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Dual-class shares: implications for firm valuation and corporate governance

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Abstract

Using a data set of corporate voting rights of firms in North-Western Europe from 2009-2018, the valuation dynamics over maturity of dual-class firms are compared to single-class firms. By means of regression analysis using Tobin's q as dependent variable, this is assessed on the basis of dual-class and maturity indicators, while controlling for firm characteristics and industry by year fixed effects. Indicative evidence is found that the investment q-sensitivity and valuation of dual-class firms tend to decline over maturity, compared to their single-class equivalents. Furthermore, probit analysis suggests that highly levered and innovative firms are more likely to have dual-class status. These findings challenge the notion of the optimality of the one share-one vote principle and suggest more benefits of dual-class voting in the developmental stages of a firm's life cycle by enabling management to maximize long-term value when growth potential is high.

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1. Introduction

1.1 Corporate share structures

The basic share structure of most corporate firms abides by the principle of *one share-one vote*, under which shareholders enjoy proportional voting rights, which are derived from a single class of shares. Over the past decades, however, firms have increasingly been establishing dual-class share structures, in which superior voting rights are given to an additional class of the company's shares, typically with the purpose of concentrating control of the firm in the hands of minority shareholders. Within the dominant academic view, single-class share structures are considered optimal, whereas dual-class share structures are associated with several governance problems (Adam & Ferreira, 2008). Nuancing this view, Kim & Michaely (2019) found that young dual-class firms trade at a premium and operate at least as efficiently as young single-class firms, but valuation declines as dual-class firms mature. In the continuous search for more definitive answers to this efficiency question, studying the effects of corporate share structures on firm valuation and performance remains a point of interest.

1.2 Research questions

Contributing to the literature concerning dual-class share structures and firm valuation/performance, this study provides empirical insights taken from the European front. Building on the framework of Kim & Michaely (2019), a comparison can be made with their results from the United States. Naturally, the underlying legal structure (e.g. minority shareholder rights like right of inquiry) of different jurisdictions may impact the effects of dual-class voting on firm performance and valuation. Therefore, broadly starting from the following main research question, the implications of dual-class share structures are further explored.

> *Main research question:*
> What are the implications of dual-class share structures for firm valuation/performance and corporate governance in Europe?

Two aspects of this overarching question are investigated: (1) the cost-benefit dynamics of dual-class firms and (2) the nature of dual-class firms. Results for both aspects combined may add to the discussion on rules for corporate voting rights and the optimal governance structure for dual-class firms.

Research question (1):

What are the cost-benefit dynamics of dual-class share structures in Europe?

Empirically, this research adds more gradations of firm maturity to the analysis. Not only are young firms broadly compared to mature firms, the developmental course of firms through their junior, medior, and senior phases is roughly assessed as well. This enables differentiating the discussion and setting up different policies conditional on subsequent maturity phases.

Research question (2):

What are the predictors for firms having a dual-class share structure in Europe?

By looking at the nature of dual-class firms, it can be induced for which type of firms a dual-class share structure is most desired by the founders or controlling shareholders of the firm. This may be important information when developing a theory about firm valuation over maturity and realisation of growth potential. Consequently, an even more nuanced view on optimal corporate governance becomes possible when differentiating across firm types.

1.3 Scientific and social relevance

Considering that dual-class structures have become more commonplace, most notably among firms in the technology industry, the implications of this form of ownership and control have become more relevant both scientifically and socially. The increase in popularity of the dual-class share structure can be illustrated by the upwards trend since 1980 of the fraction of total initial public offerings (IPO's) in the United States that presented a dual-class share structure right from the start. In 1980 only 1.4% of all IPO's fell in the dual-class category, versus 22.7% in 2019 and a record high of 28.0% in 2017. The contrast is even greater for IPO's of tech firms only, with 0% being dual-class in 1980, versus 38.2% in 2019 and a record high of 43.3% in 2017 as well (Ritter, 2020).

Where historically dual-class firms were mostly family-owned businesses, like Ford and Volkswagen, the 2004 dual-class IPO of Google seemed to have inspired the next generation of (tech) firms to adopt a dual-class share structure as well, such as Snap, Spotify, LinkedIn, and Facebook (Robertson & Tan, 2019). Despite its increasing popularity, critics of the dual-class share structure have spoken out against its undemocratic nature. This discussion revolves around the legitimacy of the dual-class share structure violating the one share-one vote principle. Opponents of dual-class share structures argue that the one share-one vote principle – which honours equality among investors – is the bedrock notion of capitalism, saying that those who provide the money should proportionally control how the company is run (Robertson & Tan, 2019). Proponents argue, however, that dual-class shares help executives to maintain a long-term focus, not getting distracted by the pressure to make short-term profits. Policy-wise, for example, prohibiting dual-class listings from indexes would be a discouraging factor to some of the most innovative (tech) entrepreneurs for taking their company public, depriving investors from such investment opportunities.

Besides these discussions in the public debate, the implications of dual-class share structures have also become a topic of interest academically within financial economics. Past research in this area has most often used data from the United States, providing initial insights into its implications for firm valuation and corporate governance, which will be further discussed in chapter 2 *Literature review*.

2. Literature review

2.1 One share-one vote principle

2.1.1 Allocation of voting rights

A shareholder's right to vote on important corporate decisions is regarded to be the most fundamental contractual right attached to owning a company's stock. The question of how voting rights must be allocated among shareholders is therefore an essential one from a governance standpoint. Intuitively, one could say that voting rights must be allocated proportional to the amount of share capital provided by the investor. In other words, the allocated voting rights must then be proportional to the investor's percentage of share ownership, which is allocation based on the one share-one vote principle.

2.1.2 Governance mechanisms

The way in which voting rights are allocated determines the balance of power among shareholders and the leverage shareholders have with respect to management (Burkart & Lee 2008). As a consequence of this dynamic, a governance mechanism takes shape that relies on active ownership and (the possibility of) takeovers. This governance mechanism in turn influences the efficiency of the firm's business. Besides these shareholder dynamics, the composition of the board of directors, executive compensation, legal protection for investors, product market competition and the financial structure are among the important governance mechanisms present in firms (Becht, Bolton, & Roëll, 2003; Shleifer & Vishny, 1997). Depending on the differing effects of such governance mechanisms across firms and jurisdictions, the prevalence of takeovers and active owners may vary (Allen & Gale, 2000).

2.1.3 Arguments for one share-one vote

The dominant view in the literature considers proportional voting rights (i.e. one share-one vote) to be most desirable (Adams & Ferreira, 2008). Proponents of the one share-one vote principle argue that adherence to this proposition results in good governance. Conversely, disproportional voting rights – where control is concentrated in the hands of minority shareholders – would lead to governance problems in the form of agency and entrenchment costs. These costs can take the form of inefficiencies in the market for corporate control (Grossman & Hart, 1988; Harris & Raviv, 1988), tunnelling (Johnson et al., 2000), distortions in investment decisions (Bebchuk, Kraakman, & Triantis, 2000), inefficient perk consumption (Yermack, 2006), and formation of monopolies (Khanna & Yafeh, 2007).

Along broader lines, two main arguments for the one share-one vote principle are presented by Burkart & Lee (2008). Firstly, it is argued that (1) the alignment of voting power with economic incentives in the form of dividends will presumably make blockholders more inclined to take value-maximizing decisions. Secondly, it is argued that (2) in the context of takeovers the level playing field resulting from one share-one vote will secure allocation of control to the most efficient bidder. The question remains if on the basis of these arguments pertaining to (1) the reduction of agency problems and (2) the efficiency of control allocations, single-class firms would outperform dual-class firms in every case.

2.1.4 Arguments against one share-one vote

In the view of Burkart & Lee (2008), takeover models show that one share-one vote is most conducive to a socially optimal control allocation in some instances, but not in others. Additionally, they assess blockholder models showing that deviations from one share-one vote are associated with costs as well as benefits. Costs may depend on institutional factors like shareholder protection across jurisdictions. Even when economic institutions are underdeveloped, centrally controlled business groups are able to act as a substitute for those institutions (e.g. Khanna & Yafeh, 2007). Finally, implementation costs may arise when strictly mandating one share-one vote, having adverse effects on growth and choice of financing and ownership structure. In conclusion, theoretically it is not clear-cut that having proportional voting rights would consistently result in superior firm performance.

2.2 Dual-class share structures

2.2.1 Differentiated voting rights

In practice a significant portion of companies chooses to deviate from the one share-one vote principle by introducing a special class of equity with superior voting rights alongside the regular ordinary shares (with inferior voting rights). This split into two types of shares with differentiated – i.e. disproportional – voting rights means that the company in question has a dual-class share structure.

2.2.2 Google / Alphabet

The direct practical implications of differentiated voting rights for a specific company will be illustrated by briefly discussing Google's history on a corporate structural level. In 2004, with the IPO of Google Inc., two classes of authorized common stock were introduced, where each share of class A is entitled to one vote per share and each share of class B to ten votes per share (Google, 2004). Since 2014 a third type of share, without voting rights, named class C capital stock, has been listed on the NASDAQ stock exchange alongside the class A common stock (Alphabet, 2020). On the contrary, the 'superior' class B common stock has remained unlisted and untraded, being held by just 66 stockholders of record.

In 2015 these three classes of shares were converted to shares of Google's newly founded successor corporation Alphabet Inc., from then on acting as holding company for Google LLC and other enterprises.[1] Having been founded by Larry Page and Sergey Brin, the two of them owned 84.3% of outstanding class B common stock of Alphabet by the end of 2019, amounting to 51.2% of all outstanding voting power, despite owning just 5.7% of all outstanding shares (Alphabet, 2020).[2] In the 2019 annual report of Alphabet this concentrated control is explained as a limitation or severe restriction of other stockholders' ability to influence corporate matters, even indicating the risk that the controlling founders may take actions which lower the market price of the traded class A common stock and class C capital stock. The founders' influence thus stretches over all corporate matters that require stockholder approval, such as the election of directors and significant corporate transactions.

2.2.3 Superior voting shares

Considering the theoretical value of influencing corporate decisions by voting in a shareholder's meeting, one would expect a higher value for shares that have more votes attached to them. The hypothesis that shares with superior voting rights carry a premium in acquisitions was supported by the research of DeAngelo & DeAngelo (1985). This paper marks the starting point of the modern literature on dual-class shares, showing the value of voting rights in a study of 45 United States dual-class firms.

[1] With this corporate restructuring, the legal form of Google was changed from corporation (Inc.) to limited liability company (LLC).

[2] The number of outstanding shares per share class as of January 27, 2020, and its percentage of the total number of outstanding shares (between parentheses) are as follows – Class A: 299,895,185 (43.6%); Class B: 46,411,073 (6.8%); Class C: 340,979,832 (49.6%); Page & Brin (owning approximately 84.3% of class B shares): 39,124,535 (5.7%). All shares of Class A combined hold 39.3% of voting power and all shares of Class B combined hold the remaining 60.7%, whereas Class C consists of non-voting capital shares. The corresponding economic interest remains proportional to the percentage of total outstanding shares held – of any class (A, B, or C).

2.2.4 Control and liquidity

Logically, it is assumed that dual-class shares are mainly used to retain control within a given company. This assertion is supported by the observation that around 85% of United States dual-class firms have one or more share classes that are untraded, of which the vast majority are in fact superior voting shares (Gompers, Ishii, & Metrick, 2010). Typically, dual-class firms have one publicly traded share class with inferior voting rights, next to another non-publicly traded share class with superior voting rights that is mostly owned by insiders of the firm like managers and directors (Gompers et al., 2010). Consequently, most superior voting shares have little to no liquidity as the respective owners normally would not be interested in disposing of those shares. Moreover, a firm may make the superior voting shares in a sense untradeable by forcing a conversion to inferior voting shares upon sale (e.g. Alphabet, 2019).

2.2.5 Dual-class unifications

The possibility exists for dual-class firms to unify their multiple classes of shares into one type. Research on European dual-class firms by Pajuste (2005) finds that the need to raise capital and to make acquisitions are important drivers for such a unification decision, whereas higher value of retaining control and private benefits for the superior voting shareholders lower the probability of unification. Using a German sample, Dittmann & Ulbricht (2005) likewise found that dual-class firms are more likely to unify if their controlling shareholder loses only little voting power in a stock unification. In conclusion, the benefit of unification amounts to reducing the cost of capital for the company, at the expense of control and private benefits for the superior voting shareholder.

2.3 Agency costs

Governance problems associated with dual-class share structures can come in the form of agency costs, which refer to the costs arising from the principal-agent problem. The management of the firm (the agent) is hired to run the company on behalf of the shareholders (the principal), but this relation may lead to moral hazard due to conflicting interests when assuming that both parties are utility maximisers (Jensen & Meckling, 1976). In a situation of moral hazard, the agent is not held responsible for actions that are not in the best interest of the principal. This will be the case for a dual-class firm when management acts against the interest of (dispersed) non-controlling shareholders, together owning a majority of outstanding shares, while the behaviour of management is (tacitly) approved of by the controlling minority shareholders via the shareholders' meeting. When managers and directors are in fact the controlling shareholders, the agency problems in relation to the non-controlling shareholders become even more evident.

Agency costs occurring from the principal-agent problem are defined as the sum of (1) monitoring costs, (2) bonding costs (monetary and non-monetary), and (3) a residual loss experienced by the principal as a result of sub-optimal decisions by the agent (Jensen & Meckling, 1976). These agency costs are tightly associated with the separation of ownership and control, which is the case in dual-class firms. The purpose of this research is to estimate the possible negative impact of agency costs on valuation of dual-class firms. In this regard, it is known that agency costs may significantly reduce firm valuation, for which the evidence has been well documented over the past decades (Shleifer & Vishny, 1997). Thus, when agency costs turn out to be quite low, it might be possible that the benefits of dual-class share structures outweigh these costs, leading to equal or higher firm valuation compared to single-class firms.

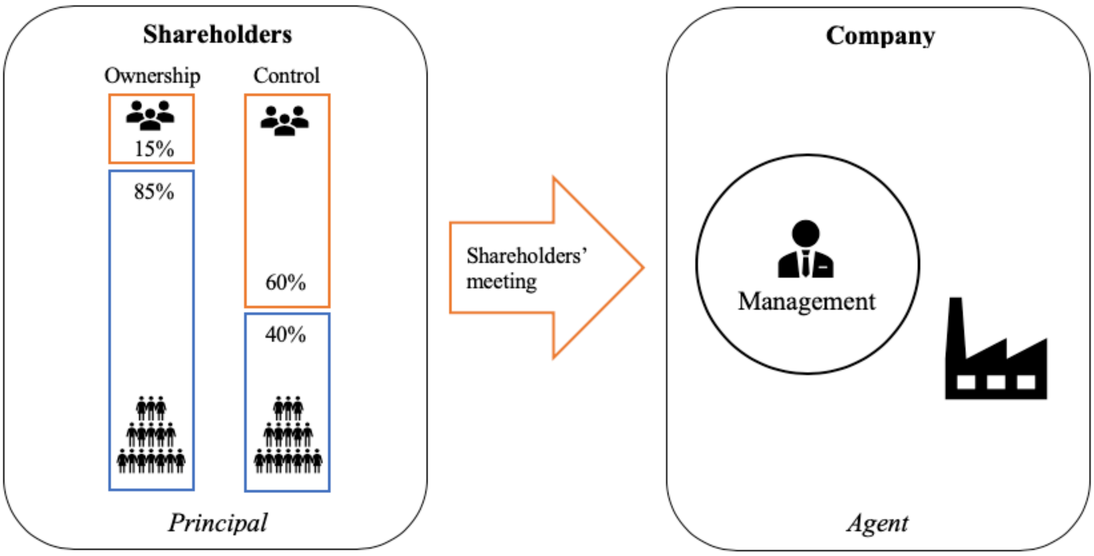

Figure L1: Visual representation of the shareholder dynamics of a dual-class firm

3. Hypotheses

3.1 Conceptual framework for dual-class dynamics

Now that the essential insights from the literature on share structures and voting rights have been established, in this chapter the direction of this thesis will be laid out in more detail. As the first research question focuses on the cost-benefit dynamics of dual-class share structures, the relevant conceptual framework and key hypotheses relating to firm valuation, performance, and investment sensitivity are addressed next. In light of the second research question, the hypothesis for predictors of dual-class status will be formulated at last.

Being central in this research is the relation between dual-class voting and firm maturity. The applicable conceptual framework revolves around the cost-benefit trade-off of dual-class share structures to outsider shareholders who have inferior voting rights (e.g. Rydqvist, 1993; Burkart & Lee, 2008). On the benefit side, dual-class firms can focus more on maximizing long-term value by avoiding obsessing over short-term profits and not having the need to set up costly takeover defenses (Knoeber, 1986; Shleifer & Summers, 1988; Stein, 1988, 1989). Dual-class firms are also less vulnerable to shareholder-management agency conflicts, especially when managers are the controlling shareholders. On the cost side, within a dual-class share structure private benefits of control are more easily extractable by insiders, which comes at the expense of dispersed outsider shareholders (e.g. Zingales, 1995). Such concentrated control may also result in bad management decisions for which the board is only accountable to the controlling shareholders. Because of these governance risks, dual-class firms are more prone to agency problems like tunnelling resources to insiders, quiet life and empire building (Kim & Michaely, 2019). With respect to the efficiency of control allocations, the relative absence of control contests amounts to a significant cost attached to the dual-class share structure (Grossman & Hart, 1988; Harris & Raviv, 1988).

By the same token, protection from control contests or other capital market pressures may be beneficial in the earlier stages of a firm's development, when growth potential is high. For young firms, firm-specific investments would normally still take a long time to pay off. Moreover, there may be information asymmetry between the firm's insiders and outsiders about the quality of those investments, considering a founder-entrepreneur of a young high-growth firm presumably has more knowledge and vision about its (future) product than outside investors. For these reasons, holding a dual-class share structure would be more conducive to sticking to a long-term strategy conform the intentions of the founder. From a personal perspective, the founder also takes into account his own pay-off in economic as well as non-economic terms. Both his economic stake in the form of his equity share and his non-economic stake in the form of his reputation depend to a great extent on firm value in the future rather than cash flows or consumption of private benefits of control in the short term (Kim & Michaely, 2019). Thus, the fact that greater benefits accrue moving into the future makes that the founder has a strong incentive to improve firm efficiency in the present by reducing agency conflicts (DeMarzo & Fishman, 2007). Considering the need for more external financing in the developmental stages of a firm's life, to keep the cost of capital limited, young firms also have more incentives to hold back on private benefits (Easterbrook, 1984).

The described benefits of dual-class voting are expected to decline as firms mature and reach a more developed stage. This decline is due to diminishing growth options over time and possibly the retirement of the original founder from the managing board. All in all, the hypothetical effects of the dual-class share structure would amount to higher valuation and performance for young firms with high growth potential, compared to mature firms. This suggests a positive impact to a young firm's value when adopting a dual-class share structure. More specified hypotheses, to be discussed next, are derived from this conceptual framework following similar reasoning.

3.2 Valuation of dual-class firms

To assess the valuation of sample firms, Tobin's q is chosen as a measure. Intended as the ratio between the market value and replacement value of certain assets, like a company, Tobin's q has been widely used in economics research and particularly in previous papers on dual-class firms (e.g. Kim & Michaely, 2019; Gompers et al., 2010; Cronqvist & Nilsson, 2003), albeit in slightly different forms. Particularly, Tobin's q is helpful in measuring the contribution of intangible assets, like growth options and human capital, to a firms' market value (Cronqvist & Nilsson, 2003). As discussed in previous paragraph, especially firms with high growth potential may in theory benefit from the protecting properties of a dual-class share structure. At the same time, Tobin's q captures any agency costs resulting from the decisions of controlling minority shareholders in dual-class firms, which can directly affect the value of a firm's intangible assets (Cronqvist & Nilsson, 2003).

To formulate hypotheses for this research, the findings of the following papers are drawn on. Cronqvist & Nilsson (2003) found that controlling vote ownership is associated with a significant decrease in Tobin's *q* in a sample of Swedish firms during 1991-1997, which result is interpreted as evidence of agency costs being associated with dual-class share structures. Gompers et al. (2010), using a sample of United States firms during 1995-2002, found that Tobin's *q* is positively associated with cash-flow rights of insider shareholders, negatively associated with voting rights of insider shareholders, and negatively associated with the wedge between insiders' cash-flow rights and voting rights. The 'wedge' means disproportional control of the company by insider shareholders, i.e. violation of the one share–one vote principle. Analysis of the association between dual-class voting and Tobin's *q* over firm maturity by Kim & Michaely (2019) revealed that young dual-class firms have 9% greater valuation relative to similar young single-class firms in the United States during 1971-2015. As dual-class firms mature, however, they showed a 10% greater decline in Tobin's *q* relative to single-class firms. This nuances the view implied by previous research that dual-class firms have lower valuation than single-class firms per se.

I. Hypothesis 1:

Valuation of dual-class firms declines over maturity, relative to single-class firms.

3.3 Operating performance and investment sensitivity of dual-class firms

Additionally, Kim & Michaely (2019) assessed the underlying drivers of declining valuation and increasing agency costs for dual-class firms over maturity. Two of the valuation drivers they investigated were: (1) firm performance in the form of the operating margin, asset turnover and labour productivity, and (2) responsiveness to changes in investment opportunities.

Firstly, they found that operating margins and labour productivity of dual-class firms decrease significantly over maturity, compared to single-class firms. The slight increase in asset turnover was found to be insignificant.

II. Hypothesis 2:

Operating performance of dual-class firms declines over maturity, relative to single-class firms.

Secondly, they found that responsiveness of management to changes in investment opportunities of dual-class firms decreases over maturity compared to single-class firms. This measure encompasses the sensitivity of capital investment and employment decisions to marginal changes in firm valuation, as proxied by Tobin's q. Ideally, a positive relation is expected: implying investment (in capital and labour) when valuation increases and divestment when valuation decreases. Making these decisions come with adjustment costs, however, which limit the flexibility of the business. The higher the adjustment costs, the less sensitive a firm is expected to be to changes in valuation, causing any recommended expansion or contraction of the business to be less likely executed. It is hypothesised that management of a dual-class firm becomes less sensitive to valuation changes as the firm matures – i.e. when it expectedly becomes less efficient, see hypothesis (I) and (II) – compared to single-class firms.

III. Hypothesis 3:

Capital and labour investment sensitivity of dual-class firms declines over maturity, relative to single-class firms.

3.4 Predictors of dual-class status

The paper on dual-class firms in the United States by Gompers et al. (2010) provides estimates of a probit regression for dual-class status including variables for firm, industry and market characteristics at the time of IPO: 'industry', 'media company', 'firm name', 'state law', 'sales rank', 'profit rank', 'percentage of firms and sales', and 'percentage of regional sales'. They found that the most powerful predictor is whether a person's name appears in the company's name at the time of the IPO (Gompers et al., 2010). Other significant predictors at the time of IPO are whether the firm is in a media industry, the number of firms in the same metropolitan area, the size of firms in the same metropolitan area, and the sales of the firm relative to others going public in the same year (Gompers et al., 2010). The paper on dual-class firms in Sweden by Cronqvist & Nilsson (2003) also provides probit estimates for dual-class status, but they solely use explanatory indicator variables of the controlling owner categories 'founder family', 'non-founder family', 'corporate', and 'financial institution', finding that firms controlled by a family are at least two times more likely to use dual-class shares compared to firms controlled by corporations or financial institutions. The aforementioned papers are, to my knowledge, the only empirical studies on the predictors of dual-class status that directly use a dual-class indicator as dependent variable. Therefore, it may be interesting to expand on those designs trying different variables and using a more comprehensive European data set, for the purpose of answering the second research question.

As discussed previously, protection from control contests or other capital market pressures via dual-class shares may be most beneficial in a firm's developmental stage, making it more likely for developing firms to have dual-class status. Being in this developmental stage can be proxied by a firm having higher levels of debt relative to market equity, considering the need for more external financing when still developing business, while market capitalisation may still be low. Therefore, one would expect a higher probability of dual-class status for highly levered firms. Additionally, considering the high prevalence of dual-class share structures among (high-growth) tech firms, such innovative firms presumably have higher relative levels of investment in research and development (R&D) than other firms. Because of information asymmetry between insiders and outsiders, it makes sense for entrepreneurs with a long-term focus – that expect to run a firm with high growth potential – to want to maintain control via dual-class shares. Thus, a higher probability of dual-class status is also expected for highly innovative firms.

IV. Hypothesis 4:

Highly innovative firms and highly levered firms are more likely to have dual-class status.

4. Data

4.1 Process

4.1.1 Initial selection

To be able to assess public shareholder dynamics, market capitalization and relevant information from public annual reports, only companies that are listed on a stock exchange will be included in the data set. Specifically, this research will focus primarily on European listed companies, for which the following twelve North-Western European countries are chosen as the regions to gather data from.

Table D1: Overview of countries for data collection

	Code	Country	Membership	Currency
1	NLD	Netherlands	EU	Euro
2	BEL	Belgium	EU	Euro
3	LUX	Luxembourg	EU	Euro
4	DNK	Denmark	EU	Danish krone
5	NOR	Norway	Non-EU	Norwegian krone
6	SWE	Sweden	EU	Swedish krona
7	FIN	Finland	EU	Euro
8	GBR	United Kingdom	EU	Pound sterling
9	FRA	France	EU	Euro
10	DEU	Germany	EU	Euro
11	AUT	Austria	EU	Euro
12	CHE	Switzerland	Non-EU	Swiss franc

This selection comprises 10 of the EU-15 countries (the 15 EU member states as of 1995), thus with the exception of Portugal, Spain, Italy, Greece and Ireland, and with the addition of non-EU members Norway and Switzerland. Three of the selected countries, namely Germany, France, and the United Kingdom, are also members of the G8. Moreover, the countries in which dual-class structures are quite common, such as Sweden and Finland, are included. All in all, the selection covers 12 jurisdictions in Europe, of which 10 also fall under the supranational jurisdiction of the European Union during the complete time span of the data set. All EU member states are in principle governed by European law, which means that directives and regulations set by the European Commission regarding corporate law will apply to the companies incorporated in the member states. From a data perspective, the starting point is therefore to gather a candidate set of European sample firms. After having searched for publicly listed companies located in the aforementioned 12 European countries, the International

Securities Identification Number (ISIN) codes of 5,657 companies were retrieved from the Orbis database, serving as main identifier and matching variable of the firms in the data set.

4.1.2 Dual-class share structure identifier

For the purpose of this research, it is essential to identify the share structure of the sample firms. Using the candidate list of ISIN codes, the indicator 'Different share classes different rights' is retrieved from the Asset4 ESG database of Datastream.[3] This variable indicates with 'yes' (Y), 'no' (N) or 'not available' (NA) whether or not a firm has different share classes that also hold different rights, for the years 2001-2019. Data for the year 2001 (or earlier), however, are not available for any company, leaving a core period of 2002-2019. The acquired data set is then reshaped into firm-year panel data in which Y is replaced with 1 (indicating a dual-class firm), N is replaced with 0 (indicating a non-dual-class firm), while NA and empty cells of wholly missing firms are treated as missing data points. Thus, by adding this indicator variable [0, 1] to the data set, *dual-class firms* (which have differentiated voting rights) are contrasted with *single-class firms* (which have proportional voting rights).

The method of Kim & Michaely (2019) for identifying dual-class firms in the United States, who have based it on Gompers et al. (2010), is not suitable for research on European companies using the Compustat Global and Orbis databases. By assessing the difference in the number of outstanding shares as provided by the Compustat North America database (data at the firm level) compared to the number of outstanding shares as provided by the CRSP database (data at the security level), they could form a candidate list with the firms that differed more than 2% between those levels, which difference suggests the existence of multiple classes of shares. As Compustat Global and Orbis both seem to provide data at the firm level, in addition to cross-platform definitional and rounding differences, that method is not possible for European companies using these two sources.

4.1.3 Financial data

Bound by the range of the dual-class indicator data, this research is maximally able to cover the time period of 2002-2019 (18 years). Financial data at the firm level are retrieved from Compustat Global for the corresponding years, whereas data for market capitalisation and

[3] Database: Thomson Reuters Datastream ASSET4 ESG *(Environmental, Social, and Governance)*; Variable: 'Different share classes different rights' (Datastream Code Mnemonic: CGSRDP022) by ISIN.

Tobin's *q* for the years 2005-2019 (15 years) and the IPO dates of the sample firms are gathered from Orbis. For the purpose of conducting a complete quantitative analysis, the Asset4 and Orbis data sets are merged into a Stata master file containing the Compustat Global data set. A list of retrieved variables is shown in Appendix A1.

4.1.4 Duplicates

First, duplicates by firm and year were tagged, after which 4,265 observations with missing 'year' data points were deleted. Next, 2,130 observations having one or two duplicates that also have a missing 'IPO date' and/or missing 'dual-class indicator' were deleted. Of the 14 remaining observations, consisting of 7 duplicate firm-years, for each duplicate firm-year only the data point with the latest 'data date' was kept, deleting 7 of these remaining observations. After this process, resulting in a set of 5,668 unique firms, the data set is clear of duplicate observations and ready to use for statistical methods.

4.1.5 Excluded industries and minimum size threshold

To streamline the sample into a set of the most typical firms, following Kim & Michaely (2019), companies in certain business sectors are excluded, namely in the financial (SIC 6000-6999; deleting 15,459 observations), utilities (4900-4999; deleting 1,287 observations) and unclassified industries (SIC 9900-9999; deleting 443 observations). Moving on, to broaden the industry classifications a little bit, the three-digit SIC codes are used to classify sample firms, instead of the full four-digit codes. Moreover, to soften the effect of outliers, following Kim & Michaely (2019), small firms (with less than €10 million in total assets) are excluded, deleting another 6,583 observations.

4.1.6 Currency conversions

Data retrieved from Compustat Global are provided in the local currency of the firm in question. Therefore, using yearly average exchange rates retrieved from Eurostat (2020), values of relevant variables for firms with a country code from Denmark, Norway, Sweden, the United Kingdom, or Switzerland, are converted to Euros. Furthermore, the market capitalisation variable retrieved from Orbis, which is provided in United States Dollars, is converted to Euros for all observations.

4.2 Further modifications

4.2.1 Firm maturity

By using the IPO date variable from Orbis, firm age is calculated by subtracting a firm's IPO year from the data year for every entry.[4] Subsequently, an indicator variable [0, 1] is created, showing whether a firm is mature or not, relative to the median age (14 years) of dual-class firms in the sample. If a firm has been listed for 14 years or more (ergo >13 years old since IPO) in a certain data year, it is given a value of 1, indicating a *mature firm*. If a firm has been listed for zero or more, but less than 14 years (ergo 0-13 years old since IPO) it is given a value of 0, indicating a *young firm*.[5] Finally, firm-years with a negative age are treated as missing values, because obviously the respective firms were not yet publicly listed during those particular years, rendering the corresponding data points irrelevant for this research. Another indicator variable [0, 1] is created showing whether a firm is mature in addition to having a dual-class share structure, or not. Thus, by multiplying the dual-class indicator with the maturity indicator, *mature dual-class firms* are given the value of 1, while *young dual-class firms* and *single-class firms of any age* are assigned a value of 0. Besides the median split, two alternative sets of indicator variables are created, as shown in Table D2 below. The first alternative set (set 2) splits the sample in three, consisting of indicators for firms in the 33rd to 66th percentile and the 66th to 100th percentile. The second alternative set (set 3) splits the sample in four, consisting of indicators for firms in the 25th to 50th percentile, the 50th to 75th percentile, and the 75th to 100th percentile.

Table D2: Overview of maturity indicator sets

Set	Percentile	Age (since IPO if dual-class)	Indicator variable
1	50	14	Mature median
2	33	9	Mature 33p
	66	21	Mature 66p
3	25	7	Mature 25p
	50	14	Mature 50p
	75	26	Mature 75p

[4] The IPO date variable from Orbis is preferred over the IPO date variable from Compustat Global simply due to data availability. Orbis provides 96,086 observations for this variable, whereas Compustat Global only gives 8,609 observations.

[5] The median cut-off point for the maturity indicator is based on Kim & Michaely (2019). The median age for dual-class firms in their sample was 12 years, slightly lower than the median age of 14 years of dual-class firms in the data set of this research.

4.2.2 Tobin's q

Building on existing work on valuation of dual-class firms (e.g. Kim & Michaely, 2019; Gompers et al., 2010) three variants of Tobin's q are used in this research to measure firm valuation. Following these studies, equal prices across share classes of dual-class firms are assumed, also considering that robustness checks of this assumption by Kim & Michaely (2019) led to similar results. Firstly, the Tobin's q variable retrieved directly from the Orbis database will act as leading variable, which is precalculated by Orbis as follows:

$$Tobin's \text{ q } (Orbis) = \frac{market\ capitalisation}{total\ assets},$$

Secondly, the formula of Kim & Michaely (2019), abbreviated to KM, is replicated to calculate the first alternative measure of Tobin's q:

$$Tobin's \text{ q } (KM) = \frac{market\ value\ of\ capital}{book\ value\ of\ capital} = \frac{\text{market capitalisation + total debt}}{\text{total stockholders' equity + deferred taxes + total debt}},$$

> where total debt in the numerator acts as a proxy for market debt, calculated as the sum of total long term debt and total debt in current liabilities; total debt in the denominator already corresponds to the book value by definition.

Thirdly, the formula of Gompers, Ishii, & Metrick (2010), abbreviated to GIM, is replicated to calculate the second alternative measure of Tobin's q:

$$Tobin's \text{ q } (GIM) = \frac{market\ value\ of\ assets}{book\ value\ of\ assets} =$$

$$\frac{\text{total assets + market capitalisation} - \text{total stockholders' equity} - \text{deferred taxes}}{\text{total assets}},$$

In Table D3, descriptive statistics for the three different measures of Tobin's q are shown, considering only observations for which the dual-class indicator is available. It is clear that the variants differ quite substantially from each other, especially the measure of Kim & Michaely.

Table D3: Descriptive statistics for Tobin's q variants

Variable	Obs.	Mean	Std. Dev.	Min	Max
Tobin's q (Orbis)	5,680	1.318	2.506	0	78.213
Tobin's q (KM)	4,705	3.210	18.808	-161.461	847.854
Tobin's q (GIM)	4,705	2.103	3.596	0.403	93.216

In Table D4, descriptive statistics are shown of the Tobin's *q* variants after being Winsorized at the 1st and 99th percentiles, considering only observations for which the dual-class indicator is available. This procedure mitigates the influence of outliers, especially for Tobin's *q* (KM). These adjusted samples will be used for robustness checks of the models presented in the following chapters.

Table D4: Descriptive statistics for Winsorized Tobin's *q* variants

Variable	Obs.	Mean	Std. Dev.	Min	Max
Tobin's *q* (Orbis)_w	5,680	1.245	1.314	0.044	9.793
Tobin's *q* (KM)_w	4,705	2.494	2.577	0.269	16.548
Tobin's *q* (GIM)_w	4,705	1.913	1.493	0.405	9.476

4.2.3 Research & Development

Although the variable Research and Development Expense (R&D) from Compustat Global provides relatively few observations (*n*=16,146), following Kim & Michaely (2019) and Brav et al. (2018), missing data points are adjusted to zero in this case, setting the number of observations of the R&D variable to 88,844 (i.e. nearly all firm-years). To properly scale the R&D expenses, entries are divided by the values of lagged total assets for each corresponding firm-year.

4.2.4 Other calculated variables

Return on assets (ROA) is calculated as operating income before depreciation divided by total assets. Market leverage is calculated as total debt (calculated as the sum of total long term debt and total debt in current liabilities) divided by the sum of total debt and market capitalisation. To make the rather large values of net sales and total assets more compact, the natural logarithm is taken of both these variables. To calculate the growth rate of net sales, the first difference of the log net sales is taken for the respective years. To calculate the growth rate of the number of employees, the first difference of the log number of employees is taken for the respective years. Labour productivity is calculated as the log of net sales divided by the number of employees. Asset tangibility is calculated as the remainder of total assets minus total intangible assets, divided by total assets. Asset turnover is calculated as net sales divided by lagged total assets. The pay-out ratio is calculated as total dividends divided by market capitalisation. To properly scale capital expenditures, these values are divided by lagged total assets for each corresponding firm-year. Operating margin is computed as operating income before depreciation divided by net sales. Cash flow is calculated as the sum of net income and depreciation and amortization, divided by lagged total assets. A list of the equations of all calculated variables described above is shown in Appendix A2.

4.3 Descriptive statistics

Descriptive statistics of the subsets of dual-class firms and single-class firms, in addition to those of the complete data set, are shown in Appendix B. Differences between the variable means of the subsets of single-class and dual-class firms, as shown in Table B2, are significant at the 1% level, except for *Operating margin* at the 5% level and insignificant variables *Tobin's* q *(Orbis)*, *Tobin's* q *(GIM)*, *Sales growth*, *Employment growth*, and *Pay-out ratio*. Dual-class firms of the sample are on average nearly 2 years older than single-class firms and show lower values of Tobin's *q*, but have more total assets and higher relative R&D expenditure, higher market leverage, and higher labour productivity. Solely based on the overall samples, one could say dual-class firms are quite distinct from single-class firms. However, this is a direct average comparison per variable, whereas the upcoming results of the regression models in chapter 6 *Results* will enable comparisons of single-class firms to dual-class firms that have similar observable characteristics. This way, aside from any remaining sample biases, fairer conclusions may be drawn about the distinctions between single-class and dual-class firms.

In Table B3 of the Appendix, descriptive statistics of the variable *Tobin's q (Orbis)* are shown by country. Being the largest contributing country to the dataset, the United Kingdom provides 30.8% of the available observations, followed by France (12.6%) and Germany (11.0%). Denmark has the highest mean firm valuation among the included countries (2.432), whereas Austria has the lowest mean (0.658). Due to limited data availability, however, only a relatively small amount of firms is taken into account per country, especially for smaller nations. Therefore, a within-country or cross-country analysis is not possible using the data set of this study.

5. Methodology

5.1 Baseline | Relationships between dual-class status, valuation and performance

To assess the effects of certain firm characteristics on measures of firm valuation and performance, pooled regression analysis is performed on the data set of this research. In these panel data models, the coefficients – which signify the influence explanatory variables have on the dependent variable – are estimated on the basis of the least squares principle. To accommodate the panel data models to realistic error term assumptions, White's heteroskedasticity-consistent standard errors are used to assess the reliability of the least squares estimates. This approach provides a valid basis for interval estimation and hypothesis testing (Hill, Griffiths, & Lim, 2012). In the context of using least squares, White's standard errors are called *cluster-robust standard errors*, which means the random errors ε_{it} of the time-series observations are clustered at the individual firm level.

Based on Kim & Michaely (2019) industry by year fixed effects α_{jt} are added to the regressions to account for the unique effect of each three-digit SIC industry *j* per year *t* in the panel. By performing the Hausman test, it could be concluded that the intended models are best suited to either year or industry fixed effects, considering the Hausman test is significant at the 1% level (p=0.0000) in both cases. This outcome rejects the null-hypothesis that a random effects model is to be preferred. When applying industry by year effects, however, the Hausman test is insignificant (p=1.0000), implying a preference for random effects. A limiting factor for interpretation of this result is that the Hausman test is unable to include cluster-robust standard errors, whereas those will indeed be used in the models of this research. Either way, a fixed effects model is consistent regardless of the Hausman test result and turns out to provide more significant outputs for this panel data set than a random effects model during regression trials.

The baseline regression as formulated in equation (1) below is estimated to assess the average relations between a firm having a dual-class share structure and its valuation, as measured by three variants of Tobin's q (as discussed in chapter 4 *Data*), and its operating efficiency, as measured by the three ratios operating margin, asset turnover, and labour productivity:

$$y_{it} = \alpha_{jt} + \beta Dual_{it} + \gamma' X_{it} + \varepsilon_{it}, \qquad (1)$$

where y_{it} either is one of the Tobin's q variants or a measure of firm performance, including operating margin, asset turnover, and log labour productivity, for firm i in year t; α_{jt} represents three-digit SIC industry (indexed by *j*) by year fixed effects; $Dual_{it}$ is an indicator variable equal to one if firm *i* has a dual-class share structure in year *t*; X_{it} is a vector of control variables including log total assets, age (by IPO), market leverage, R&D expenses scaled by lagged assets, asset tangibility, sales growth rate, ROA, and pay-out ratio. ROA is excluded from the set of controls when the dependent variable is a measure of operating performance; and ε_{it} represents random errors clustered at the firm level.

The results of this regression enable us to statistically compare dual-class firms to single-class firms with similar (financial) characteristics in the same industry and year. Within this fixed effects model, the intercept coefficient α is different for different industry-years jt, but the slope coefficients β and γ' remain constant. This type of model is suitable to short and wide panels, i.e. panels with relatively few time-series observations for many firms (Hill, Griffiths, & Lim, 2012). With about 8-10 years of observations for each of around 500-600 firms, this is the case for the panel used in this research.

5.2 Valuation and performance dynamics over firm maturity

The methodology for testing the predictions of hypotheses (I) and (II) is determined as follows.

Hypothesis (I):
Valuation of dual-class firms declines over maturity, relative to single-class firms.

The question is if and how the presence of a dual-class share structure can (partly) explain the valuation dynamics of a firm over maturity. The first step was to look at the effect dual-class status and IPO age have on Tobin's q within a fixed effects model, as described in the previous paragraph and equation (1). If in addition, the effect on Tobin's q of mature firms (defined as firms in the upper half of the IPO age distribution) is compared to the effect of mature dual-class firms on Tobin's q, conclusions may be drawn regarding hypothesis (I). In the first instance, this is tested by adding two more indicator variables to the baseline regression: one for mature firms and one for mature dual-class firms, while leaving out the continuous age variable. The prediction is that the indicator for mature dual-class firms will show a negative (or smaller positive) effect on Tobin's q relative to the indicators for mature firms of all categories and dual-class firms of all ages. Confirmation of this prediction would both indicate declining valuation of dual-class firms over maturity in a broad sense, as well as a decline over maturity relative to single-class firms.

Hypothesis (II):
Operating performance of dual-class firms declines over maturity, relative to single-class firms.

The second hypothesis is mutatis mutandis tested in the same way as the first one, and following the same principles for interpretation. Theoretically, however, hypothesis (II) serves as a plausible explanation for hypothesis (I), presupposing operating performance to be an underlying driver of firm valuation. The results of testing hypothesis (II) will be presented in additional columns showing outputs for the regressions that use one of three measures of operating efficiency – instead of a Tobin's q variant – as dependent variable: operating margin, asset turnover, or labour productivity. The control variable 'return on assets' (ROA), which is calculated using operating income before depreciation and lagged assets, is omitted when the dependent variable is another measure of operating performance.

In the first instance, based on Kim & Michaely (2019), the effect of dual-class voting on valuation and performance changes over firm maturity is assessed by estimating the following regression equation:

$$q_{it} = \alpha_{jt} + \beta_1 Dual_{it} + \beta_2 Mature_{it} + \beta_3 Dual_{it} \times Mature_{it} + \gamma' X_{it} + \varepsilon_{it}, \qquad (2)$$

where q_{it} either is one of the Tobin's q variants or a measure of firm performance, including operating margin, asset turnover, and log labour productivity, for firm i in year t; α_{jt} represents three-digit SIC industry (indexed by j) by year fixed effects; $Dual_{it}$ is an indicator variable equal to one if firm i has a dual-class share structure in year t; $Mature_{it}$ is an indicator equal to one if firm i in year t is older than or equal to 14 years in IPO age, and zero otherwise; X_{it} is a vector of control variables including log total assets, market leverage, R&D expenses scaled by lagged assets, asset tangibility, sales growth rate, ROA, and pay-out ratio; and ε_{it} represents random errors clustered at the firm level.

In the second instance, hypotheses (I) and (II) are tested by adding set 2 and 3 of the maturity indicators to the regression, which have been described in paragraph 4.2.1 *Firm maturity*. This way, more nuanced comparisons can be made across firm age groups. The regressions are fundamentally the same as equation (2), aside from the addition of more indicator variables:

$$q_{it} = \alpha_{jt} + \beta_1 Dual_{it} + \beta_2 Mature33_{it} + \beta_3 Dual_{it} \times Mature33_{it} + \beta_4 Mature66_{it} + \beta_5 Dual_{it} \times Mature66_{it} + \gamma' X_{it} + \varepsilon_{it}, \quad (3)$$

where $Mature33_{it}$ is an indicator variable equal to one if firm *i* in year *t* is 9-20 years of IPO age (33rd to 66th percentile of IPO age for dual-class firms), and zero otherwise; $Mature66_{it}$ is an indicator variable equal to one if firm *i* in year *t* is older than or equal to 21 years of IPO age (66th percentile and up of IPO age for dual-class firms), and zero otherwise; and all other variables are the same as in equation (2).

$$q_{it} = \alpha_{jt} + \beta_1 Dual_{it} + \beta_2 Mature25_{it} + \beta_3 Dual_{it} \times Mature25_{it} + \beta_4 Mature50_{it} + \beta_5 Dual_{it} \times Mature50_{it} + \beta_6 Mature75_{it} + \beta_7 Dual_{it} \times Mature75_{it} + \gamma' X_{it} + \varepsilon_{it}, \quad (4)$$

where $Mature25_{it}$ is an indicator variable equal to one if firm *i* in year *t* is 7-13 years of IPO age (25th to 50th percentile of IPO age for dual-class firms), and zero otherwise; $Mature50_{it}$ is an indicator variable equal to one if firm *i* in year *t* is 14-25 years of IPO age (50th to 75th percentile of IPO age for dual-class firms), and zero otherwise; $Mature75_{it}$ is an indicator variable equal to one if firm *i* in year *t* is older than or equal to 26 years of IPO age (75th percentile and up of IPO age for dual-class firms), and zero otherwise; and all other variables are the same as in equation (2).

5.3 Sensitivity of investment decisions over firm maturity

Another mechanism that may partly explain the declining firm valuation predicted in hypothesis (I) is a decline over firm maturity of managers' responsiveness with regard to capital investment opportunities and employment decisions. This relation between changes in Tobin's *q* (i.e. marginal *q*) and changes in capital or labour investment is called q-sensitivity.

Hypothesis (III):
Capital and labour investment sensitivity of dual-class firms declines over maturity, relative to single-class firms.

Following Kim & Michaely (2019), Hubbard (1997), and Kaplan & Zingales (1997), values for Tobin's q are used as a proxy for marginal q, while cash flow (scaled by lagged assets) is added to the model to control for relative cash availability. Investment in capital is measured by capital expenditures, whereas investment in labour is proxied by employment changes (e.g. Kim & Michaely, 2019; Bloom, 2009). Based on Kim & Michaely (2019), to be able to compare single-class to dual-class firms over maturity, regressions are estimated by interacting Dual and Mature indicators with the Tobin's q and cash flow variables:

$$Investment_{it} = \alpha_t + \beta_1 q_{it} + \beta_2 q_{it} \times Dual_{it} + \beta_3 q_{it} \times Mature_{it} + \beta_4 q_{it} \times Dual_{it} \times Mature_{it} + \beta_5 CF_{it} + \beta_6 CF_{it} \times Dual_{it} + \beta_7 CF_{it} \times Mature_{it} + \beta_8 CF_{it} \times Dual_{it} \times Mature_{it} + \varepsilon_{it}, \quad (5)$$

where $Investment_{it}$ is either capital expenditures scaled by lagged assets or employment growth rates from the previous year; α_t represent year fixed effects; q_{it} is Tobin's q, a proxy for marginal q; CF_{it} is cash flow scaled by lagged assets for firm *i* in year *t*; $Dual_{it}$ and $Mature_{it}$ are indicator variables as previously defined in equation (2); and ε_{it} represents random errors clustered at the firm level.

This equation is estimated separately for subsamples of firms for which firm-specific demand is low and consequently downward adjustment costs have become more important. Following Kim & Michaely (2019) and Achyuta, Chari, & Sharma (2013), sales growth rates are used as a proxy for demand conditions. Equation (5) is estimated for the subsets of firms in the bottom quartile of sales growth (below -2.5%) and the bottom decile of sales growth (below -17.1%) respectively.

5.4 Predictors of dual-class status | Probit regression analysis

To estimate how different factors predict dual-class status of a firm, the nonlinear *probit* model can be used. Let the dual-class indicator [0, 1] of this research be denoted by *y*, taking the value of *y*=0 for single-class firms and *y*=1 for dual-class firms.

The probit function is formulated as follows (Hill, Griffiths, & Lim, 2012):

$$\Phi(z) = P[Z \leq z] = \int_{-\infty}^{z} \frac{1}{\sqrt{2\pi}} e^{-0.5u^2} du, \qquad \text{(P1)}$$

where the integral expression is the probability that a standard normal random variable falls to the left point of *z* and the function $\phi(z)$ is the cumulative distribution function to compute normal probabilities.

The probability *p* that *y*=1 takes the form of (Hill, Griffiths, & Lim, 2012):

$$p = P[Z \leq \beta_1 + \beta_2 x] = \Phi(\beta_1 + \beta_2 x), \qquad \text{(P2)}$$

where $\phi(z)$ is the probit function.

By using the control variables from equation (1) to predict dual-class status, the probit model is estimated as follows:

$$p[Dual_{it} = 1 \mid X_{it}] = \Phi(\alpha_t + X'_{it}\beta), \qquad (6)$$

where $Dual_{it}$ is an indicator variable equal to one if firm *i* has a dual-class share structure in year *t*; p is the probability that $Dual_{it}$=1; $\Phi(z)$ is the probit function; α_t represents year fixed effects; and X_{it} is a vector of control variables including log total assets, age (by IPO), market leverage, R&D expenses scaled by lagged assets, asset tangibility, sales growth rate, ROA, and pay-out ratio.

Equation (6) is used to plot the probabilities that $Dual_{it}$=1 against different values of the largest predictors among the control variables. In light of hypothesis (IV) it is expected that 'Market leverage' and 'R&D' are (among) the most powerful predictors of dual-class status.

Hypothesis IV:
Highly innovative firms and highly levered firms are more likely to have dual-class status.

6. Results

6.1 Baseline | Relationships between dual-class status, valuation and performance

In this chapter, selected outputs resulting from the regression models as formulated in chapter 5 *Methodology* are presented and interpreted. For brevity, some additional outputs are placed in Appendix C. In all tables, the following signs and abbreviations are used: three asterisks represent significance at the 1% level (***) for the corresponding coefficient, two asterisks represent significance at the 5% level (**), and one asterisk represents significance at the 10% level (*); the corresponding t-statistics of the coefficients are shown between parentheses, except when stated otherwise; FE denotes Fixed Effects; SE denotes Standard Errors; and R^2 denotes the R-squared determination coefficient. In models using year fixed effects, coefficients are estimated for the years 2010-2017. When using industry by year fixed effects, coefficients are estimated for the years 2009-2017 for most industries, aside from regular exceptions that exclude some (earlier) years or include the year 2018.

The results from Table 1 provide a baseline impression of the influence financial characteristics, firm age and dual-class status have on firm valuation and firm performance. The first noticeable thing is the significant and quite substantial positive influence of dual-class status on firm valuation, which is similar across the different Tobin's q variants (and later regressions in Tables 2, 3, and 4). This means dual-class firms have a higher valuation when controlled for other firm characteristics, which is contrary to the lower mean valuation of dual-class firms from the descriptive statistics. The influence of dual-class status on performance measures shown in columns 4-6, however, is negative: significantly so for operating margin, but insignificantly so for asset turnover and labour productivity. The same pattern for impact of dual-class status on firm performance is seen in Table 2 as well. Furthermore, firm age has a negative influence on firm valuation, significant at the 1% level across all Tobin's q variants, implicating that – for any firm – valuation declines over maturity when considering IPO age as a continuum.[6] Remarkably, the reverse is implicated by the positive influence of IPO age on the three measures firm performance, again significant at the 1% level.

The contrast between the results of valuation (columns 1-3) and performance (columns 4-6) is contradictory to the theory that differences in firm performance would account for differences

[6] Unreported regressions using age since incorporation as a proxy for firm age show very similar results.

in firm valuation across dual-class and single-class firms, although dual-class status coefficients for asset turnover and labour productivity are not significant and should therefore be interpreted with caution. Robustness checks of the regressions in columns 1-5 of Table 1 are shown in Table C1 of the Appendix, along with a comparative interpretation.[7]

Table 1: Average relations between dual-class status and financial measures

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Tobin's q (Orbis)	Tobin's q (KM)	Tobin's q (GIM)	Operating margin	Asset turnover	Log(Labour productivity)
Dual	0.917**	6.563**	1.325	-0.027**	-0.061	-0.072
	(2.30)	(2.28)	(1.10)	(-2.03)	(-0.80)	(-1.10)
log Assets	-0.214	-0.776	-0.538*	0.011	-0.100	0.020
	(-1.27)	(-0.31)	(-1.83)	(1.18)	(-1.36)	(0.40)
Age	-1.945***	-27.386***	-1.732***	0.155***	0.133***	0.171***
	(-4.84)	(-4.44)	(-4.51)	(30.70)	(8.32)	(11.26)
Market leverage	0.756	25.500**	0.722	-0.082***	-0.217**	-0.147
	(1.12)	(2.13)	(0.82)	(-2.79)	(-2.00)	(-1.29)
R&D	-9.877***	-79.704	-3.177	0.134	1.985***	0.477
	(-6.03)	(-1.38)	(-0.60)	(0.82)	(2.66)	(0.94)
Tangibility	1.882***	8.364	1.894	0.019	0.169	0.346**
	(2.83)	(0.79)	(1.39)	(0.49)	(0.50)	(2.30)
Sales growth	-1.115***	-13.624***	-1.157***	0.042**	0.508***	0.754***
	(-3.37)	(-4.15)	(-2.77)	(2.10)	(7.60)	(13.25)
ROA	17.892***	177.691***	15.637***	-	-	-
	(7.10)	(4.36)	(6.47)	-	-	-
Pay-out ratio	-9.384***	-41.294	-6.453	0.241	-0.639	0.110
	(-3.21)	(-1.25)	(-1.41)	(1.45)	(-0.99)	(0.23)
SIC3 x Year FE	Y	Y	Y	Y	Y	Y
Cluster-robust SE	Y	Y	Y	Y	Y	Y
R^2	0.020	0.001	0.020	0.024	0.002	0.001
Observations	2,820	2,630	2,630	2,820	2,821	2,774
Firms	524	519	519	524	525	523

[7] In short, it turns out that the effect of dual-class status on the Tobin's q variants is not significant in samples that are Winsorized at the 1st and 99th percentiles. In the later models of Table 4, which use several types of maturity indicators, the effect of dual-class status becomes insignificant as well after Winsorization (unreported). When taking the natural logarithms of dependent variables Operating margin and Asset turnover, results are quite similar for most coefficients, although the effect of dual-class status on Operating margin becomes insignificant.

6.2 Valuation and performance dynamics over firm maturity

To test hypothesis (I) and (II) – about declining valuation and performance for dual-class firms over maturity – multiple regressions are run using several sets of maturity indicators, instead of firm IPO age as continuous maturity variable.

In Table 2, regressions using a maturity indicator for above median aged firms are shown. The coefficients for the 'Mature median' indicator are positive for the valuation regressions in columns 1-3, but negative for the performance regressions in columns 4-6. These results are exactly the reverse of what the significant continuous age coefficients of Table 1 would lead us to expect, although the maturity indicators of Table 2 are not significant at all and may show a statistically incorrect sign. Nevertheless, it is shown that mature dual-class firms have a smaller positive coefficient than mature firms, implicating a smaller increase for dual-class firm when they become mature, relative to single-class firms. This would mean that for single-class firms, valuation increases over maturity, but that the overall greater valuation of dual-class firms declines when becoming mature (as proxied by reaching a firm IPO age of 14 years). This is most apparent when looking at the Tobin's *q* (KM) regression of column (2), which even provides a negative sign for mature dual-class firms (instead of a smaller positive coefficient) and still positive signs for dual-class firms and mature firms. These results would support hypothesis (I), but this cannot be stated with high confidence considering the insignificance of the indicators (except for 'Dual' at the 10% level).[8]

Again, the performance results of columns 4-6 in Table 2 show the opposite of the valuation results, implicating increasing operating efficiency (or less declining in the case of asset turnover) for dual-class firms over maturity, relative to single-class firms (which show a slight decrease in performance over maturity). This would reject hypothesis (II), although not with confidence, considering the models for performance in columns 4-6 are even less significant and have a worse fit compared to the valuation models of columns 1-3.

[8] Alternatively, unreported regressions for Tobin's *q* variants are estimated by interacting the dual-class indicator with the continuous age variable. As in Table 1, the effect of Age turns out significantly negative, but the effect of Dual x Age is very insignificant, being slightly negative but very close to zero.

Table 2: Valuation and performance dynamics over firm maturity

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Tobin's q (Orbis)	Tobin's q (KM)	Tobin's q (GIM)	Operating margin	Asset turnover	Log(Labour productivity)
Dual	0.903*	7.642*	1.072	-0.036**	-0.054	-0.096
	(1.88)	(1.86)	(1.12)	(-2.40)	(-0.80)	(-1.24)
Mature median	0.100	1.153	-0.108	-0.003	-0.067	-0.036
	(0.78)	(0.49)	(-0.28)	(-0.51)	(-1.44)	(-1.06)
Dual x Mature	0.015	-2.134	0.471	0.021	-0.004	0.060
median	(0.04)	(-0.58)	(0.52)	(1.31)	(-0.04)	(0.85)
log Assets	-0.213	-0.761	-0.543*	0.011	-0.101	0.020
	(-1.27)	(-0.31)	(-1.83)	(1.17)	(-1.36)	(0.41)
Market leverage	0.767	25.706**	0.696	-0.083**	-0.223**	-0.153
	(1.13)	(2.10)	(0.77)	(-2.84)	(-2.07)	(-1.35)
R&D	-9.769***	-78.237	-3.323	0.125	1.907**	0.435
	(-6.05)	(-1.34)	(-0.65)	(0.77)	(2.46)	(0.88)
Tangibility	1.928***	8.802	1.875	0.018	0.138	0.334**
	(2.86)	(0.79)	(1.45)	(0.48)	(0.42)	(2.17)
Sales growth	-1.110***	-13.532***	-1.165***	0.042**	0.503***	0.751***
	(-3.35)	(-4.17)	(-2.78)	(2.07)	(7.61)	(13.22)
ROA	17.906***	177.846***	15.620***	-	-	-
	(7.09)	(4.34)	(6.47)	-	-	-
Pay-out ratio	-9.393***	-41.207	-6.464	0.241	-0.634	0.121
	(-3.21)	(-1.26)	(-1.41)	(1.45)	(1.00)	(0.25)
SIC3 x Year FE	Y	Y	Y	Y	Y	Y
Cluster-robust SE	Y	Y	Y	Y	Y	Y
R^2	0.773	0.618	0.440	0.076	0.091	0.023
Observations	2,820	2,630	2,630	2,820	2,821	2,774
Firms	524	519	519	524	525	523

For brevity, all upcoming models are estimated using only the Tobin's q (Orbis) variant as dependent variable, presuming this will provide the highest quality results based on the outputs reported in Tables 1 and 2.

In Table 3, the same prediction is tested using sales growth as a proxy for firm maturity. Compared to the firm age variable, higher values of sales growth mean the reverse for firm maturity. A higher age naturally corresponds to maturity, whereas a higher sales growth rate is characteristic to young firms. Conversely, a lower sales growth rate indicates a mature firm – one that is more established and has already exhausted most growth potential. The negative coefficients for 'Sales growth' in columns (1) and (2), which are significant at the 1% level, indicate that increases in sales growth rate are associated with decreases in firm valuation, and vice versa. Therefore, a decreasing sales growth rate, which is indicative for a firm becoming mature, implies increasing firm valuation. When looking at dual-class firms over maturity, proxied by 'Dual x Sales growth', the reverse is shown, although the coefficients are insignificant. This means that a decreasing sales growth rate would lead to decreasing firm valuation, implying a decline in firm valuation of dual-class firms as they mature (in opposite of the increasing valuation of single-class firms), which would support hypothesis (I), although not with confidence.

Table 3: Valuation dynamics over firm growth

	(1)	(2)
Dependent variable:	Tobin's q (Orbis)	Tobin's q (Orbis)
Dual	0.635**	-
	(2.10)	-
Sales growth	-1.042***	-1.055***
	(-3.37)	(-3.38)
Dual x Sales growth	0.267	0.282
	(0.97)	(1.01)
log Assets	-0.237*	-0.235*
	(-1.72)	(-1.71)
Market leverage	0.241	0.271
	(0.40)	(0.44)
R&D	-9.645***	-9.785***
	(-4.73)	(-4.55)
Tangibility	1.589***	1.566***
	(2.85)	(2.80)
ROA	17.538***	17.531***
	(6.12)	(6.08)
Pay-out ratio	-3.917	-3.906
	(-1.44)	(-1.44)
SIC3 x Year FE	Y	Y
Cluster-robust SE	Y	Y
R^2	0.769	0.771
Observations	3,275	3,275
Firms	602	602

In Table 4, hypothesis (I) is tested once again by using the two alternative sets of maturity indicators, cutting the sample by IPO age in terciles and quartiles respectively (based on the dual-class firm IPO age distribution). For single-class firms, an increasingly positive, but insignificant, effect is shown when moving from the second to third tercile. An increase is observed for single-class firms moving from the second quartile through the third quartile (at 1% significance) and to the fourth quartile (at 5% significance) as well. For dual-class firms, the indicators are not significant at all, but show declining valuation over maturity when considering terciles or quartiles (in opposite of the increasing valuation of single-class firms). These results thus would provide additional support for hypothesis (I), but are very insignificant and should therefore be interpreted with much caution.[9]

Table 4: Valuation dynamics over alternative firm maturity sets

	(1)		(2)
Dependent variable:	Tobin's q (Orbis)		Tobin's q (Orbis)
Dual	0.907*	Dual	0.808
	(1.71)		(1.13)
Mature 33p	0.038	Mature 25p	0.466***
	(0.29)		(2.98)
Mature 66p	0.098	Mature 50p	0.671***
	(0.43)		(2.99)
-	-	Mature 75p	0.743**
	-		(2.21)
Dual x Mature 33p	0.135	Dual x Mature 25p	0.088
	(0.49)		(0.20)
Dual x Mature 66p	-0.267	Dual x Mature 50p	0.047
	(-0.68)		(0.08)
-	-	Dual x Mature 75p	-0.106
	-		(-0.16)
log Assets	-0.220		-0.231
	(-1.32)		(-1.34)
Market leverage	0.763		0.648
	(1.11)		(0.95)
R&D	-9.973***		-10.219***
	(-6.00)		(-5.82)
Tangibility	1.862***		1.830***
	(2.78)		(2.82)
Sales growth	-1.116***		-1.092***
	(-3.38)		(-3.33)
ROA	17.905***		17.820***
	(7.12)		(7.11)
Pay-out	-9.281***		-9.350***
	(-3.17)		(-3.20)
SIC3 x Year FE	Y		Y
Cluster-robust SE	Y		Y
R^2	0.774		0.771
Observations	2,820		2,820
Firms	524		524

[9] Unreported regressions using the alternative maturity sets of Table 4 with operating performance measures as dependent variable yield very insignificant results, showing maturity indicators of mixed signs that are very close to zero. Therefore, on this basis even less can be concluded in relation to hypothesis (II).

6.3 Sensitivity of investment decisions over firm maturity

To test hypothesis (III) – about declining *q*-sensitivity of dual-class firms over maturity – models of capital and labour adjustment sensitivity (when controlling for cash flow relative to firm size) are estimated using two subsamples of the data set, presented in panel A and B of Table 5 respectively.

While all coefficients for single-class firms are insignificant, a clear trend is observable for dual-class firms, which amounts to a declining *q*-sensitivity of capital investment over maturity. In both panel A and B, the effect of marginal Tobin's *q* on capital investment as shown in column (1) is positive for young dual-class firms and negative for mature dual-class firms, all coefficients being significant at the 1% or 5% level. This means that for a young dual-class firm belonging to either the first quartile or first decile of sales growth rates, a change in Tobin's *q* positively influences capital expenditures relative to firm size. In that case, the managers' investment decisions are *q*-sensitive, implying more capital investments when firm valuation increases, and less capital investments (or more divestments) when firm valuation decreases. For a mature dual-class firm, however, the reverse is implicated by the negative coefficient, meaning that its managers are less *q*-sensitive with respect to capital investment. Thus, the capital investment *q*-sensitivity of dual-class firms declines over maturity. On the contrary, the coefficients for single-class firms, which are much smaller and close to zero anyway, show a slight and insignificant increase in capital investment *q*-sensitivity over firm maturity. In other words, the downward adjustment costs for capital increase over maturity for dual-class firms, relative to single-class firms. Results for Employment growth in column (2) imply an increase over maturity in downward adjustment costs for labour as well, although insignificantly, with the exception of the coefficient for mature dual-class firms in the first quartile (which is significant at the 5% level).

Moreover, the difference between the coefficients of young and mature dual-class firms more than doubles when moving down from the bottom 25% to the bottom 10% of firms in the sales growth rate distribution, implying even greater declines for dual-class firms over maturity under lower demand conditions. The gap between the capital investment *q*-sensitivity of young and mature dual-class firms with a sales growth rate below -2.5% (first quartile) is 0.063, whereas this difference is 0.133 for dual-class firms with a sales growth below -17.1% (first decile), which is quite substantial considering that the overall mean for Capex/Assets of dual-class firms in the sample is just 0.047. The same pattern can be observed for Employment growth, although those differences are insignificant.

All in all, these results confirm hypothesis (III) with high confidence regarding capital investments and with reasonable support regarding labour investment. Unreported regressions using the full sample reveal the same patterns, in which the coefficients become more significant for Employment growth (at the 1% and 5% level), but less significant for Capex/Assets (one at the 10% level, the other insignificant), compared to the results shown in Table 5 below.

Table 5: Capital investment and employment q-sensitivities[10]

Panel A

	(1)		(2)	
Dependent variable:	Capex/Assets		Employment growth	
Sales growth:	First quartile (bottom 25%)			
Maturity:	Young	Mature	Young	Mature
Tobin's q (Orbis)	-0.005	0.005	0.085***	0.022
	(-0.09)	(1.11)	(2.66)	(0.40)
Tobin's q (Orbis) x Dual	0.032***	-0.031***	0.077	-0.168**
	(3.00)	(-2.57)	(1.48)	(-2.12)
Cash flow	0.126***	-0.083	0.298	-1.307*
	(2.70)	(-1.55)	(1.35)	(-1.67)
Cash flow x Dual	-0.132**	0.128*	-0.212	1.920*
	(-2.08)	(1.73)	(-0.57)	(1.91)
Year FE	Y		Y	
Cluster-robust SE	Y		Y	
R^2	0.008		0.022	
Observations	924		890	
Firms	366		360	

Panel B

	(1)		(2)	
Dependent variable:	Capex/Assets		Employment growth	
Sales growth:	First decile (bottom 10%)			
Maturity:	Young	Mature	Young	Mature
Tobin's q (Orbis)	-0.011	-0.005	0.041	-0.029
	(-0.93)	(-0.36)	(0.71)	(-0.28)
Tobin's q (Orbis) x Dual	0.060**	-0.073***	0.293	-0.408
	(2.10)	(-2.66)	(1.31)	(-1.41)
Cash flow	0.047	-0.028	0.013	-0.386
	(0.96)	(-0.50)	(0.03)	(-0.46)
Cash flow x Dual	0.352*	-0.288	3.199**	omitted
	(1.81)	(-1.48)	(2.41)	-
Year FE	Y		Y	
Cluster-robust SE	Y		Y	
R^2	0.002		0.038	
Observations	274		262	
Firms	166		162	

[10] Firm fixed effects were omitted in all q-sensitivity regressions because of collinearity. In the Employment growth regression for the first decile of sales growth rates (in Panel B), the variable 'Cash flow x Dual x Mature' was omitted because of collinearity.

6.4 Predictors of dual-class status | Probit regression analysis

In Table 6, the results for the probit regression model are shown, with z-statistics between parentheses. It is estimated that market leverage and R&D expenses relative to firm size are the largest and most significant predictors of dual-class status among the firm level control variables used in this research, being significant at the 1% and 10% level respectively. This confirms hypothesis (IV) that highly levered and highly innovative firms– as proxied by debt financing and R&D activities – are more likely to have dual-class status. Considering only sample firms for which the dual-class indicator is available, 241 out of 1,125 firms (21.4%) have dual-class status, which can be stylized to a random chance of 20%.

Table 6: Probit regression of dual-class status dependent on firm characteristics

	(1)
Dependent variable:	Dual
log Assets	-0.048
	(-0.93)
Age	0.006
	(1.56)
Market leverage	1.904***
	(4.22)
R&D	3.134*
	(1.83)
Tangibility	-0.283
	(-0.74)
Sales growth	-0.017
	(-0.11)
ROA	-0.226
	(-0.31)
Pay-out ratio	-1.181
	(-0.33)
Year FE	Y
Cluster-robust SE	Y
Pseudo R^2	0.121
Observations	2,820
Firms	524

In order to obtain a visual impression of these estimated effects, both ‘Market leverage’ and ‘R&D’ are plotted (in Figures 1 and 2) to show the probability of a firm’s dual-class status for given levels of either parameter. It should be noted that – for the sample firms in this research – market leverage ranges approximately from 0 to 1, whereas R&D generally ranges from 0 to 0.5 (with two outliers of 0.6 and 0.8 when rounded to 1 decimal). The median firm has a market leverage of about 0.2, 75% of firms have a market leverage below 0.4, 95% of firms below

0.75, and 99% below 0.9. Moreover, the median firm spends about 0.0002 on R&D relative to size, 75% of firms spend less than 0.02 on R&D, 95% of firms less than 0.1, and 99% less than 0.2. In Figure 1, 'Market leverage' is plotted on the *x*-axis for different levels of 'R&D', against the probability of dual-class status on the *y*-axis. For a firm with zero R&D expenses (=0), the probability of dual-class status increases with higher levels of market leverage, starting from close to *p*=0 to close to *p*=0.5. This indicates a near 50% probability that a firm with the highest level of market leverage and the lowest level of R&D has a dual-class share structure, which far exceeds the random chance of 20% of a sample firm having dual-class status. For a firm at the 95th percentile of R&D (=0.1), the probability of dual-class status increases from around *p*=0.05 to *p*=0.6 over increasing levels of market leverage. For a firm at the 99th percentile of R&D (=0.2), the probability increases from around *p*=0.1 to *p*=0.7 over market leverage, although the confidence intervals are especially large at the end of the market leverage spectrum and thus should be interpreted with more caution. For the median firm with respect to market leverage (=0.2), the probability of dual-class status ranges from *p*=0.05 to *p*=0.2 over R&D levels of 0-0.2. On the higher end, firms between the 75th (=0.4) and 95th (=0.75) percentile of market leverage with zero R&D expenses have a probability of dual-class status between *p*=0.1 to *p*=0.3. Therefore, to be able to supersede the random chance of 20%, the predictive value of market leverage realistically only starts at levels of 0.6 or more with zero R&D, and at levels of 0.4 and 0.25 or more with 0.1 and 0.2 R&D respectively.

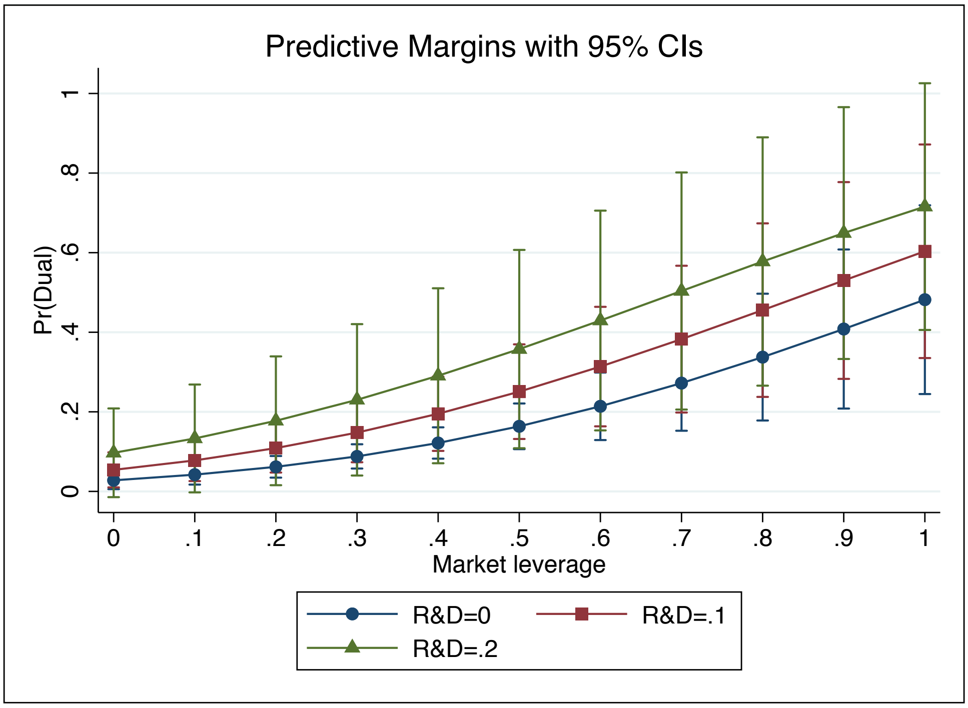

Figure 1: Probability of dual-class status for levels of Market leverage and R&D

In Figure 2, 'R&D' is plotted on the x-axis for different levels of 'Market leverage', against the probability of dual-class status on the y-axis. For a firm with zero market leverage (=0), the probability of dual-class status increases with higher levels of R&D, starting from close to p=0 to close to p=0.7. This indicates a 70% probability that a firm with the highest level of R&D (=0.8) and the lowest level of market leverage (=0) has a dual-class share structure, although the higher levels of R&D have especially broad confidence intervals when market leverage is zero. For a firm at the 83rd percentile of market leverage (=0.5), the probability of dual-class status increases from around p=0.2 to p=0.9 over R&D. For firms with the highest level of market leverage (=1), the probability of dual-class status moves from p=0.5 approaching p=1 over R&D. Notice that – when R&D is zero (=0) – the probability of dual-class status increases more when levels of market leverage jump from 0.5 to 1 (+0.3 in p) than when jumping from 0 to 0.5 (+0.2 in p). At the top end, firms with levels of both R&D (>0.2) and market leverage (>0.9) above the 99th percentile are very likely to have a dual-class share structure, with a probability ranging from p=0.75 approaching p=1.

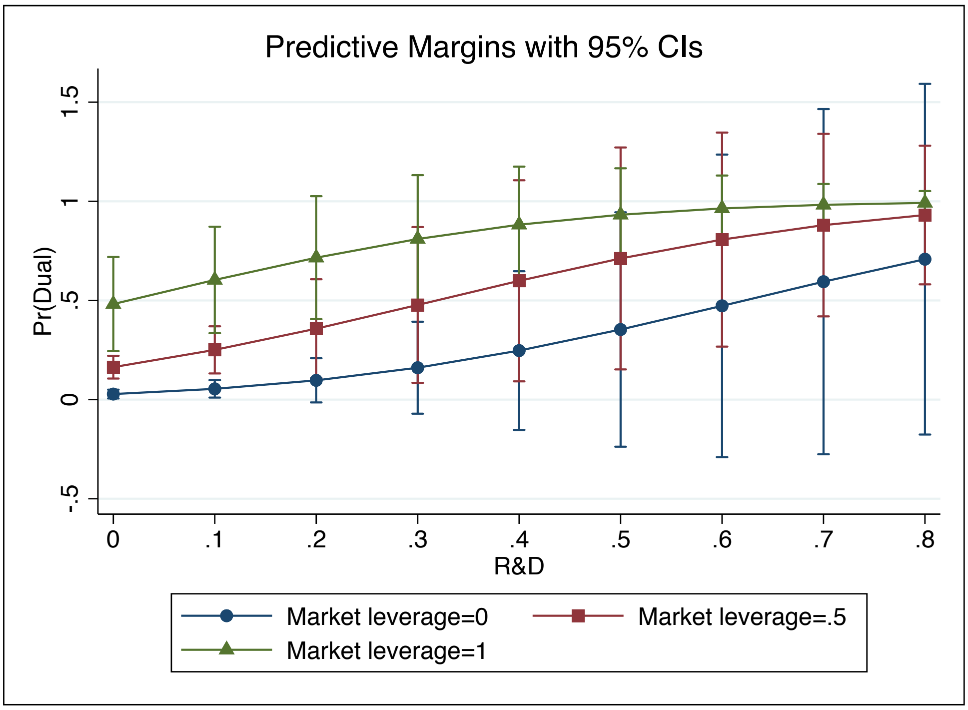

Figure 2: Probability of dual-class status for levels of R&D and Market leverage

7. Conclusion

7.1 Summary of findings

7.1.1 Research question (1)

The first research question read as follows: *What are the cost-benefit dynamics of dual-class share structures in Europe?* In the attempt of finding an answer, three hypotheses were formulated covering different aspects of the cost-benefit dynamics of dual-class share structures: valuation, performance, and q-sensitivity.

The results show that dual-class firms have higher valuation than single-class firms with similar firm characteristics in the same industry and year, significant across most models estimated in this research. Furthermore, a significant negative relation between firm age (as a continuum) and valuation is observed, although this relation turns out to be insignificant when using indicator variables for firm maturity, and even showing a significant increasingly positive relation over firm maturity when considering indicators for firm age quartiles. Regarding dual-class firms specifically, multiple indications have been found that valuation of those firms does decline over maturity (as proxied by either firm age or growth), relative to single class firms. These findings would support hypothesis (I), although there is no significant relationship and therefore the hypothesis has to be rejected.

Remarkably, in opposite of the valuation results, dual-class firms seem to have lower operating performance than single-class firms with similar firm characteristics in the same industry and year, although this relation is only significant in the operating margin model. Furthermore, the models for operating efficiency broadly show a significant positive effect of continuous firm age on operating margin, asset turnover, and labour productivity, which is also contrary to the valuation results. The same contrasting pattern is observed when using a maturity indicator, showing increasing operating efficiency over maturity for dual-class firms, although insignificantly. All in all, contrary to theory, no evidence is found that these performance measures drive the valuation dynamics of dual-class firms, although the insignificant maturity indicators may show an incorrect sign. Therefore, in light of the contradictory evidence, hypothesis (II) has to be rejected.

Regarding the q-sensitivity of capital and labour investment decisions, when controlling for cash flow, results show a decline over maturity for dual-class firms when demand conditions are low, which is especially significant in the capital investments models. With respect to labour investments, not all coefficients are significant (but not far from it either), although a significant relation is shown when assessing the full sample. Therefore, hypothesis (III) can be confirmed with high confidence regarding capital investments and with reasonable support regarding labour investment.

7.1.2 Research question (2)

The second research question read as follows: *What are the predictors for firms having a dual-class share structure in Europe?* By performing a probit regression of dual-class status dependent on the set of control variables used in this research, the predictive value of several firm characteristics could be estimated. Among the different factors, market leverage and scaled R&D are the significantly largest predictors of dual-class status. Therefore, hypothesis (IV) can be confirmed, as highly levered and highly innovative firms are more likely to have dual-class status.

7.1.3 Main research question

The main research question read as follows: *What are the implications of dual-class share structures for firm valuation/performance and corporate governance in Europe?* The results for research questions (1) and (2) provide evidence that a differentiated discussion on dual-class share structures – conditional on firm maturity and financial characteristics – is more appropriate than generalisations for all dual-class firms per se. When considering all firms, it is observed that firm age has a significant effect on valuation and performance. For dual-class firms specifically, indications are found of a relative decline in valuation and investment *q*-sensitivity over maturity. These indications are supported by the conclusions of Kim & Michaely (2019), thus suggesting that a so-called 'sunset provision' would be a beneficial governance mechanism for dual-class firms. Such a provision would trigger the elimination of dual-class voting at a threshold event, like firm age since IPO or the retirement of the founder-entrepreneurs from the executive board. Finally, leverage and innovation as predictors of dual-class status seem to provide a link between high growth potential of a firm and the popularity of such a share structure with concentrated control.

7.2 Discussion of limitations

The foremost limitation of this research is the lack of data, particularly on dual-class firms. The typical model used in this research is only able to assess 265 observations of 62 dual-class firms, relative to 2,555 observations of 472 single-class firms. This may explain why most maturity indicators turn out to be insignificant, especially when interacted with the dual-class indicator. Nevertheless, as summarized in the previous paragraph, the results pointed in the direction of the conclusions of Kim & Michaely (2019). Moreover, the typical time span of 2009-2018 covers less than 10 years of data, a large portion of which was observed during the European debt crisis (starting in 2010) and its aftermath. The crisis effect was partly mitigated by excluding some of the European countries that were hit the hardest (being Portugal, Italy, Ireland, Greece, and Spain) and adding industry by year fixed effects. Furthermore, the effect of dual-class status on firm valuation is not significant after Winsorizing the Tobin's *q* variants. By comparison, the study of Kim & Michaely (2019) used a final sample containing 8,445 observations of 920 unique dual-class firms in the United States from 1971-2015, in addition to a multiplicity of single-class firm observations. With the advantage of having such a large sample, they found similar results after Winsorizing potentially unbounded variables at different levels. Another limitation is the assumption made in this study that the effects of control variables on Tobin's *q* are linear, when in reality they may be nonlinear and would therefore render the least squares method inadequate. In addition, sample selection bias may be present if private firms that already have high growth potential are more likely to have the bargaining power to set up a dual-class share structure before IPO when wanting to go public.

7.3 Recommendations for future research

Within the topic of valuation and performance of dual-class firms in Europe, the most important potential improvement of this study depends on data availability. Approximately just 1/5 of listed firms retrieved from the Orbis database were covered by the Asset4 ESG database, while still having many missing firm-years. Starting out with 5,668 firms in the data set – which are basically all listed firms of the chosen European countries – only 1,125 firms are covered by the dual-class indicator, with sufficient data being available for just around 534 of these firms (for estimation of a typical model in this study). Moving into the future, the database for this dual-class indicator, containing data from 2002 at the earliest, will presumably be continually updated, with more data points being added every year to come and the database being expanded to cover more listed firms in Europe. Alternatively, one could attempt to construct a data set manually by investigating the annual reports of European sample firms. However, lacking a centralized filings database like the SEC's EDGAR for the United States, to construct a comprehensive data set for research on European dual-class firms would require a lot of time and effort. Another logical recommendation is to include Southern and Eastern European countries as well. While this study has focused on dual-class share structures – defined as a firm having different share classes that also hold different voting rights – other corporate structures exist that lead to similar governance issues and agency costs, like pyramid structures and cross-ownerships, which violate the proportional voting rights principle more indirectly.

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Appendix

A1. List of retrieved variables

Variable name	Note	Source
Company name	String	Orbis
International Securities Identification Number (ISIN)	Identifier	Orbis
Different share classes different rights	Indicator	ASSET4 ESG
Data Year – Fiscal	68861 firm-years	Compustat Global
Global Company Key (GVKEY)	Identifier	Compustat Global
Current ISO Country Code - Incorporation	Country	Compustat Global
Standard Industry Classification Code	Industry	Compustat Global
Date of incorporation	Date	Orbis
IPO date	Date	Orbis
Assets – Total	x1.000.000	Compustat Global
Intangible Assets – Total	x1.000.000	Compustat Global
Stockholders Equity – Total	x1.000.000	Compustat Global
Debt in Current Liabilities – Total	x1.000.000	Compustat Global
Long-Term Debt – Total	x1.000.000	Compustat Global
Deferred Taxes (Balance Sheet)	x1.000.000	Compustat Global
Net Sales	x1.000.000	Compustat Global
Operating Income Before Depreciation	x1.000.000	Compustat Global
Net Income (Loss) - Consolidated	x1.000.000	Compustat Global
Depreciation and Amortization (Cash Flow)	x1.000.000	Compustat Global
Dividends – Total	x1.000.000	Compustat Global
Capital Expenditures	x1.000.000	Compustat Global
Research and Development Expense	x1.000.000	Compustat Global
Employees	x1.000	Compustat Global
Market capitalisation / Total assets (Tobin's Q)	(-15 years)	Orbis
Market capitalisation m USD	x1.000.000 (-15 years)	Orbis

A2. List of calculated variables

Dependent variables

- $Tobin's\ \mathrm{q}\ (Orbis) = \frac{market\ capitalisation}{total\ assets}$
- $Tobin's\ \mathrm{q}\ (KM) = \frac{market\ value\ of\ capital}{book\ value\ of\ capital} = \frac{\text{market capitalisation + total long term debt+total debt in current liabilities}}{\text{total stockholders' equity + deferred taxes + total long term debt+total debt in current liabilities}}$
- $Tobin's\ \mathrm{q}\ (GIM) = \frac{market\ value\ of\ assets}{book\ value\ of\ assets} = \frac{\text{total assets +market capitalisation}-\text{total stockholders' equity}-\text{deferred taxes}}{\text{total assets}}$
- $Operating\ margin = \frac{operating\ income\ before\ depreciation}{net\ sales}$
- $Asset\ turnover = \frac{net\ sales}{lagged\ total\ assets}$
- $Labour\ productivity = \log\left(\frac{net\ sales}{lagged\ number\ of\ employees}\right)$
- $Capex\ scaled = \frac{capital\ expenditures}{lagged\ total\ assets}$
- $Employment\ growth\ rate = \log(number\ of\ employees) - \log(number\ of\ employees)\ [\_n-1]$

Control variables

- $Market\ leverage = \frac{total\ long\ term\ debt + total\ debt\ in\ current\ liabilities}{market\ capitalisation + total\ long\ term\ debt + total\ debt\ in\ current\ liabilities}$
- $R\&D\ scaled = \frac{research\ \&\ development\ expense}{lagged\ total\ assets}$
- $Asset\ tangibility = \frac{total\ assets - total\ intangible\ assets}{total\ assets}$
- $Sales\ growth\ rate = \log(net\ sales) - \log(net\ sales)\ [\_n-1]$
- $ROA\ (return\ on\ assets) = \frac{operating\ income\ before\ depreciation}{lagged\ total\ assets}$
- $Payout\ ratio = \frac{total\ dividends}{market\ capitalisation}$
- $Cash\ flow\ scaled = \frac{net\ income + depreciation\ and\ amortization}{lagged\ total\ assets}$

B. Descriptive statistics

Table B1

This table presents descriptive statistics of the complete data set of European sample firms.

Variable	Obs.	Mean	Std. Dev.	Min	Max
Dual	8,532	0.179	0.383	0	1
Age	43,232	12.442	14.212	0	150
Tobin's *q* (Orbis)	25,233	3.932	191.560	0	26396.17
Tobin's *q* (KM)	19,194	2.476	12.204	-706.743	847.854
Tobin's *q* (GIM)	18,500	1.832	2.744	0.025	106.384
Assets	37,151	3285.497	15911.37	10.002	610799
log Assets	37,151	5.549	2.090	2.303	13.323
Asset tangibility	39,357	0.804	0.211	0.001	1.040
ROA	37,045	0.144	15.509	-78.768	2977.286
Asset turnover	36,484	2.301	181.792	-0.364	34614
Capex/lagged assets	35,104	0.226	17.716	0	2551.857
R&D/lagged assets	88,845	0.018	0.858	-0.206	253.335
Sales growth	35,238	0.084	0.507	-11.019	8.741
Operating margin	37,750	-5.190	185.804	-15123	4160.833
Market leverage	21,278	0.273	0.269	-0.001	0.999
Pay-out ratio	8,982	0.036	0.065	0	4.387
Log(Labour productivity)	25,960	5.587	1.271	-5.745	14.569
Employment growth	25,394	0.040	0.318	-9.226	6.297

Table B2

This table presents descriptive statistics and mean differences of the subsets of European sample firms that are represented by the dual-class indicator (Dual) with a value of either 0 (assigned to 884 firms) or 1 (assigned to 241 firms) respectively, shown separately.

	Single-class firms (Dual=0)			**Dual-class firms** (Dual=1)			**Single − Dual**
Variable	**Obs.**	**Mean**	**Std. Dev.**	**Obs.**	**Mean**	**Std. Dev.**	**Difference**
Age	5,875	18.829	18.862	967	20.683	20.201	-1.854***
Tobin's *q* (Orbis)	4,745	1.328	2.655	935	1.266	1.545	0.062
Tobin's *q* (KM)	3,893	3.372	20.634	812	2.435	2.795	0.937***
Tobin's *q* (GIM)	3,893	2.128	3.855	812	1.985	1.924	0.143
Assets	6,244	11924.27	31899.98	1,455	15432.75	25423.78	-3508.476***
log Assets	6,244	8.071	1.539	1,455	8.745	1.395	-0.674***
Asset tangibility	6,232	0.763	0.199	1,452	0.740	0.188	0.022***
ROA	6,235	0.157	0.154	1,451	0.147	0.116	0.010***
Asset turnover	6,104	1.096	1.157	1,444	0.995	0.541	0.101***
Capex/lagged assets	6,219	0.053	0.070	1,448	0.047	0.043	0.006***
R&D/lagged assets	7,004	0.018	0.041	1,528	0.029	0.056	-0.011***
Sales growth rate	6,100	0.051	0.272	1,444	0.054	0.255	-0.003
Operating margin	6,102	0.179	0.232	1,446	0.169	0.122	0.010**
Market leverage	4,283	0.250	0.218	891	0.363	0.269	-0.113***
Pay-out ratio	2,899	0.034	0.051	459	0.032	0.021	0.002
Log(Labour prod.)	5,891	5.713	1.090	1,392	6.147	1.199	-0.433***
Employees growth	5,906	0.029	0.224	1,368	0.037	0.192	-0.008
Total observations	7,004			1,528			
Total firms	884			241			

Table B3

This table presents descriptive statistics of the variable Tobin's *q* (Orbis) when considering only observations for which the dual-class indicator is available, shown separately by country.

Code	**Country**	**Firms**	**(%)**	**Obs.**	**(%)**	**Mean**	**Std. Dev.**	**Min**	**Max**
~~1 = AUS~~	~~Australia~~	-	-	-	-	-	-	-	-
2 = AUT	Austria	18	(1.9%)	102	(1.8%)	0.658	0.434	0.103	2.32
3 = BEL	Belgium	26	(2.7%)	162	(2.9%)	0.954	0.904	0	8.45
~~4 = BLZ~~	~~Belize~~	-	-	-	-	-	-	-	-
5 = CHE	Switzerland	73	(7.6%)	401	(7.1%)	1.656	1.257	0.103	7.798
6 = CYP	Cyprus*	1	(0.1%)	10	(0.2%)	0.703	0.562	0.061	1.438
7 = DEU	Germany	114	(11.8%)	626	(11.0%)	1.054	1.040	0	10.723
8 = DNK	Denmark	33	(3.4%)	213	(3.8%)	2.432	2.726	0.025	13.996
9 = FIN	Finland	34	(3.5%)	238	(4.2%)	1.039	0.726	0.071	4.093
~~10 = FLK~~	~~Falkland Islands~~	-	-	-	-	-	-	-	-
11 = FRA	France	113	(11.7%)	717	(12.6%)	0.951	0.960	0.012	7.486
12 = FRO	Faroe Islands**	1	(0.1%)	1	(0.0%)	2.673	-	2.673	2.673
13 = GBR	United Kingdom	245	(25.4%)	1,747	(30.8%)	1.697	4.057	0.018	78.213
~~14 = GGY~~	~~Guernsey~~	-	-	-	-	-	-	-	-
15 = IMN	Isle of Man***	4	(0.4%)	25	(0.4%)	0.917	0.538	0.308	2.073
~~16 = ITA~~	~~Italy~~	-	-	-	-	-	-	-	-
17 = JEY	Jersey***	10	(1.0%)	54	(1.0%)	1.135	0.859	0.126	4.632
18 = LUX	Luxembourg	14	(1.4%)	86	(1.5%)	0.857	0.498	0.092	2.262
~~19 = MUS~~	~~Mauritius~~	-	-	-	-	-	-	-	-
20 = NLD	Netherlands	48	(5.0%)	281	(4.9%)	1.182	1.427	0.058	11.961
21 = NOR	Norway	31	(3.2%)	141	(2.5%)	0.953	0.588	0.135	3.204
~~22 = ROU~~	~~Romania~~	-	-	-	-	-	-	-	-
~~23 = SEN~~	~~Senegal~~	-	-	-	-	-	-	-	-
24 = SWE	Sweden	78	(8.1%)	373	(6.6%)	1.302	1.373	0.058	19.195
~~25 = SWZ~~	~~Swaziland~~	-	-	-	-	-	-	-	-
~~26 = VGB~~	~~Virgin Islands~~	-	-	-	-	-	-	-	-
. = missing	unidentified	123	(12.7%)	503	(8.9%)	0.807	1.220	0	13.033
Total		966	(100%)	5,680	(100%)	1.318	2.506	0	78.213

*This one Cyprus firm has an ISIN code from Norway.

**The Faroe Islands are an autonomous country within the Kingdom of Denmark, but no member of the European Union.

***The Isle of Man and Jersey fall under the responsibility of the United Kingdom, but are no members of the European Union.

C. Robustness checks

Table C1

This table shows robustness checks of average relations between dual-class status and financial measures, using Tobin's q samples that are Winsorized at the 1st and 99th percentiles, and using the natural logarithms of dependent variables Operating margin and Asset turnover. A comparison to the interpretation of Table 1 of chapter 6 *Results* is made below.

Dependent variable:	Tobin's q (Orbis)_w	Tobin's q (KM)_w	Tobin's q (GIM)_w	Log(Operating margin)	Log(Asset turnover)
Dual	-0.118	0.052	-0.022	-0.108	-0.098
	(-0.31)	(0.19)	(-0.13)	(-1.39)	(-1.55)
log Assets	-0.178	-0.667***	-0.376***	0.123*	-0.085
	(-1.49)	(-2.72)	(-2.72)	(1.85)	(-1.41)
Age	0.850***	0.723***	0.623***	0.400***	0.199***
	(5.93)	(3.58)	(4.37)	(18.20)	(14.03)
Market leverage	-1.732***	-2.456***	-1.500***	-0.873***	-0.241**
	(-5.46)	(-4.56)	(-4.28)	(-4.51)	(-2.10)
R&D	3.291	2.673	1.622	0.807	2.099***
	(0.79)	(0.51)	(0.39)	(0.84)	(3.52)
Tangibility	1.305**	2.159**	0.817	-0.198	-0.027
	(2.19)	(2.00)	(1.24)	(-0.72)	(-0.12)
Sales growth	0.414***	0.499*	0.170	0.022	0.768***
	(3.95)	(1.89)	(0.96)	(0.32)	(13.93)
ROA	0.530	0.660	0.515	-	-
	(0.61)	(0.56)	(0.61)	-	-
Pay-out ratio	-6.006***	-9.254***	-6.214***	1.449	0.456
	(-3.87)	(-3.42)	(-3.40)	(1.49)	(0.82)
SIC3 x Year FE	Y	Y	Y	Y	Y
Cluster-robust SE	Y	Y	Y	Y	Y
R^2	0.006	0.008	0.009	0.021	0.006
Observations	2,820	2,630	2,630	2,811	2,821
Firms	524	519	519	524	525

The effect of dual-class status becomes insignificant for all regressions, showing mixed signs for the Tobin's q variants. The negative effect of log Assets becomes more significant for the Tobin's q variants. The effect of Age switches signs for the Tobin's q variants, becoming significantly positive. The effect of Market leverage also switches signs for the Tobin's q variants, becoming significantly negative. Both R&D and Sales growth switch signs compared to the unwinsorized samples of the Tobin's q variants, but become insignificant. The effect of ROA becomes insignificant and much smaller in magnitude. Similar results are found after Winsorizing potentially unbounded variables R&D, Sales growth, ROA and Pay-out ratio, in addition to Tobin's q (Orbis) itself. However, in that case Age and Sales growth become insignificant, whereas ROA becomes significant. Insignificant variables Dual and Sales growth also switch signs again. The insignificant effect of Tangibility switches signs for Operating margin and Asset turnover when taking the natural logarithms of these dependent variables. The effects of Age and Market Leverage on Operating margin and Asset turnover are robust when taking the natural logarithms of these dependent variables. The effects of R&D and Sales growth are robust as well when taking the natural logarithm of Asset Turnover.

Tables C2-C4 show estimates that are based on an earlier version of the data set, so they may not be directly comparable to Table 1 of chapter 6 *Results* or Table C1 of this Appendix, although the general outcome and interpretation are similar.

Table C2

This table shows robustness checks of average relations between dual-class status and Tobin's *q* (Orbis), by omitting certain (combinations of) variables.

Dependent variable:	Tobin's *q* (Orbis)	Tobin's *q* (Orbis)	Tobin's *q* (Orbis)	Tobin's *q* (Orbis)	Tobin's *q* (Orbis)	Tobin's *q* (Orbis)	Tobin's *q* (Orbis)
Dual	0.217	0.204	0.591**	0.598**	0.575*	0.488**	0.485**
	(1.64)	(1.54)	(2.02)	(2.03)	(1.93)	(2.09)	(2.14)
log Assets	-0.371**	-0.389**	-0.195	-0.167	-0.312**	-0.232**	-0.242*
	(-2.21)	(-2.25)	(-1.21)	(-1.15)	(-2.01)	(-2.14)	(-1.81)
Age	0.058***	0.087***	-0.222	-0.230	-0.243	-	-
	(3.16)	(5.14)	(-1.27)	(-1.27)	(-1.28)	-	-
Market leverage	0.097	-0.126	0.353	-	-	-	0.094
	(0.15)	(-0.20)	(0.56)	-	-	-	(0.16)
R&D	-8.580***	-8.633***	-10.259***	-10.383***	-10.676***	-9.727***	-9.705***
	(-3.09)	(-2.97)	(-6.49)	(-6.54)	(-5.80)	(-4.51)	(-4.66)
Tangibility	0.625	0.542	1.809***	1.791***	-	1.615***	1.616***
	(1.37)	(1.18)	(2.84)	(2.88)	-	(3.05)	(3.02)
Sales growth	-0.965***	-1.018***	-0.957***	-0.953***	-1.046***	-0.843***	-0.844***
	(-3.60)	(-3.59)	(-3.40)	(-3.40)	(-3.76)	(-3.52)	(-3.49)
ROA	16.427***	16.374***	17.806***	17.780***	17.846***	17.445***	17.452***
	(5.00)	(4.90)	(6.89)	(6.92)	(6.91)	(6.10)	(6.03)
Pay-out ratio	-2.434***	-2.820***	-1.973**	-1.872**	-1.770**	-2.003***	-2.044***
	(-3.45)	(-3.43)	(-2.16)	(-2.29)	(-2.25)	(-2.97)	(-2.69)
SIC3 x Year FE			Y	Y	Y	Y	Y
			2009-2018	2009-2018	2009-2018	2009-2018	2009-2018
Year FE	Y						
	2010-2017						
SIC3 FE		Y					
Cluster-robust SE	Y	Y	Y	Y	Y	Y	Y
R^2	0.666	0.555	0.271	0.259	0.249	0.765	0.764
Observations	3,010	3,010	3,010	3,010	3,013	3,483	3,483
Firms	555	555	555	555	555	636	636

Table C3
This tables shows robustness checks of average relations between dual-class status and Tobin's q (Orbis) with Year Fixed Effects only (descending R^2), by omitting certain (combinations of) variables.

Dependent variable:	Tobin's q (Orbis)	Tobin's q (Orbis)	Tobin's q (Orbis)	Tobin's q (Orbis)	Tobin's q (Orbis)	Tobin's q (Orbis)	Tobin's q (Orbis)
Dual	0.174	0.173	0.160	0.220	0.217	0.207	0.210
	(1.58)	(1.60)	(1.47)	(1.60)	(1.64)	(1.55)	(1.52)
log Assets	-0.274**	-0.286**	-0.342**	-0.362**	-0.371**	-0.429**	-0.420***
	(-2.58)	(-2.01)	(-2.31)	(-2.57)	(-2.21)	(-2.43)	(-2.89)
Age	-	-	-	0.058***	0.058***	0.060***	0.060***
	-	-	-	(3.31)	(3.16)	(3.19)	(3.34)
Market leverage	-	0.110	0.114	-	0.097	0.095	-
	-	(0.17)	(0.18)	-	(0.15)	(0.15)	-
R&D	-7.990***	-7.972***	-7.939***	-8.605***	-8.580***	-8.596***	-8.619***
	(-2.64)	(-2.71)	(-2.64)	(-2.96)	(-3.09)	(-3.02)	(-2.91)
Tangibility	0.674*	0.672*	-	0.625	0.625	-	-
	(1.72)	(1.72)	-	(1.37)	(1.37)	-	-
Sales growth	-0.870***	-0.871***	-0.882***	-0.965***	-0.965***	-0.975***	-0.975***
	(-3.56)	(-3.50)	(-3.54)	(-3.63)	(-3.60)	(-3.64)	(-3.66)
ROA	15.960***	15.980***	16.010***	16.412***	16.427***	16.449***	16.435***
	(4.76)	(4.63)	(4.64)	(5.11)	(5.00)	(5.01)	(5.12)
Pay-out ratio	-2.092***	-2.139***	-2.087***	-2.400***	-2.434***	-2.403***	-2.369***
	(-4.79)	(-4.16)	(-4.12)	(-3.73)	(-3.45)	(-3.42)	(-3.67)
Year FE	Y	Y	Y	Y	Y	Y	Y
	2010-2018	2010-2018	2010-2017	2010-2017	2010-2017	2010-2017	2010-2017
Cluster-robust SE	Y	Y	Y	Y	Y	Y	Y
R^2	0.770	0.768	0.762	0.667	0.666	0.660	0.658
Observations	3,484	3,484	3,485	3,010	3,010	3,011	3,011
Firms	637	637	637	555	555	555	555

Table C4
This table shows robustness checks of average relations between control variables (without Dual) and Tobin's q (Orbis) with Year Fixed Effects only (descending R^2), by omitting certain (combinations of) variables.

Dependent variable:	Tobin's q (Orbis)	Tobin's q (Orbis)	Tobin's q (Orbis)	Tobin's q (Orbis)	Tobin's q (Orbis)	Tobin's q (Orbis)	Tobin's q (Orbis)
Dual	0.217	-	-	-	-	-	-
	(1.64)	-	-	-	-	-	-
log Assets	-0.371**	0.034	0.033	-	-0.145**	0.022	0.021
	(-2.21)	(0.43)	(0.43)	-	(-2.36)	(0.28)	(0.27)
Age	0.058***	-	-	-	0.085	0.083	0.083
	(3.16)	-	-	-	(1.56)	(1.53)	(1.53)
Market leverage	0.097	-0.953*	-0.954*	-0.931**	-	-0.955*	-0.957*
	(0.15)	(-1.89)	(-1.88)	(-2.00)	-	(-1.85)	(-1.86)
R&D	-8.580***	0.289	-	-	-0.586	-	-0.595
	(-3.09)	(0.26)	-	-	(-0.46)	-	(-0.47)
Tangibility	0.625	0.941***	0.940***	0.896***	-	0.898***	0.895***
	(1.37)	(4.17)	(4.19)	(4.14)	-	(3.69)	(3.69)
Sales growth	-0.965***	-0.787**	-0.786**	-0.779**	-0.874**	-0.842**	-0.840**
	(-3.60)	(-2.14)	(-2.11)	(-2.03)	(-2.43)	(-2.20)	(-2.22)
ROA	16.427***	10.014***	10.019***	10.024***	11.368***	11.079***	11.089***
	(5.00)	(2.63)	(2.64)	(2.65)	(3.12)	(2.87)	(2.87)
Pay-out ratio	-2.434***	-1.273***	-1.274***	-1.272***	-1.344***	-1.289***	-1.289***
	(-3.45)	(-3.74)	(-3.74)	(-3.74)	(-3.24)	(-3.09)	(-3.09)
Year FE	Y	Y	Y	Y	Y	Y	Y
	2010-2017	2006-2018	2006-2018	2006-2018	2006-2017	2006-2017	2006-2017
Cluster-robust SE	Y	Y	Y	Y	Y	Y	Y
R^2	0.666	0.625	0.625	0.624	0.290	0.281	0.280
Observations	3,010	9,216	9,216	9,216	7,924	7,907	7,907
Firms	555	1,608	1,608	1,608	1,394	1,394	1,394