a wedge,

with single class firms having a wedge of zero per definition. Column (2) presents a Probit model, where the dependent variable is a dummy equal to 1 if a firm adopts a dual-class structure at IPO and 0 otherwise. This model is primarily used for robustness checks and serves as an alternative first-stage model to validate the Tobit-based results. Standard errors for both models are clustered at the industry level and reported in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% levels respectively.

Consistent with results found by Masulis, et al. (2009) and Cao, et al. (2020), *Industry adoption rate* is a strong and highly significant predictor in both models. This supports the notion that firms are more likely to adopt (regression (2)) or intensify (regression (1)) dual-class structures when adoption by peer companies is high, potentially reflecting perceived benefit or investor tolerance in a certain sector. The *State anti-takeover law index*, as constructed by Bebchuk and Cohen (2003), is not found to be statistically significant, in line with results found by Cao, et al. (2020) and Baran, et al. (2022). This means that variation in state-level legal protections does not independently explain cross-sectional variation in dual-class adoption or wedge size within this sample of tech firms. This is likely due to limited variation in incorporation state, as 474 out of 556 firms (85.3%) in the sample are incorporated in Delaware. This overrepresentation limits the explanatory power of state-level legal variation. The *Active founder dummy* is found to be highly statistically significant in both models. This indicates that firms with an actively involved founder, either as an executive or board member, are substantially more likely to adopt a dual-class share structure and exhibit a greater wedge between voting control and economic rights. This finding aligns with the theoretical expectation that founders often seek to retain control after IPO, and dual-class structures enable them to do so without sacrificing equity. The first-stage Tobit model yields a McFadden pseudo R^2 of 0.4711, while the Probit model achieves 0.5032. According to Louviere, et al. (2000, p. 54) values above 0.2 indicate a strong model fit and values above 0.4 are considered excellent. These results suggest that the instruments and control variables in the first stage explain a substantial portion of the variation in the wedge and the probability of dual-class adoption, supporting the strength of the first-stage model. The strong association reinforces the idea that dual-class adoption is not random but systematically linked to founder presence and preference.

Firm-level characteristics also display significant effects. *Firm size*, measured by the logarithm of total assets the year prior to IPO, is positively associated with both the wedge and the likelihood to adopt a dual-class structure, indicating that larger firms are more likely to introduce such structures at IPO and take on a larger wedge. *Profitability*, measured by ROA

the year prior to IPO, is negatively related to both outcomes, suggesting that more profitable firms adopt dual-class structures less often and take on a higher wedge after we controlled for other firm characteristics. These lagged variables are available because the SEC's S1-form requires firms to submit 2 to 3 years of audited financial statements when registering for an IPO. *Market-to-Book ratio* is found to have no statistically significant effect in either model.

First stage models	(1)	(2)
	Tobit model (Dependent variable: Wedge)	*Probit model (Dependent variable: Dual-class Dummy)*
Intercept	-1.286***	-3.937***
	(0.131)	(0.338)
Industry adoption rate	1.681***	5.163***
	(0.164)	(0.467)
State anti-takeover law index (Bebchuk and Cohen (2003))	-0.037	-0.161
	(0.065)	(0.207)
Active founder dummy	0.250***	0.763***
	(0.065)	(0.191)
Log(total assets), lagged at IPO	0.095***	0.304***
	(0.015)	(0.044)
Market-to-book Ratio	0.0001	0.001
	(0.001)	(0.003)
ROA, lagged at IPO	-0.150*	-0.508*
	(0.075)	(0.201)
McFadden Pseudo R^2	0.4711	0.5032
Number of firms	556	556
Clustered SEs	Industry level	Industry level

The table represents the first-stage regressions of the wedge in regression (1) and a dual-class dummy in regression (2). Numbers in parentheses represent standard errors clustered at the industry level, with "***","**" and "*" representing significance at the 1%-, 5%- and 10%-levels respectively.

Table 3: First stage estimation results

6.3 Second-stage Innovation results

Table 4 presents the second-stage OLS regressions using the fitted wedge from the Tobit first stage as the main explanatory variable. Regressions (3), (5) and (7) report the effects on patent counts, R&D intensity and innovation efficiency respectively. All models include year fixed effects and are estimated with standard errors clustered at the firm level. Regressions (3) and (5) have 6288 firm-year observations, with regression (7) having 4495, as only active R&D

years (meaning year with both patent output and R&D expenditure) were included in order to calculate a meaningful ratio.

These results provide evidence that a greater separation between voting control and economic rights, as captured by the wedge, is negatively associated with innovation. In regression (3), a one-unit increase in the fitted wedge, that is a 100% increase in difference in voting control and economic interest, leads to a statistically significant reduction in yearly patent output of 83.9 patents per year, ceteris paribus. This variable being significant at the 1%-level, suggests that there is a sizable economic impact. In regression (5), a similar pattern emerges for R&D intensity, with firms with a greater separation between voting control and economic rights investing less in innovation relative to total assets, statistically significant at the 10%-level. These results align with the agency cost hypothesis stating that greater separation between voting control and economic rights can reduce innovation incentives.

In contrast, regression (7) shows that a larger wedge is not statistically significantly associated with greater innovation efficiency. This weaker result is likely due to increased noise in the innovation efficiency measure, which is calculated by dividing patent counts by R&D spending. Since both variables can be volatile on their own, combining them into a ratio may introduce additional noise that makes it harder to detect a clear relationship. Another likely explanation is due to the inherent limitation of ratios: dividing zero or dividing by zero being undefined. This made the sample size 28.5% smaller, as only active R&D years were taken into consideration. This reduction in sample size may further contribute to the lack of statistical significance.

Importantly, the Inverse Mills Ratio (IMR) is statistically significant in regression (3) and (5), at the 5%- and 10%-level respectively. As established before, a significant IMR coefficient supports the validity of the two-stage Tobit approach and indicates that selection bias is indeed present and effectively addressed by the model. Similar results were found by Cao, et al. (2020). It can be concluded that failing to account for the endogenous adoption of dual-class structures would likely have biased the estimated effects on innovation outcomes.

The effect of the control variables are as expected. Firm size, as measured by the log of total assets, has a positive effect on patent output, explained by larger firms being in a better position to innovate due to both resource access and attraction of human talent. The negative coefficient on innovation efficiency suggests that, although larger firms produce more patents, they may do so less efficiently. Explanations could be bureaucratic frictions or diluted

incentives. Leverage is negatively associated with innovation output, aligning with the view that levered firms may be more financially constrained making them less likely to commit to long-term resource allocation. Lagged ROA also has a consistent negative association with innovation outcomes, potentially reflecting a reduced need for risky growth strategies when performance is already strong.

The innovation regressions overall provide partial support for the agency costs hypothesis. Regressions (3) and (5) do not support hypothesis 1, showing that a higher separation between voting control and economic rights is associated with lower patent output and reduced R&D intensity. While the results provide evidence that control separation decreases innovation quantity and R&D intensity, its effect on innovation efficiency remains inconclusive. Regression (7) does not provide evidence in support of hypothesis 1, as it was unable to show any relationship of statistical significance.

Second stage Innovation regressions	(3)	(5)	(7)
Dependent Variable: (Tobit first stage)	***Number of Patents***	***R&D intensity***	***Innovation efficiency***
Intercept	-45.732	0.070	1.411
	(139.441)	(0.307)	(10.648)
Fitted Wedge	-83.940***	-0.127*	0.875
	(31.494)	(0.069)	(2.756)
Dual-class Dummy			
Inverse Mills Ratio (IMR)	-34.157**	-0.064*	0.667
	(16.683)	(0.037)	(1.476)
Log(total assets)	31.817***		-0.459***
	(1.044)		(0.099)
Leverage	-26.097***	0.289***	-0.223
	(6.500)	(0.014)	(0.574)
Lagged ROA	-44.869***	-0.282***	0.472
	(6.611)	(0.013)	(0.669)
R^2	0.1559	0.145	0.017
Time fixed effects	Yes	Yes	Yes
Clustered SEs	Firm level	Firm level	Firm level
Number of firm-year observations	6288	6288	4495
Second stage regression model	Pooled OLS	Pooled OLS	Pooled OLS

This table presents the second-stage regressions for innovation outcomes: Number of Patents, R&D Intensity and Innovation Efficiency. The fitted wedge variable and Inverse Mills Ratio (IMR) are derived from the first stage Tobit regression. Control variables include firm size (log of total assets), leverage, and lagged ROA, with year fixed effects included in all regressions. Numbers in parentheses represent standard errors clustered at the firm level. "***", "**" and "*" indicate significance at the 1%-, 5%- and 10%-levels respectively.

Table 4: Second stage Innovation regressions

6.4 Second stage Governance results

Table 5 represents the second-stage regressions using the fitted wedge from the Tobit first stage as the main explanatory variable. Regressions (9), (11) and (13) examine the effects on governance outcomes, specifically board independence, CEO compensation and CEO turnover respectively. All models include year fixed effects and standard errors are clustered at the firm level. Regression (9) is based on 7251 firm-year observations. Regressions (11) and (13) have 3757 and 3814 firm-year observations respectively, due to disclosure around CEO

compensation only being made mandatory in 1992 by the SEC. Regression (13) uses a Logit model for the second stage, as the dependent variable, CEO turnover, is binary. To test if including a sunset horizon clause in the dual-class structure mitigates some of the governance problems, these regressions include a sunset dummy and an interaction term between the dummy and the wedge.

Regression (9) shows that a one-unit (100%) higher fitted wedge is associated with 20.4% lower board independence, statistically significant at the 1%-level. This finding is consistent with the notion that dual-class tech-firms with a significant gap between voting control and economic rights, have less incentive to maintain board oversight. Interestingly, the interaction between the wedge and the presence of a sunset clause is positive and significant at the 1%-level, suggesting that time-limited dual-class structures mitigates some of the negative governance effects typically associated with dual-class structures. This interaction effect implies that for firms with a sunset clause included in their dual-class structure, the effect is limited to 12.3% lower board independence compared to firms where voting control and economic interest are aligned. This evidence is in support of the agency costs hypothesis and hypothesis 5.

Regression (11) examines the relationship between the wedge and CEO compensation. The fitted wedge is positively associated with CEO pay and statistically significant at the 5%-level, suggesting that greater divergence between control and ownership is linked to higher executive compensation, in line with Smart & Zutter (2003) and Masulis, et al. (2009). However, the sunset clause dummy and its interaction with the wedge remain statistically insignificant, indicating the presence of a sunset provision does not appear to moderate this relationship. Regression (13) does not show statistically significant results in none of the variables of interest. The smaller sample size could be an explanation in both of these regressions. Reduced sample variation due to the binary nature of the CEO turnover variable could also impact the results.

The Inverse Mills Ration (IMR) is statistically significant in regressions (9) and (11) both at the 1%-level, further reinforcing the validity of the two-stage model and highlighting the importance of accounting for endogeneity in governance research. Regarding the control variables, firm size is statistically significant at the 1%-level and positively associated with board independence and CEO compensation. Larger firms are more visible to institutional investors incentivising board independence, while firm size is a well-known determinant of

CEO compensation (see Gabaix & Landier (2008)). Leverage also has a positive effect on board independence, possibly due to facing external monitoring pressures. Return on assets at $t-1$ seems to have no effect on the independence of the board, however, it does have an effect significant at the 1%-level on CEO compensation, confirming that CEO's pay does increase as firm performance increases. In regression (13) we can see that CEO turnover decreases as firm performance, proxied by ROA, increases, which is in line with expectations as boards should have less reasons to fire a CEO when the firm is doing well.

The governance regressions provide partial support for the agency costs hypothesis. Regression (9) confirms hypothesis 4, showing that a larger wedge between voting control and economic rights is significantly associated with lower board independence, and that this negative effect is partially mitigated by firms adopting a sunset clause at IPO. The latter supporting hypothesis 5. Hypothesis 2 is also supported by this data, with regression (11) finding separation between voting control and economic rights being associated with higher CEO compensation. In contrast, hypothesis 3 is not supported by the data, meaning that the wedge does not significantly affect CEO turnover in this sample. Executive pay and leadership stability are likely shaped by other factors such as size and performance.

Second stage Governance regressions	(9)	(11)	(13)
Dependent Variable: (Tobit first stage)	***Board Independence***	***CEO Compensation***	***CEO turnover***
Intercept	0.384***	4.443***	-15.977
	(0.081)	(1.514)	(724.70)
Fitted Wedge	-0.204***	1.016**	-0.107
	(0.025)	(0.457)	(1.094)
Dual-class Dummy			
Sunset horizon clause Dummy	-0.002	-0.135	-0.113
	(0.008)	(0.181)	(0.446)
*Sunset horizon * Fitted wedge*	0.081***	-0.189	-0.470
	(0.019)	(0.352)	(0.847)
Inverse Mills Ratio (IMR)	-0.089***	0.728***	0.026
	(0.013)	(0.242)	(0.576)
Log(total assets)	0.012***	0.326***	0.066*
	(0.001)	(0.017)	(0.038)
Leverage	0.034***	0.336***	0.434*
	(0.005)	(0.109)	(0.236)
Lagged ROA	-0.002	0.5802***	-0.759*
	(0.005)	(0.202)	(0.456)
R^2 / McFadden Pseudo R^2	0.3007	0.1905	0.0132
Time fixed effects	Yes	Yes	Yes
Clustered SEs	Firm level	Firm level	Firm level
Number of firm-year observations	7251	3757	3814
Second stage regression model	Pooled OLS	Pooled OLS	Logit

This table presents the second-stage regressions of governance outcomes: Board Independence, CEO compensation and CEO turnover. The fitted wedge variable and Inverse Mills Ratio (IMR) are derived from the first stage Tobit regression. The regression include a dummy for the presence of a time-based sunset horizon clause and its interaction with the fitted wedge. Control variables include firm size (log of total assets), leverage, and lagged ROA, with year fixed effects included in all regressions. Numbers in parentheses represent standard errors clustered at the firm level. "***", "**" and "*" indicate significance at the 1%-, 5%- and 10%-levels respectively.

Table 5: Second stage Governance regressions

6.5 Robustness checks

To assess the robustness of the results, each of the second-stage regressions were re-estimated using an alternative first-stage model. While odd-numbered regressions, the ones we

talked about so far, use the fitted wedge obtained from a Tobit model, the even-numbered regressions rely on predicted dual-class probability at IPO probabilities derived from a Probit model. This two-model approach allows us to check whether results are sensitive to using a continuous measure like the wedge or a binary measure like the dual-class dummy. This alternative first-stage model also serves as a robustness check for the Tobit model.

6.5.1 Innovation robustness checks

Innovation outcomes in table 6 display a mixed pattern across models. In regression (3), a higher fitted wedge is associated with a statistically significant decline in yearly patent output. However, in regression (4), which uses the predicted dual-class probability instead of the fitted wedge, this effect becomes statistically insignificant. We see a similar pattern for R&D intensity in regression (6). One possible explanation for this difference lies in the character of the first stage model itself. The Tobit-based fitted wedge captures continuous variation in the form of separation between control and cash flow rights, while the binary dual-class dummy only distinguishes between adopters and non-adopters. This loss of specificity may reduce the model's ability to express a more nuanced relationship between dual-class share structures and innovation. These second stage results are in line with what Cao, et al. (2020) found. The divergence may suggest that the relationship between dual-class structures and innovation is not just driven by the presence of such structure, but rather by the degree of separation between voting control and economic rights. These findings suggest that innovation outcomes may depend on the extend of control separation rather than the mere presence of a dual-class structure. However, further research is needed to more robustly confirm this effect. Regression (7) shows no statistically significant effect of the wedge on innovation efficiency. The same results hold for regression (8), confirming that the null finding is not sensitive to the first-stage model.

Second stage Innovation robustness	(4)	(6)	(8)
Dependent Variable: (Probit first stage)	***Number of Patents***	***R&D intensity***	***Innovation efficiency***
Intercept	-76.827	0.018	1.632
	(138.13)	(0.306)	(10.612)
Fitted Wedge			
Dual-class Dummy	-10.755	-0.012	0.344
	(15.015)	(0.033)	(1.410)
Inverse Mills Ratio (IMR)	5.631	-0.001	0.240
	(3.964)	(0.008)	(0.381)
Log(total assets)	31.908***		-0.460***
	(1.047)		(0.100)
Leverage	-25.517***	-0.289***	-0.222
	(6.510)	(0.014)	(0.575)
Lagged ROA	-44.481***	-0.281***	0.473
	(6.620)	(0.013)	(0.671)
R^2	0.1552	0.1450	0.0167
Time fixed effects	Yes	Yes	Yes
Clustered SEs	Firm level	Firm level	Firm level
Number of firm-year observations	6288	6288	4495
Second stage regression model	Pooled OLS	Pooled OLS	Pooled OLS

The table presents robustness checks for the second-stage regressions innovation regressions, using a first-stage Probit model to address potential selection bias. The predicted dual-class probability and Inverse Mills Ratio (IMR) are derived from the first stage Probit regression. Control variables include firm size (log of total assets), leverage, and lagged ROA, with year fixed effects included in all regressions. Numbers in parentheses represent standard errors clustered at the firm level. "***", "**" and "*" indicate significance at the 1%-, 5%- and 10%-levels respectively.

Table 6: Robustness regressions Innovation

6.5.2 Governance robustness checks

For governance, the results in table 7 are highly consistent across first stage models. For board independence, the negative statistically significant effect in regression (9) persists in regression (10). The coefficient on the dual-class dummy is negative and also statistically significant at the 1%-level, indicating that firms with dual-class structures tend to have lower board independence even when the wedge is not modelled. The sunset clause interaction term remains positive and significant, suggesting that the mitigating effect of sunset provisions is

also not dependent on the first-stage model. A brief comparison of the CEO compensation regressions (11) and (12), as well as the CEO turnover regressions (13) and (14), shows consistent results across models, with all variables of interest remaining the same. Overall, the consistency of governance related results across first-stage models lends strong support to the hypothesis that dual-class share structures weaken the checks and balances of a company.

Second stage Governance robustness	(10)	(12)	(14)
Dependent Variable: (Probit first stage)	***Board Independence***	***CEO Compensation***	***CEO turnover***
Intercept	0.329***	4.610***	-16.131
	(0.081)	(1.509)	(724.82)
Fitted Wedge			
Dual-class Dummy	-0.049***	0.523*	0.184
	(0.012)	(0.236)	(0.530)
Sunset horizon clause Dummy	-0.043***	0.021	0.198
	(0.014)	(0.220)	(0.490)
*Sunset horizon * Fitted wedge*	0.073***	-0.385	-0.556
	(0.022)	(0.444)	(1.050)
Inverse Mills Ratio (IMR)	0.002	0.276***	0.111
	(0.003)	(0.062)	(0.139)
Log(total assets)	0.012***	0.327***	0.065*
	(0.001)	(0.017)	(0.038)
Leverage	0.035***	0.321***	0.443*
	(0.005)	(0.109)	(0.237)
Lagged ROA	-0.002	0.453**	-0.748*
	(0.005)	(0.211)	(0.457)
R^2 / McFadden Pseudo R^2	0.2957	0.1896	0.0132
Time fixed effects	Yes	Yes	Yes
Clustered SEs	Firm level	Firm level	Firm level
Number of firm-year observations	7251	3757	3814
Second stage regression model	Pooled OLS	Pooled OLS	Logit

The table presents robustness checks for the second-stage regressions governance regressions, using a first-stage Probit model to address potential selection bias. The predicted dual-class probability and Inverse Mills Ratio (IMR) are derived from the first stage Probit regression. Control variables include firm size (log of total assets), leverage, and lagged ROA, with year fixed effects included in all regressions. Numbers in parentheses represent standard errors clustered at the firm level. "***", "**" and "*" indicate significance at the 1%-, 5%- and 10%-levels respectively.

Table 7: Robustness regressions Governance

6.5.3 Standard error clustering

Both first stage regressions employ cluster-robust standard errors at the industry level, while the second stage regressions employ cluster-robust standard errors at the firm level, which corrects for within-firm correlation and heteroskedasticity often the case in panel settings. While this is more an econometric adjustment rather than a robustness check, it is worth noting that in the first-stage Probit model, clustering slightly effected the statistical significance of lagged ROA, reducing it from the 5%- to the 10%-level. This was the only change in significance in any variable when comparing before and after introducing clustered standard errors. This suggests the model is relatively robust.

6.6 Summary table of findings in relationship to hypotheses

The evidence provides partial support for the agency costs hypothesis as previously defined. Regarding innovation, a higher wedge between voting control and economic rights is significantly associated with fewer patents and lower R&D investment, but shows no statistically significant effect on innovation efficiency. However, when the fitted wedge is exchanged for a predicted dual-class probability, we see the effect disappearing. This may suggest a more nuanced relationship, where innovation outcomes decline with increasing separation between voting control and economic rights, but are positively associated with dual-class status itself. Further research is needed to confirm this effect. I have to conclude mixed results for the first hypothesis. For governance, a larger wedge is significantly associated with lower board independence, supporting hypothesis 4, and this negative effect can be partially mitigated by including a sunset clause at IPO, supporting hypothesis 5. Hypothesis 2 also finds support in this thesis, with separation between voting control and economic interest being linked to higher CEO compensation. However, no significant effects were found regarding the effects of separation between voting control and economic rights on CEO turnover. Table 8 summarises the results by hypothesis.

Hypothesis Summary table			
Hypotheses	**Description**	**Supported**	**Explanation**
Hypothesis 1	*Dual-class tech-firms display more output and a more efficient patent output than single-class tech-firms.*	Mixed results	Patent output and R&D investment decline with the wedge, but does not show robustness. No significant effect on innovation efficiency.
Hypothesis 2	*Dual-class tech-firms' CEOs have higher compensation than single-class tech-firms' CEOs.*	Supported	Greater control separation is linked to significantly higher CEO compensation.
Hypothesis 3	*Dual-class tech-firms exhibit lower CEO turnover than single-class tech-firms.*	Not supported	No significant relationship between control separation and CEO turnover found.
Hypothesis 4	*Dual-class tech-firms have a lower board independence than single-class tech-firms.*	Supported	Greater control separation is linked to significantly lower board independence.
Hypothesis 5	*Dual-class tech-firm including a time-based sunset provision, mitigate some of the negative effects on governance due to separation of voting control and economic rights.*	Supported	Sunset clauses moderate the negative effects on board independence of control separation.

Table 8: Summary table Hypotheses

7 Conclusion

This thesis investigated the impact of dual-class structures on innovation and corporate governance in U.S. technology sector. Using a Heckman two-step approach to correct for endogeneity in the form of selection bias, the analysis estimated the effects of separation between voting control and economic interest on three innovation measures (patent output, R&D intensity and R&D efficiency) and three governance measures (board independence,

CEO compensation and CEO turnover). The first-stage model generated fitted values for the degree of separation, called the wedge, which are then used to assess their influence in second-stage regressions.

The results present a nuanced picture. Innovation outcomes are inconclusive. While patent output and R&D intensity indicate a negative effect of dual-class structures, they lack robustness across model variations. Interestingly, when first-stage models are specified as done in Cao, et al. (2020) research with a dual-class dummy variable, results are in line with their findings, suggesting effects might be driven by the degree of separation rather than dual-class status itself. These findings suggest that the innovation effects observed in the technology sector differ somewhat from those reported in the wider literature, where several studies such as Baran, et al. (2022) report positive innovation outcomes. In contrast, this thesis does not find consistent evidence of an innovation benefit from dual-class share structures in the tech sector. However, the governance findings are clearer. Firms with greater separation exhibit a significantly less independent board and significantly higher CEO compensation, consistent with the agency cost hypothesis. Importantly, dual-class firms including a time-based sunset horizon clause at IPO were shown to partially mitigate some of the governance issues related with dual-class structures. Similar to findings reported in broader cross-sector studies, the governance risks in technology firms appear robust and are comparable in magnitude. Overall, these results suggest that the primary cost of dual-class in the tech-sector lies in governance, not necessarily innovation suppression, and that on a policy-level, time-based sunset horizon clauses might aid in governance.

This thesis contributes to the literature by isolating technology firms, a sector where innovation is a key driver of firm performance. This thesis also fills a gap in literature by making use of updated data that runs through 2024. It also adds nuance in the policy debate by distinguishing the degree of separation between voting control and economic interest, measuring its effects using firm-level governance and innovation data, and offering a potential solution in the form of a time-based sunset horizon to mitigate long-term governance risks.

Several limitations should be noted. First, while best efforts have been made to counter endogeneity, I cannot completely rule out the possibility of endogeneity in the form of omitted variable bias. Second, data limitations restricted the sample size for certain governance measures, particularly CEO compensation and CEO turnover. Third, the analysis is limited to U.S.-incorporated technology firms, which may reduce generalisability to firms incorporated

in other countries. Lastly, there is a time difference between research and development being done and costs being incurred, and a patent being granted.

Future research could build on these finding by incorporating measures of patent quality, such as citations five-year post being granted, as done by Baran, et al. (2022). Further, examining event-based sunsets, such as those triggered by founder death or disability, could yield insights into alternative governance metrics, if sample size is sufficient. Event studies tracking firm outcomes after the time-based sunset conversion may help quantify the long-term value of such reforms. Further research could also be done on the effect of time phased voting, as described in section 4.1, and if it has any benefit to enhancing innovation without having a negative effect on governance. Finally, further investigation into how founder shareholdings affect the adoption and structure of dual-class firms could provide deeper insights into the dynamics of founder control.

In sum, while dual-class structures may offer flexibility to visionary founder, this thesis shows that such structures come with clear governance trade-offs, which merit closer regulatory scrutiny in an era of rapid innovation and evolving capital markets.

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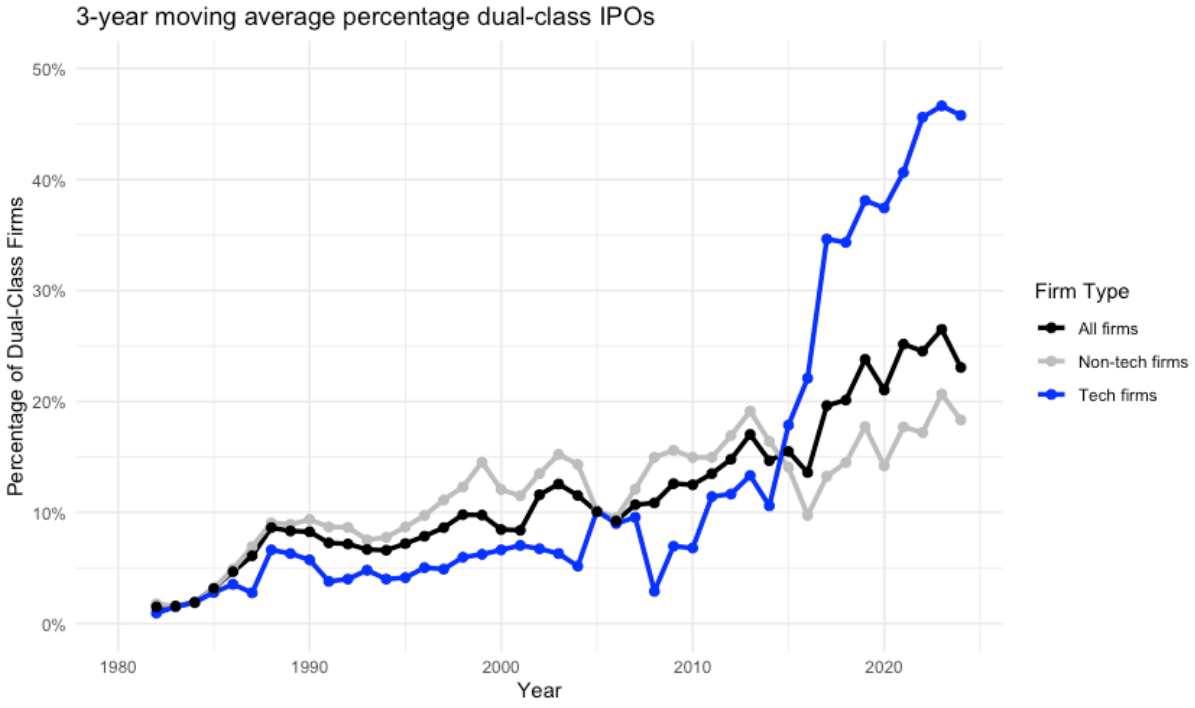
Appendix

Appendix A – 3-year moving average dual-class IPOs



Appendix B – Tech classifications SIC-codes

Tech SIC	Name	Number of Dual-class firms	Number or Single-class firms
3570*	Computer & office Equipment	0	2
3571*†	Electronic computers	2	1
3572*†	Computer storage devices	1	3
3575*†	Computer terminals	0	1
3576*	Computer Communications Equipment Companies	0	7
3577*†	Computer peripheral equipment, nec	1	4
3578*†	Calculating and accounting equipment	0	1
3579*	Office machines, nec	0	0
3661*†	Telephone and telegraph apparatus	0	7
3663*†	Radio and TV communications equipment	1	18
3669*†	Communications equipment, nec	0	5
3670*	Electronic Components & Accessories	0	2
3671†	Electron tubes	0	0
3672*†	Printed circuit boards	0	7
3674*†	Semiconductors and related devices	1	52
3675†	Electronic capacitors	0	0
3676‡	Electronic resistors	0	0
3677*†	Electronic coils and transformers	1	0
3678*†	Electronic connectors	0	1
3679*†	Electronic components, nec	1	7
3812†	Search and navigation equipment	1	3
3821*	Laboratory apparatus and furniture	0	1
3822*	Environmental controls	0	0
3823*†	Process control instruments	0	7
3824*	Fluid meters and counting devices	0	1
3825*†	Instruments to measure electricity	0	3
3826*†	Analytical instruments	3	15
3827*†	Optical instruments and lenses	0	3
3829*†	Measuring and controlling devices, nec	2	9
3841*†	Surgical and medical instruments	1	34
3844*	X-ray apparatus and tubes	0	2
3845*†	Electromedical equipment	1	49
3861*	Photographic equipment and supplies	1	2
4812*†	Radiotelephone communication	4	2
4813*†	Telephone communication, except radio	5	6
4822*	Telegraph and other communications	0	0
4899*†	Communication services, nec	2	9
4911‡	Electric services	2	3
7370*	Services-Computer Programming, Data Processing, Etc.	1	140
7371*†	Custom computer programming services	15	5
7372*†	Prepackaged software	56	52
7373*†	Computer integrated systems design	5	15
7374*†	Data processing and preparation	13	7
7375†	Information retrieval services	0	0
7377*	Computer rental and leasing	0	0
7378†	Computer maintenance and repair	0	0
7379†	Computer related services, nec	0	0
7389*	Business services, nec	5	19
8731*	Commercial physical research	4	10
8734*	Testing laboratories	1	2

*: From Kile and Phillips (2009), †: From Loughran and Ritter (2004), and ‡: Own inclusion

Statements

Statement on the Use of AI Tools

In line with the policy on the use of AI Tools for written assignments in the MSc Finance, I hereby declare that AI tools were used in this thesis in a supportive role only. Specifically, I used AI tools to:

- Proofread the text for spelling, grammar and coherence.
- Assist with debugging R code used for the empirical analysis

At no point was AI used to generate substantive content, theoretical discussion, or empirical interpretation presented in this thesis. All analysis, results and interpretations reflect my own work. I hereby acknowledge this work has been written solely by Mark Smits.