The Effect of Labour Unions, Venture Capital and Growth Equity on Firm Performance

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Bachelor Thesis

International Bachelor Economics and Business Economics

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Date: 05/08/2020

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Abstract

This paper investigates the relationship between labour unions and firm performance, and how venture capital and growth equity shareholders moderate this relationship. For this, Tobin's Q and firm mortality are used as measures of post-issue firm performance. For a sample of 5205 North-American IPOs during the 1983-2019 period, the main results are as follows. The presence of labour unions can be associated with lower levels of firm performance, whereas firms backed by financial stakeholders such as venture capitalists and growth equity funds exhibit better performance. Furthermore, the interaction between venture capital funds and labour unions as stakeholders of the firm leads to lower performance. This implies that the presence of strong stakeholders with opposing interests can be associated with lower levels of performance. For the interaction between growth equity and labour unions the results signify that these stakeholders do not 'clash', as suggested for VCs and labour unions. Specifically, the negative effect of unionisation on firm performance is moderated by the presence of a growth equity shareholder.

1 Introduction

The way employees and employers interact is changing. In the United States (US), the recent enactment of right-to-work (RTW) laws has resulted in a decline of labour union membership and real wage growth (Chava, Danis, & Hsu, 2017). Other developments change the role of labour unions too. A recent example shows that employers care for the implications that labour unionisation can have on their business: in June 2020 Facebook proposed an office collaboration tool named 'Workplace' which offers employees a stream of content that can be censored by the employer, for example by blacklisting the word 'unionise'. These developments illustratively highlight the importance of labour unions as stakeholders of the firm. Venture capital (VC) funds are important stakeholders too, and are recognised as an engine for growth with their investments in innovative technology firms (Puri & Zarutskie, 2012). These firms often demand volatile and flexible labour markets (Bozkaya & Kerr, 2014) and therefore oppose the interests that labour unions typically defend. Accordingly, the setting where labour unions encounter private investors like venture capitalists provides an intriguing framework to study stakeholder interaction, where the firm is a 'stakeholder society', as posited by Tirole (2001).

This paper studies the relationship between firm performance, labour unions, and how this relationship is affected by the presence of two types of private capital investors: venture capital and growth equity. The effect of labour unions on the performance and productivity of companies is the focal point of a large body of studies. Older studies by Freeman and Medoff (1984) and Freeman and Kleiner (1999) point toward an equivocal effect, while recent studies point towards unions having a negative effect on firm performance (Chen, Kacperczyk, & Ortiz-Molina, 2011; Lee & Mas, 2012). Besides, Grout (1984) and Van der Ploeg (1987) point out that unions may hamper innovative firms through wage demands. Therefore, I expect the effect of labour unions on the

performance of the firm to be negative. Following several studies, this paper measures the *unionisation* rate at the industry level since firm-level unionisation rates are not freely available (Chen et al., 2011; Xing, Howe, Anderson, & Yan, 2017).

In order to study the effect of VC financing on firm performance, the indicator variable *venture capital* is constructed that has the value of one for firms backed by venture capital funds. Prior literature suggests that the effect of VCs is positive on firm performance (Fulghieri & Sevilir, 2009; Hellmann & Puri, 2000). Accordingly, I expect the effect of VCs on performance to be positive. The interaction effect between *venture capital* and *unionisation* is assessed using an approach analogous to that of Xing et al. (2017). Their study provides the first systematic evidence on the relationship between venture capitalists and labour unions, and how this relationship affects firm performance. Their study analyses the yearly performance of North-American companies that went public between 1983-2013. They find that the combination of VCs and strong labour unions can be associated with lower firm performance. Similarly, I expect that the joint effect of labour unions and VCs results in poor firm performance.

Still, it remains unclear why private investors like VCs invest in unionised firms if this will adversely affect the value of their investment. There are two possible reasons for VCs to keep investing in companies that have (strong) labour unions. First, VCs could be unaware of the negative effect on firm performance as a result of the interaction between unions and shareholders. Second, their deliberate choice to invest could be due to the possibility for VCs to exit their investments early, thereby avoiding the full costs of stakeholder interaction.

To understand why VC investors keep investing in companies with (strong) labour unions, this paper examines an additional unexplored factor: growth equity financing. Whether there is growth equity backing is based on the indicator variable *growth equity*. Growth equity funds typically help more mature companies to grow their revenue for products with scalable unit economics. Ritter (2015) finds that three-year BHARs are substantially higher for IPOs backed by growth capital, compared to venture capital and leveraged buyouts. Accordingly, I expect to find that growth equity has a positive effect on firm performance.

Furthermore, the unexplored interaction effect of *growth equity* and *unionisation* on firm performance is studied. This aids in clarifying the reasons as to why VCs invest in firms that have (strong) labour unions. That is, growth equity differs from venture capital in several aspects. While VCs tend to hold controlling stakes and make early stage investments (Xing et al., 2017), growth equity is typically defined by minority investments in larger and more mature businesses (Xiao, 2013). VCs are also typically known to invest in new markets, while growth equity invests in more mature markets (Venero Capital Advisors, 2018). Accordingly, because growth equity funds invest in more mature companies and industries, they cannot prematurely exit the investment to avoid the costs of stakeholder interaction, as suggested for VCs. This should result in a more pronounced negative effect, and would explain why VCs tend to still invest in unionised firms. On the other

hand, because growth equity funds often invest in non-controlling stakes, the interaction effect may be less pronounced for labour unions and growth equity. Clearly, the interaction effect between labour unions, growth equity and venture capital provides an interesting framework to further explore. To this end, the following research question is posed:

How do venture capital and growth equity financing moderate the relationship between labour unions and firm performance?

A sample with yearly data on North-American firms that went public in the period 1983-2019 is used. To measure firm performance two different measures are used. As a measure of contemporaneous firm performance, *Tobin's Q* is used. To measure long-run firm performance the indicator variable *firm mortality* is used. The data is collected from several sources. Ritter's sample of IPOs is used as the starting point. Whether the IPO has been backed by growth equity is based on the requirements set out by Ritter (2015). Whether the company is VC-backed is extracted from ThomsonOne SDC. The data on unionisation at the industry level is collected from UMCD, where the percentage of unionised employees in a company's industry classification (CIC) is recorded. The data on firm mortality (i.e. delisting codes) is collected from the CRSP Stock Header Database. The remaining firm-year data is collected from the CRSP/Compustat database.

To estimate the effects of unionisation, venture capital, growth equity and the respective interaction effects on firm performance, this paper presents two models: (1) a pooled ordinary least squares (OLS) regression with the dependent variable *Tobin's Q*, and (2) a pooled logistic regression with the dependent variable *firm mortality*. Both models control for industry and year fixed effects and present typical control variables associated with contemporaneous performance and firm mortality.

The remainder of this paper is structured as follows. Section 2 presents a review of the relevant literature on labour unions, venture capital and growth equity, and develops the hypotheses. Successively, the data and relevant methods are described in Section 3 and 4. In Section 5 the results are presented. Section 6 presents additional tests that check for several biases and for robustness. Finally, Sections 7 and 8 discuss the findings, conclude the paper and provide suggestions for future research.

2 Theoretical Framework

2.1 Labour Unions

The concept of a labour union dates back to the 19th century when the first organised labour movements started to appear in Britain and the United States. These movements largely started as relatively small groups of skilled workers that would organise within their craft. Towards the second half of the 19th century the organisation of workers became more formal: in Britain the concept of unionisation received its legal foundation in 1871 with the Trade-Union Act; in the US the start of larger scale labour unionism can be marked with the foundation of the American Federation of Labor (AFL) in 1886.

A labour union is generally known as a collectivising instrument for workers to voice their interests towards the company's management. Traditionally defined, a labour union improves the working conditions, gradually shortens the working hours, and realises higher wages (Thompson, 1916). The union's function goes beyond its direct impact on workers: it has a role in producing macroeconomic outcomes too (Behrens, Hamann, & Hurd, 2004). Following Calmfors and Driffill (1988), countries with highly centralised unions generally perform better compared to countries with intermediate forms of union centralisation on several economic indicators such as GDP and employment. Still, better economic performance of countries with encompassing labour unions is not uncontested: Franzese and Hall (2000) find that real wages do not directly increase as a function of unionisation. Holistically, countries with weak labour unions do seem to exhibit higher income inequality and longer working hours (Aidt & Tzannatos, 2002; Hall & Soskice, 2001).

Despite the importance of labour unions at both the worker and country level, the last several decades have shown meaningful shifts in labour union membership in the United States. These shifts have been driven by the evolvement of union organisations as well as a changing legal framework, exemplified by the recent enactment of RTW laws in several US states (Chava et al., 2017). From 2009 to 2019, the union membership rate dropped from 12.3% to 10.3%, emphasising that a multiple-decade spanning trend has not been halted: in 1983 this number stood at 20.1% (U.S. Bureau of Labor Statistics, 2020). Coincidentally, this is a recognised trend for economies outside of the US too: Visser (2006) reports union membership rates to increase only for four of the 24 economies in his analysis over the 1970-2000 time period. Evidently, shifts in unionisation rates have meaningful ramifications. Such implications are elucidated when analysed in light of firm productivity and performance.

For the purposes of measuring the effect of unionisation on firm performance, this paper considers the performance of the firm after its initial public offering (IPO). This is due to the nature of the study: large sample data on firm-level performance of private companies backed by VC and growth equity funds is not publicly available for US firms. Since public firms are required by the Securities and Exchange Commission

(SEC) to disclose financial information, this data is available for VC and growth equity backed companies after they issue equity in an IPO. Hence, this study uses post-issue performance to measure the effects of unionisation, in line with Xing et al. (2017).

Recent research points towards unions having a negative effect on firm performance (Chen et al., 2011; Lee & Mas, 2012). Employers are aware of such negative outcomes and have openly shown defiance towards unionisation. For example, Walmart has openly resisted unions by strategically choosing its store locations (Basker, 2007). This accentuates the contemporaneous relevance of unionisation in relation to firm performance. The relationship of unions and the productivity and performance of firms is the focal point of a large body of studies dating back to the nineteen-eighties. Recent research by Lee and Mas (2012) points towards a negative impact of union events on the stock market performance of firms. Moreover, Chen et al. (2011) find that cost of equity is significantly higher for firms in industries with higher unionisation rates, resulting from higher levels of systematic risk. In addition, they find that unionisation is negatively related to operating flexibility. Older studies report opposite or equivocal effects. The landmark study *What do Unions do?* by Freeman and Medoff (1984) changed the perspective on unions for scholars: until that point, studies of labour unions largely emphasized the monopoly aspects of unions. In contrast, Freeman and Medoff (1984) emphasize the importance of the collectivising function that a union has. Freeman and Kleiner (1999) point toward an ambiguous effect of unions on the performance of the firm: on the one hand unions can smooth industrial relations, while on the other hand, unions can lead to higher salaries and more work restrictions. (Metcalf, 2002, p. 45) establishes the relationship between the presence of unions in the workplace, subsequent elevated pay levels and the effects on firm productivity and performance for six countries. He finds that unions lower labour productivity: (1) by confining workplace processes; (2) by industrial action; (3) by reduced firm investment; and (4) 'if adversarial industrial relations lower trust and cooperation'. Alternatively, he also finds that labour unions positively affect productivity by: (1) monitoring by the union; (2) collectivising the worker's opinion; (3) reducing manager's lethargy; and (4) reducing exploitative labour practices. For US firms he finds that unions increase productivity, however, finds inconclusive results with regards to financial performance. Hirsch (2004) finds that while unions can be good for firm productivity, they are related to lower profits too. Besides, Grout (1984) and Van der Ploeg (1987) point out that unions may hamper innovative firms through wage demands. Addison (2005) finds that while the direct effect of unions on firm productivity is positive and small, the effect of labour unions should be related to their impact on innovative work practices, which in turn positively contribute to firm performance. In addition, Acharya, Baghai, and Subramanian (2013) conclude that stringent dismissal laws, implicating strong labour unions, are good for innovation in the firm. Contrarily, Bradley, Kim, and Tian (2017) find that passing union elections results in a decline of patent quantity and quality, hence, negatively affecting the firm's innovative power. The effect of labour unions on innovation is important since innovation is

an important determinant of economic activity (Galindo & Méndez, 2014). The literature thus provides mixed results which are threefold: (1) labour unions can be associated with lower profits and worse firm performance; (2) labour unions can increase productivity, which in turn affects long-run firm performance; (3) labour unions have an ambiguous effect on the innovative power of firms. This yields the following hypothesis:

H1: Firms with (strong) labour unions experience negative post-issue firm performance.

2.2 Venture Capital

Following Da Rin, Hellmann, and Puri (2013, p. 574), the concept of venture capital is defined as 'the professional asset management activity that invests funds raised from institutional investors, or wealthy individuals, into promising new ventures with high growth potential', which specifically excludes other forms of private investment, like buyouts, turnarounds, growth equity and mezzanine finance. For a concise account of a VC fund structure I refer to Da Rin et al. (2013, p. 575-576). There is clear disparity between the amount of ventures VCs invest in, and how many ventures ultimately succeed. That is, between 1980 and 2010, of all IPOs in the US, 35% were backed by venture capital (Ritter, 2011). On the other hand, less than 1% of start-ups receive venture financing (Robb et al., 2009). Interestingly, VC-backed firms provide approximately 5.3-7.3% of employment in the US (Puri & Zarutskie, 2012). In addition, VCs invest in a concentrated group of industries, specifically focused on the technology industry (Amit, Brander, & Zott, 1998; Bertoni, Colombo, & Grilli, 2011). While the positive impact of VCs on the economy is often claimed to be due to their drive for innovation (Celikyurt, Sevilir, & Shivdasani, 2014), there are other factors that drive VC impact, both at industry- and firm-level. Following Amit et al. (1998), VCs focus on sectors with high information asymmetries, and are superior at monitoring the market for opportunities and at selecting ventures compared to other financial sponsors. Gompers (1995) confirms the preference for technology companies and projects with high levels of uncertainty, signifying a preference for information asymmetry. Recent results confirm this finding; Puri and Zarutskie (2012) find that 47% of firms backed by VCs had no commercial revenues when financed. Moreover, they find that these firms are disproportionally represented in high-tech and low-tech industries.

Thus, VCs have a preference for technology ventures, some degree of information asymmetry, and appear superior at monitoring and selection of investment opportunities. Following Hellmann and Puri (2002), VCs offer help in operational practices of their portfolio companies to professionalise their practices. For example, VCs leverage their networks to hire superior management teams and implement new human resource policies (Hellmann & Puri, 2002). In addition, VCs support their portfolio companies by professionalising their managers as well as significantly reducing the lead time to bring a product to market (Hellmann and Puri, 2000). Following

Fulghieri and Sevilir (2009), corporate VCs complement the innovative power of the firm's main product lines, thereby enhancing the strategic competitiveness of the firm's products in the market and deterring competition from exerting R&D effort. Krishnan, Ivanov, Masulis, and Singh (2011) examine corporate governance activities for IPOs backed by venture capital, and find that when VCs continue to hold board positions post-IPO, the incumbent firm accomplishes superior long-term firm performance. Furthermore, Hsu (2004) finds that entrepreneurs are willing to accept a 10-14% discount to receive funding from highly reputable VCs, therefore recognising the value of VCs beyond the financial capital provided. Thus, the literature suggests that there is significant value for an entrepreneur to partner with a VC to further grow the business.

Several studies provide insight in as to whether these value-enhancing activities of VCs lead to superior performance compared to non-VC-backed firms. Brav and Gompers (1997) find that IPOs without a financial sponsor have returns significantly below those of VC-financed IPOs on an equally-weighted basis, but results are reduced once returns are value-weighted. Jain and Kini (1995) report that post-IPO operating performance of VC-backed firms is superior to that of their non-VC peers. Contrarily, for a Singaporean sample, Wang, Wang, and Lu (2003) find that post-issue operating performance, measured as return on assets (ROA) and return on sales (ROS), is inferior for VC-backed firms. A recent study by Puri and Zarutskie (2012) reports that VC-backed IPOs outperform their non-VC-backed counterparts in terms of IPO size and acquisition rates. Still, they find that VC-backed and non-VC-backed firms do not differ in terms of profitability. Lastly, Puri and Zarutskie (2012) also find that after the length of a typical VC investment, only 39.7% of VC-backed firms fail, whereas this is 78.9% for their non-VC-backed counterparts. Consequently, I expect that VC-backing has a positive effect on the performance of the incumbent firm. This yields the following hypothesis:

H2: Firms with venture capital financing experience positive post-issue firm performance compared to firms without a financial sponsor.

2.3 Growth Equity

Growth equity is a category of private equity distinguishable from traditional venture capital and leveraged-buyouts. Given the scarce amount of attention in academic literature, I rely on a definition by the National Venture Capital Association (NVCA), which reports growth equity as a distinctive sub-asset class since 2010. Since then, growth equity deal flow has more than doubled from 551 deals in 2010 to 1217 deals in 2019, as well as tripling its deal value over the same period (NVCA, 2020). Following the NVCA Yearbook for 2020, growth equity can be best described as to invest in: (1) business models with proven unit economics that have an established group of customers for an existing product; (2) rapidly-growing revenue streams; (3) companies

that are cash-flow positive, have positive earnings or are approaching positive earnings and cash flows; (4) the investment by the growth equity fund is often but not exclusively in terms of a minority stake; (5) investment returns are a function of growth, not leverage. Industry experts such as Venero Capital Advisors (2018) report that growth equity typically invests in more mature markets compared to venture capital. Xiao (2013) confirms this and finds that growth equity funds typically invest in larger and more mature businesses. Accordingly, given the exposure to proven business models and more mature markets, growth equity funds are mainly exposed to execution and managements risks, but less so to product and market risks (which VCs are heavily exposed to). Ritter (2015) provides the most directly relatable research by identifying growth capital-backed IPOs, and comparing their long-run returns to VC-backed and buyout-backed IPO returns for the period 1980 to 2012.

Ritter (2015) identifies growth equity-financed IPOs based on three criteria. First, the company must have at least one financial sponsor as one of its pre-issue shareholders. This feature does not distinguish growth equity from VC- and PE-backed firms. Second, the financial sponsor preferably takes on a minority (i.e. non-controlling) position, where the invested capital flows to the firm, which issues shares for this purpose. For venture capital investments, the invested capital flows directly to the firm too, but for buyout stakes the funds typically flow to the existing owners. The resulting position may be controlling, but only as a result of 'dilution of the ownership percentage of management and other investors, rather than as a goal in itself' (Ritter, 2015, p. 485). Third, a substantial fraction of the incumbent firm's growth comes from acquisitions or the addition of tangible assets. Ritter (2015) reports average style-adjusted three-year buy-and-hold-returns (BHAR) for growth equity backed IPOs of 25.2%, compared to -2.6% for VC-financed IPOs, 0.7% for buyout-financed IPOs, and -14.2% for IPOs without financial sponsor. By virtue of the results discussed, the following hypothesis is posed:

H3: Firms with growth equity financing experience positive post-issue firm performance compared to firms without a financial sponsor.

2.4 Labour Unions, Venture Capital and Growth Equity

The effects of non-financial stakeholders like a labour unions is part of a larger body of literature that examines the relation between non-financial stakeholders and firm value. Firstly, for customer and suppliers, Banerjee, Dasgupta, and Kim (2008) study stakeholder relationships by specifically looking at the effects of supplier and customer relationships on the capital structure decisions of the firm. Fee and Thomas (2004) also study customers and supplier relationships and their effects on post-merger stock performance. Secondly, for employees, Ginglinger, Megginson, and Waxin (2011) study the relationship between mandated employee board representation

and firm performance. Thirdly, for politicians, Goldman, Rocholl, and So (2009) find that politically connected boards affect the stock price performance of the firm. The overlapping characteristic for these studies of non-financial stakeholders is the isolated approach for studying these stakeholders; the potential interactions with other (non-)financial stakeholders that can affect firm value, performance and productivity are not considered. Accordingly, following the analysis by Xing et al. (2017) who provide the first systematic evidence of stakeholder interaction, this paper examines the interaction effects between labour unions, VCs and growth equity investors on the performance of the firm.

The previous literature posits that the isolated effect of labour unions has a negative effect on the performance of the firm. Furthermore, prior literature suggests that the isolated effects of venture capital and growth equity financing on firm performance are positive. Accordingly, it is suggested that labour unions and private capital shareholders have opposing effects on firm performance. Xing et al. (2017) suggest that if these stakeholders are independent, the collective effects of these stakeholders on firm performance is the summation of their individual effects. Hence, if the firm has both stakeholders, this would mean that either's effect is mitigated. For example, if both stakeholders are an equally important influence on firm performance, their effects would cancel out in the aggregate. As a result, firms with just a private capital stakeholder would enjoy the best post-issue performance, whereas firms with only a labour union would be worst off in terms of post-issue performance.

However, these stakeholders may not be independent as initially suggested. That is, labour unions and private capital investors interact with each other in a 'stakeholder society', as posited by Tirole (2001). With the concept of a stakeholder society, Tirole (2001) aims to justify the changed economic paradigm in which shareholder value centric theories do not justify the large number of externalities imposed by the profit maximizing choices on other non-financial stakeholders like labour unions. Therefore, the firm should internalise the externalities that affect various other stakeholders. The implementation of a stakeholder society refers to two broad concepts. On the one hand, it imposes a utilitarian perspective in which management should aim to maximize *stakeholder* value. On the other hand, it refers to 'the sharing of control among stakeholders' (Tirole, 2001, p. 28). He posits that private equity investors, who are 'stakeholder by design' seek shareholder value maximisation, and employees, who are 'nature stakeholders' pursue to enlarge their own interests. This can result in disparity among the respective stakeholders, affecting management in such a way that it can lead to decision-making cessations.

When labour unions with (substantial) bargaining power represent employees as a stakeholder of the firm, the presence of powerful shareholders like venture capital investors can lead to amplified conflicts between these stakeholders. That is, because venture capital shareholders typically invest in the technology industry (Bertoni et al., 2011) which demands flexible labour markets (Bozkaya & Kerr, 2014), VCs are prone to have incentives contrary to those of employees. Because venture capital shareholders typically have controlling ownership

stakes in their portfolio companies, they can pay lower wages, and reduce overall work-related benefits, exactly what labour unions aim to prevent (Metcalf, 2002). Since VCs promote innovation in the overall economy through their portfolio companies (Kortum & Lerner, 2000), and labour unions may actually hamper innovative practices through wage demands (Grout, 1984; Van der Ploeg, 1987), the assumed managerial deadlocks would be amplified.

Xing et al. (2017) suggest that the presence of labour unions can result in VCs adapting their investment criteria such that it would limit their exposure to firms with labour unions. Bozkaya and Kerr (2014) similarly suggest that VCs prefer flexible labour markets, which would imply at least some degree of aversion toward industries with rigid labour laws, which in turn imply strong labour unions. Moreover, if labour unions progressively become more present in a certain industry the VC is already exposed to, the VC may decide to (partially) liquidate its investment in order to avert managerial deadlocks that would harm the long-term value of their investment. The results of Xing et al. (2017) indicate that VC-backed firms in relatively unionised industries perform worse than their counterparts without a financial sponsor. Based on these results combined with the premise that stakeholders interact in a 'stakeholder society', the following hypothesis is derived:

H4: Firms that experience a (strong) degree of unionisation and have a venture capital shareholder experience negative post-issue firm performance.

However, from the study by Xing et al. (2017) it remains unclear why private capital investors like VCs invest in firms with strong labour unions. That is, if the interaction between the labour union and the presence of VCs results in a negative effect on firm performance, the VC directly impedes its own investment returns. Accordingly, Xing et al. (2017) suggest two possible motivations for VCs to keep investing in companies that are exposed to a strong degree of unionisation. Firstly, VCs could be unaware of the negative effect on firm performance as a result of the interaction between unions and shareholders. Secondly, their deliberate choice to invest could be due to the possibility for them to exit their investments early, avoiding the full costs of stakeholder interaction. Accordingly, it is explored in this paper whether the interaction between labour unions and growth equity investors holds similar results. Considering the premise that growth equity funds generally invest in more mature markets and more mature companies (Xiao, 2013), it holds that growth equity investors cannot exit their investment early to overcome the (full) cost of stakeholder interaction. However, since growth equity investors often invest with minority stakes (NVCA, 2020) and without the intention to hold a controlling stake (Ritter, 2015), they clearly distinguish themselves from VCs that often deliberately hold controlling stakes. Hence, because controlling ownership is not a goal in itself for growth equity investors, the negative effects of stakeholder interaction between labour unions and growth capital investors is arguably mitigated. Besides,

growth equity backed IPOs yield much higher style-adjusted BHAR than venture-backed IPOs (Ritter, 2015). In sum, this yields the following hypothesis:

H5: Firms that experience a (strong) degree of unionisation and have a growth equity shareholder experience negative post-issue firm performance.

3 Data

The data used for sample construction is collected from five different sources. Ritter's sample of North-American IPOs between 1975 and 2019 is used as the starting point and selects IPOs based on the criteria listed in Loughran and Ritter (2004). The list of IPOs excludes special purpose acquisition companies (SPACs); American depository receipts (ADRs) which are companies that are listed in at least one other foreign country; real estate investment trusts (REITs); unit offers and financial firms. In addition, IPOs with an offer price below $5 before 1984 are screened out. All IPOs are required to have a founding date.

The data on industry-level unionisation membership rates is collected from the Union Membership and Coverage Database (UMCD), which is maintained by Hirsch and McPherson. The UMCD provides data on public and private sector labour unionisation membership and coverage rates. The database provides industry-level unionisation rates from 1983. Accordingly, any IPOs before 1983 are deleted from the sample.

Annual firm-level data for the sample is collected from the CRSP/Compustat database for the period 1983–2019. The firms from Ritter's sample should be available in the CRSP/Compustat database, otherwise they are deleted. In addition, delisting codes are gathered from the CRSP Stock Header Information Database. The data on growth equity backing is collected from Ritter's website, and is analogous to the dataset used by Ritter in *Growth Capital Backed IPOs* (2015). The subset includes 406 growth equity backed IPOs for the period 1980–2019. Any IPOs before 1983 are excluded from the sample. The data on venture capital backing is collected from the ThomsonOne SDC database for the IPOs in the period 1983-2019.

The sample is further reduced by deleting any firms that have total sales less than $20 million. Utility firms (with 2-digit SIC code 49) are discarded too. Furthermore, the IPOs that have missing values for the variables explaining firm performance are discarded from the sample. Lastly, the following variables are winsorised at the 1st and 99th percentiles: Tobin's Q, profitability, size, leverage, market-to-book, capex-to-sales, dividends-to-equity and Z-score. The final sample consists of 44722 firm-year observations constituting 5205 IPOs of which 1822 are financed by VCs and 247 are financed by growth equity.

3.1 Main Variables

3.1.1 Post-Issue Firm Performance

In order to measure post-issue performance by firms that are exposed to labour unions and are backed by venture capital or growth equity, two distinct measures of firm performance are used. Following Xing et al. (2017), I use Tobin's Q as a measure of contemporaneous firm performance by virtue of its attractive characteristics. To begin with, Tobin's Q is a point measure of firm value as opposed to techniques using abnormal returns. According to Lang and Stulz (1994) a point measure of value is more appropriate when the research does not aim to fully explain the cross-section. Moreover, Franks, Harris, and Titman (1991) show that abnormal returns are sensitive to the degree of risk-adjustment. Accordingly, since the analysis in this paper does not aim to fully explain cross-sectional results and only aims to establish a certain relationship, a point measure of firm value is more appropriate compared to measuring abnormal returns. Besides, for the analysis of firm performance in light of an event impact like financial backing by a venture capital or growth equity fund, it is essential to measure the value of the firm in light of the expected future cash flows as opposed to more present-focused measures of performance like ROA. *Tobin's Q* is defined as follows: the market value of assets divided by the book value of assets, where the market value of assets is measured as book value of assets plus market value of equity minus book value of equity minus deferred taxes. The mean and median for Tobin's Q are 2.223 and 1.611 respectively.

To measure long-run firm performance, I follow Xing et al. (2017) and use firm mortality. This is not a novel approach to measuring long-run performance; Queen and Roll (1987) already used market indicators to predict firm survival. In addition, Bhattacharya, Borisov, and Yu (2015) use data on venture capital financing and other financial intermediary data to predict firm mortality. I follow the methodology in these studies to distinguish between voluntary and involuntary firm deaths. There exist seven types of 3-digit delisting codes in the CRSP Stock Header Information Database: active (100-170); mergers (200-290); exchanges (300-390); liquidations (400-490); dropped (500-591); expirations (600-610); and domestic securities that become foreign (900-903). As in Xing et al. (2017) and Bhattacharya et al. (2015), I use involuntary death as a measure of firm mortality, which are firms with codes 400-490 (liquidations), 500-591 (dropped) and 600-610 (expirations) and experience an involuntary death in the period 1983-2019. Accordingly, the indicator variable *firm mortality* is constructed. It is interesting to study the interaction effect between labour unions and private capital financing on firm mortality for several reasons. First, the effect of financial intermediaries on the mortality rate of public firms is most striking during the years close to the IPO, but can last up to 7 years after issuance (Bhattacharya et al., 2015). Accordingly, firm mortality offers a distinct perspective from contemporaneous firm performance. Second, contrary to Tobin's Q, using firm mortality as a measure of performance allows to rule out any concerns

regarding simultaneous equations bias and reverse causality (Xing et al., 2017). For the full sample, 1397 IPOs experience an involuntary death, constituting 26.84%.

3.1.2 Labour Unionisation

Due to the nature of the data, labour unionisation rates are not publicly accessible for the purposes of constructing a representative panel. Accordingly I resort to measuring labour force unionisation as the percentage of employees that are covered by unions in the company's primary Census Industry Classification (CIC), in line with previous work of several authors (e.g. Chen et al., 2011; Chen, Kacperczyk, & Ortiz-Molina, 2012; Connolly, Hirsch, & Hirschey, 1986). The continuous variable *unionisation* is measured as the number of union members at the industry level divided by the total employment at the industry level.

Since industry union and occupation classifications have undergone changes in the period 1983-2019, I use the U.S. Census Bureau's crosswalk tables to reconcile all the industry-year data over time.[1] There have been major overhauls of the Census classifications that I have reconciled to the most recent 2017 CIC classification. The CIC codes and industry classifications are identical for the period 1983 to 1991 as reported by UMCD. The CIC codes and industry classifications are identical for the 1992 to 2002 period as report by UMCD. The mapping from 2002 to 2008 is identical. From 2008 to 2009 one CIC Category: 'internet publishing and broadcasting' changes its CIC code. The mapping for 2009 and 2010 is equal to that of 2011 to 2019 except that in 2011 four CIC industry categories are removed: not specified type of mining (480); not specified machinery manufacturing (3290); internet service providers (6692); footwear and leather goods (8890). See appendix 1 for the main reconciliations over the 1983-2019 period.

After the industry-year mappings are reconciled to the newest Census classification, the CIC codes are matched to 3-digit and 4-digit SIC industry codes that are extracted from CRSP/Compustat. To map all the SIC codes to their CIC counterparts I use the rough classification given in the UMCD database for the 2002-2009 data, matching 60% of the firms. For the remaining SIC codes that cannot be matched on this basis, I manually match 3-digit and 4-digit SIC codes to CIC codes for 30% of the firms. For less than 10% of the sample, it is not possible to match the SIC code to a CIC code, or the reported SIC codes in CRSP/Compustat cannot be aligned with those reported by the U.S. Securities and Exchange Commission.[2] These observations are deleted from the sample. The mean and median unionisation rates are 0.079 and 0.042 respectively.

[1] See https://www.census.gov/topics/employment/industry-occupation/guidance/code-lists.html for a crosswalk table that can be used to reconcile CIC industry categories over the 1983-2019 period.

[2] I used https://www.sec.gov/info/edgar/siccodes.htm to align the SIC codes retrieved from CRSP/Compustat.

3.1.3 Venture Capital and Growth Equity

To measure the effect of venture capital financing, the indicator variable *venture capital* is constructed, which has the value of one if the company is financed by a venture capital shareholder, and zero otherwise. Similarly, to measure the effect of growth equity financing, the indicator variable *growth equity* is constructed, which takes on the value of one if the firm is financed by a growth equity fund, and zero otherwise. In the full sample, 1822 firms are backed by VC, and 247 firms are financed by growth equity.

3.2 Control variables

The models used in this study use several variables to control for the confounding factors in the relationships between the main variables of interest. I control for the following variables that are identified by Xing et al. (2017) and Bhattacharya et al. (2015) as factors to affect firm performance: (1) *size*, measured as the natural logarithm of total sales; (2) *age*, measured as difference between the final year of the company (being 2019 if the company is still active, and otherwise the year in which it delisted), and the year in which the company was founded; (3) the *market-to-book* ratio, as a proxy for a firm's growth opportunities, measured as the market value of equity divided by the book value of equity; (4) *profitability*, measured as the ratio of earnings before interest, taxes, depreciation and amortization (EBITDA) to total sales; (5) *capex-to-sales*, measured as the ratio of capital expenditures to total sales; (6) *dividends-to-equity*, measured as the ratio of dividends to book value of equity; (7) Sufi's (2009) modified *Z-score* as a proxy for bankruptcy and distress, measured as the sum of (3.3 x earnings before interest and taxes (EBIT), 1.4 x retained earnings, sales, and 1.2 x working capital), scaled by book value of assets; (8) *leverage*, measured as the ratio of total debt divided by the book value of assets.

A few control variables deserve additional explanation. Instead of using market capitalisation as a measure of firm size (e.g. Levis, 2011), I use the natural logarithm of sales to mitigate the correlation between the market-to-book ratio and size (Francis, Schipper, & Vincent, 2005). I also deviate from the approach in Xing et al. (2017) who use Altman's (1968) Z-score as a measure of bankruptcy and distress. Because many of the firms in the constructed sample have zero debt or quasi-zero debt, this results in great variation in Altman's original Z-score for this sample. Accordingly, I resort to Sufi's (2009) modified Z-score which explicitly excludes the leverage factor and therefore ensures conservativeness of the analysis. Consequently, I control for debt as an independent factor with the variable *leverage*.

3.3 Sample Analysis

The final sample consists of 5205 IPOs for the period 1983 to 2019, for a total of 44722 firm-year observations. In Table 1 the descriptive statistics for the main variables are reported. The results for the main variables

are in line with the results reported by Xing et al. (2017). In the total sample, 26.84% of firms experience an involuntary death. Within the sample of 1822 VC-backed IPOs, 418 experience an involuntary death (22.94%). For the sample of 247 growth equity financed IPOs, 59 experience an involuntary death, corresponding to 23.89%.

Table 1: Descriptive Statistics

This table presents the descriptive statistics for 5205 North-American IPOs in the period 1983-2019, constituting 44722 firm-year observations. The main variables *Tobin's Q* and *firm mortality* are used as measures of performance. The indicator variables *venture capital* and *growth equity* take on the value of one if such a shareholder is present, and zero otherwise. *Unionisation* is measured as the number of union members at the industry level divided by the total employment at the industry level. The remaining variables presented in this table are typical control variables used in the OLS and logistic firm value regressions, and are analogous to those presented in the work of Xing et al. (2017) and Bhattacharya et al. (2015).

Variable	***N***	**Mean**	**Median**	**Standard Deviation**	**25th Percentile**	**75th Percentile**
Tobin's Q	44722	2.223	1.611	1.830	1.130	2.584
Firm mortality	44722	0.225	0	0.4178	0	0
Venture capital	44722	.329	0	0.470	0	1
Growth equity	44722	0.043	0	0.203	0	0
Unionisation	44722	0.079	0.042	0.096	0.018	0.103
Profitability	44722	-0.191	0.094	1.448	0.008	0.179
Size	44722	4.900	4.843	1.921	3.594	6.206
Age	44722	30.842	24	24.224	15	37
Leverage	44722	0.201	0.143	0.225	0.006	0.346
Market-to-book	44722	3.221	2.148	5.124	1.195	3.856
Z-score	44722	0.813	1.495	3.163	0.344	2.427
Capex-to-sales	44722	0.122	0.040	0.307	0.019	0.090
Dividends-to-equity	44722	0.016	0	0.057	0	0

Interestingly, the reported mean of profitability is -0.191 whereas similar studies generally report positive values. This result can be explained: many recent IPOs in the computer and data processing industry have steep negative EBITDA margins at the time of issue. Their valuations are based on the scalability of their product and the high growth they can attain due to network effects that are fundamental to their product or service. A prime example in the current sample is Snapchat Inc; a multimedia messaging application that becomes more valuable to users as more of their friends use it. At the time of Snapchat's IPO its EBITDA stood at -$3424.288 million compared to only $824.949 million in sales. Even at the end of the sample period its EBITDA is still negative while the equity valuation stood at approximately $25 billion.

Table 2 presents the 10 industries with the highest number of IPOs for the full sample, and reports the number of VC financed IPOs, growth equity financed IPOs, the number of involuntary deaths, the mean unionisation rate and the mean Tobin's Q per CIC category. The industries with the overall highest number of IPOs correspond roughly to the 10 industries for which VCs report the highest number of IPOs. However,

growth equity financed IPOs differ in terms of industry occurrences. Six out of the 10 industries with the most growth equity financed IPOs are not part of the overall top 10 industries; these are presented in Panel B. The remaining four industries are presented **in bold** in Panel A. Interestingly, with five out of 10 industries being related to health and medical services, growth equity investments are relatively concentrated in this sector. In sum, the descriptive statistics in Table 2 pose that VCs are active in industries that exhibit somewhat lower unionisation rates and exhibit average Tobin's Q. This suggests that VCs may select industries with relatively less powerful labour unions. For growth equity the unionisation rates are more in line with the average, while the values for Tobin's Q appear lower than average. The lower Tobin's Q for growth equity may correspond to the lower risk profile for growth equity backed firms compared to firms backed by venture capital.

4 Methodology

In order to test for the effects of labour unions, venture capital, growth equity and the respective interaction effects on firm performance I use two main models. I use a pooled ordinary least squares (OLS) specification to test for the effects of the main variables of interest on contemporaneous firm performance measured by Tobin's Q. The full sample of 44722 firm-year observations is used for this model. The following specification is used to test for the various hypotheses:

$$\begin{aligned}\text{Tobin}'\text{s Q}_{it} = \ & \beta_1 * \text{unionisation}_{1t} \ + \ \beta_2 * \text{growth equity}_i \ + \ \beta_3 * \text{venture capital}_i \\ & + \ \beta_4 * \text{growth equity}_i * \text{unionisation}_{it} \ + \ \beta_5 * \text{venture capital}_i * \text{unionisation}_{it} \ + \ \beta_6 * X_{it} \ + \ \mu_i \ + \ \lambda_t\end{aligned}$$

Where X_{it} represents a set of control variables related to contemporaneous firm performance: size_{it}, age_{it} and $\text{profitability}_{it}$ in the parsimonious specification. The parsimonious specification mitigates the risks with regards to irrelevant variables inducing spurious results. In the full specification I add the following control variables: $\text{capex}-\text{to}-\text{sales}_{it}$, $\text{dividends}-\text{to}-\text{equity}_{it}$, and leverage_{it}. The latter model alleviates risks concerning omitted variables bias. Because I use an industry-level measure of unionisation as a proxy for labour union strength at the firm level, there is the concern that the industry unionisation rate is correlated with other industry-level factors that affect firm performance. Moreover, as shown in Table 2, VCs and growth equity funds select different industries to invest in. Accordingly, industry fixed effects are represented by μ_i in the OLS models in order to control for such biases. Industry classification is based on 2-digit SIC codes. Year fixed effects are accounted for by λ_t. I refrain from using the $\text{market}-\text{to}-\text{book}_{it}$ variable in the OLS specification since it is directly related to Tobin's Q in construct.

Table 2: Summary statistics for the main variables by CIC industries

Summary statistics for the CIC industries with the most IPOs for the full sample of 5205 IPOs in the period 1983-2019. Panel A presents the 10 CIC industries with the most overall IPOs. The overall top 10 corresponds roughly to the top 10 industries for VC financed IPOs. The top 10 industries for growth equity backed IPOs are distinctive from the general and VC top 10 industries. In Panel A, four CIC industries are presented in bold; they are part of the growth equity backed top 10 industries. Panel B represents the other six industries with the most growth equity financed IPOs. *Venture capital* represents the number of VC financed IPOs by CIC industry. *Growth equity* represents the number of growth equity financed IPOs by CIC industry. *Firm Mortality* represents the number of involuntary deaths per CIC industry. *Unionisation* represents the mean unionisation rate assorted by CIC category. *Tobin's Q* represents the mean for each CIC category.

Panel A: Top industries with highest number of IPOs						
Industry (CIC)	***N***	**Venture Capital**	**Growth Equity**	**Firm Mortality**	**Unionisation**	**Tobin's Q**
Computers and data processing services	**1031**	**597**	**20**	**229**	**0.012**	**2.912**
Drugs	319	228	4	56	0.045	3.422
Electrical machinery, equipment and supplies manufacturing	226	126	1	67	0.070	2.081
Medical, dental, and optical instruments and supplies	**223**	**127**	**8**	**35**	**0.041**	**2.891**
Computers and related equipment	205	138	0	66	0.021	2.578
Radio, TV, and communication equipment	168	84	2	54	0.084	2.090
Oil and gas extraction	**139**	**16**	**19**	**31**	**0.032**	**1.548**
Eating and drinking places	**129**	**7**	**23**	**45**	**0.016**	**2.001**
Scientific and controlling instruments	116	47	0	24	0.070	2.095
Telephone communications	114	36	6	46	0.271	2.003
Panel B: Top industries with highest number of growth equity financed IPOs						
Health Services, n.e.c.	92	24	20	23	0.091	1.981
Air Transportation	55	3	10	28	0.405	1.408
Nursing and personal care facilities	34	5	10	8	0.097	1.531
Hospitals	32	3	9	8	0.143	1.584
Offices and clinics of physicians	24	5	9	8	0.023	2.004
Insurance	73	14	7	12	0.027	2.300

Since the effect of financing by VC and growth equity funds is most pronounced during early post-issue years (Bhattacharya et al., 2015), and because using firm mortality as a measure of firm performance allows to rule out any concerns regarding simultaneity and reverse causality, it is useful to test the hypotheses with regards to the main variables in relation to this measure of firm performance. A pooled logistic model is specified where the dependent variable firm mortality has the value one if a company suffers an involuntary death, and zero otherwise. The following model is specified:

$$\begin{aligned}\Pr(\text{firm mortality}_i) = \ & \beta_1 * \text{unionisation}_{it} \ + \ \beta_2 * \text{growth equity}_i \ + \ \beta_3 * \text{venture capital}_i \\ & + \ \beta_4 * \text{growth equity}_i * \text{unionisation}_{it} \ + \ \beta_5 * \text{venture capital}_i * \text{unionisation}_{it} \ + \ \beta_6 * X_{it} \ + \ \mu_i \ + \ \lambda_t\end{aligned}$$

For which the firm-year pairs are the unit of analysis, using the full sample of 44722 observations. Following Bhattacharya et al. (2015), X_{it} represents a set of control variables related to firm mortality as a measure of firm performance: size_{it}, age_{it}, leverage_{it}, $\text{Z}-\text{score}_{it}$ and $\text{market}-\text{to}-\text{book}_{it}$. Industry fixed effects are accounted for by μ_i. Year fixed effects are represented by λ_t. The control variable specification for the logistic regression is different from the OLS specification. I use the variable $\text{Z}-\text{score}_{it}$ to control for financial distress which is known as a key determinant of firm survival. Moreover, I control for a firm's growth opportunities with the $\text{market}-\text{to}-\text{book}_{it}$ variable in the logistic model.

The coefficients that follow from the logistic model are in log-odds units, and relatively easily interpretable if transformed to odds ratios. The odds ratios are calculated as e^{β_j} where β_j are the coefficients for the respective model. However, the odds ratio does not present any sense of magnitude and can therefore be misleading in interpretation. Moreover, especially for interaction terms in logistic models the interpretation in terms of log-odds or odd ratios is problematic. To enhance the interpretation of the coefficients in the logistic model I report marginal effects to present the values as differences in probabilities. Marginal effects are also commonly referred to as the average predicted probability.

A couple of remarks are in place with regards to marginal effects. Because the independent variables in the logistic specification are of different types their interpretations differ slightly. That is, for the indicator variables the reported marginal effect follows from the difference between the predictive margins of the indicator variable at 0 and 1. The interpretation for the marginal effect of the continuous variables in the logistic regressions is that a small change in some variable κ_j results in the reported marginal effect (when effects are non-linear). Technically, this is not a change by exactly one unit but provides a good enough approximation of this for practical purposes (Williams, 2012). Hence, the interpretation for continuous variables is analogous to that of indicator variables. On the other hand, the marginal effect of the interaction term does not exist; that is, there only exist the marginal effects of the component variables. This is due to the premise that the

coefficient of the interaction term cannot change independently of the component variables (Williams, 2012). The margins for the component estimators will simply soak up the effects of that variable part of the interaction term. Still, to interpret the marginal effect that the interaction terms growth equity$_i$ $*$ unionisation$_{it}$ and venture capital$_i$ $*$ unionisation$_{it}$ have, I estimate the marginal effect of unionisation conditional on growth equity and venture financing being absent and present (i.e. the indicator variable taking on the value of 0 and 1).[3] I use STATA to conveniently estimate the marginal effects of my explanatory variables in the logit model, and the marginal effects of the interaction terms for both my OLS and logistic specifications.[4]

5 Results

5.1 OLS Regressions on Contemporaneous Firm Performance

Table 3 presents four OLS specifications where the effects of labour unionisation, growth equity and venture capital on contemporaneous firm performance are presented. The dependent variable in these models is *Tobin's Q*. Models (1) and (3) present the parsimonious specification with typical variables that affect firm value (i.e. age, size and profitability) to mitigate the risks of spurious results. Models (3) and (4) specify industry fixed effects in order to control for possible correlations between the unionisation rate and other unspecified industry factors, as well as the selection biases that may occur due to VC and growth equity funds having preferences for specific industries. Table 4 reports the Pearson correlation matrix for the continuous dependent variables used in the OLS specifications. The variables *size* and *profitability* show some degree of correlation (0.403) due to their shared denominator. Similarly, *capex-to-sales* and *profitability* show a moderate degree of correlation for the same reason. The correlation between *size* and *age* is moderate at 0.384, which reasonably follows from the conception that firms grow in size over time. The other predictor variables do not show much correlation. Consequently, any major concerns with regards to the assumption of multicollinearity in the presented OLS specifications are mitigated.

The models in Table 3 all report a negative effect of *unionisation* on firm performance. The coefficient in model (2) implies that if the unionisation rate increases by 1%, firm performance decreases by 1.5%. Controlling for industry effects decreases the effect of unionisation on firm performance to -0.9% for a similar 1% increase in the unionisation rate. In all four models the unionisation rate is significant at the 1% level. Thus, in absence of growth equity or VC financing the effect of labour unions on contemporaneous firm performance is negative.

[3] Contrary to the method I explicate here, Xing et al. (2017) report the marginal effect of the interaction terms for their probit models, but do not report how they come to these coefficients.

[4] For example, to estimate the marginal effect of unionisation conditional on growth equity being present, I use the following command: *margins, dydx(unionisation) at(growth equity=(0 1))*, which gives me the marginal effect of unionisation when growth equity is absent (= 0) and when growth equity financing is present (= 1).

Table 3: Effects of unionisation, growth equity and venture capital on firm performance

Panel A reports the parameter estimates in the four OLS specifications with the dependent variable *Tobin's Q* as a measure of contemporaneous performance. Model (1) and (3) contain the parsimonious specification that control for *age*, *size* and *profitability*. The full models (2) and (4) specify the additional control variables *leverage*, *dividends-to-equity* and *capex-to-sales*. Model (3) and (4) control for industry fixed effects. All models control for year fixed effects. Panel B reports the marginal effects for the interaction terms. Robust standard errors are reported between brackets.

Panel A: Main OLS models				
Variables	(1)	(2)	(3)	(4)
Unionisation	-1.825^{***}	-1.456^{***}	-1.077^{***}	-0.905^{***}
	(0.071)	(0.070)	(0.147)	(0.144)
Growth equity	0.039	0.048	0.179^{***}	0.173^{***}
	(0.043)	(0.042)	(0.043)	(0.042)
Venture capital	0.698^{***}	0.637^{***}	0.511^{***}	0.480^{***}
	(0.026)	(0.026)	(0.027)	(0.027)
Venture capital $*$ unionisation	-2.323^{***}	-2.126^{***}	-1.550^{***}	-1.580^{***}
	(0.205)	(0.203)	(0.201)	(0.120)
Growth equity $*$ unionisation	0.436^{**}	0.598^{**}	0.191	0.296
	(0.244)	(0.244)	(0.242)	(0.241)
Profitability	-0.123^{***}	-0.131	-0.107^{***}	-0.096^{***}
	(0.010)	(0.010)	(0.010)	(0.011)
Size	-0.062^{***}	-0.039^{***}	-0.022^{***}	-0.003
	(0.006)	(0.006)	(0.006)	(0.006)
Age	-0.002^{***}	-0.003^{***}	-0.002^{***}	-0.002^{***}
	(0.000)	(0.000)	(0.000)	(0.000)
Leverage		-0.958^{***}		-0.892^{***}
		(0.044)		(0.045)
Dividends-to-equity		2.578^{***}		2.381^{***}
		(0.172)		(0.172)
Capex-to-sales		0.017		0.209^{***}
		(0.034)		(0.043)
Intercept	3.021^{***}	3.027^{***}	2.432^{***}	2.296^{***}
	(0.100)	(0.097)	(0.143)	(0.166)
Industry fixed effects	No	No	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
No. of obs.	44722	44722	44722	44722
R^2	0.119	0.137	0.151	0.166
Panel B: Marginal effects for the interaction terms				
Unionisation				
Growth equity = 0	-2.589^{***}	-2.155^{***}	-1.587^{***}	-1.425^{***}
	(0.082)	(0.082)	(0.139)	(0.137)
Growth equity = 1	-2.153^{***}	-1.557^{***}	-1.396^{***}	-1.129^{***}
	(0.244)	(0.245)	(0.269)	(0.269)
Unionisation				
Venture capital = 0	-1.806^{***}	-1.430^{***}	-1.069^{***}	-0.893^{***}
	(0.069)	(0.068)	(0.146)	(0.144)
Venture capital = 1	-4.129^{***}	-3.556^{***}	-2.619^{***}	-2.473^{***}
	(0.196)	(0.195)	(0.205)	(0.203)

Note: $^{*}\ p < 0.1$; $^{**}\ p < 0.05$; $^{***}\ p < 0.01$

In all four models the coefficient for *growth equity* is positive, though, it is only significant in models (3) and (4) after controlling for industry fixed effects. This implies that *within* industries the presence of growth equity financing is associated with higher levels of firm performance. This relationship cannot be found to hold *between* industries. That is, for any given industry the presence of growth equity financing cannot be associated with higher levels of firm performance. In other words, since there are differences between industries in terms of performance, the relationship between growth equity and firm performance is positive and significant after controlling for such performance disparities. Besides, untabulated tests[5] confirm that indeed there are differences between industries in terms of performance, and that within industries there are performance differences for firms with and without growth equity financing. This is consistent with the findings from Table 2 which show that growth equity is present in very specific industries; moreover, it confirms the suspicion for a possible selection bias to skew the reported results for the models that do not account for industry fixed effects.

In all four specifications the coefficient for *venture capital* is positive and significant at the 1% level, implying that for firms where the unionisation rate is zero, the presence of venture financing is positive for firm performance consistent within and between industries. The interaction effect for venture capital and unionisation is negative and significant at the 1% level in all four models. As presented in Panel B of Table 3, the marginal effects for unionisation when VC backing is both absent and present are all negative and significant at the 1% level. Even after controlling for industry fixed effects in models (3) and (4), the negative marginal effect of unionisation more than doubles when VCs are present (Panel B). For example, in the full specification in model (4), the marginal effect of unionisation changes from -0.893 to -2.473 when a VC finances a firm with labour unions. Therefore, the marginal effect of unionisation (i.e. a small change of unionisation of approximately 1) when no VCs are present is -0.893. Similarly, when both VCs and labour unions are present, the marginal effect of unionisation is -2.473. These results are consistent with the notion that venture capitalists and labour unions as stakeholders are not independent, but interact with one another in a 'stakeholder society' (Tirole, 2001). since VCs and labour unions have opposing interests as a stakeholder of the firm, the marginal effect of unionisation conditional on VC financing being present is understandably more negative when both stakeholders are present compared to when VCs are absent.

The interaction term *growth equity* $*$ *unionisation* is positive in all four models and significant at 5% for models (1) and (2). After controlling for industry fixed effects, the interaction term remains positive but turns insignificant in models (3) and (4). The marginal effects for the interaction term *growth equity* $*$ *unionisation* are reported in Panel B. the coefficients for the marginal effects of this interaction term are negative and significant at the 1% level. Interestingly, for all four models, the marginal effect of unionisation conditional

[5]I run the regressions (1) - (4) using the *statsby* command in STATA, which shows that there are meaningful performance differences between industries, and that only within certain industries the increased performance for growth equity financed firms holds.

on growth equity being absent is more negative compared to when growth equity financing is present. After controlling for industry fixed effects, the increment in the marginal effect of unionisation from growth equity being absent to being present is relatively small. For example, for model (4), when growth equity financing is absent and unionisation increases by approximately one unit, the marginal effect is -1.425. When growth equity and labour unions are both present, the marginal effect of an increase in unionisation by one unit conditional on growth equity being present is -1.129. These findings suggest that while the coefficient in the main model is negative, the presence of both growth equity investors and labour unions is not detrimental for firm performance. Moreover, the results imply that unions experience less intense stakeholder interaction with growth equity investors compared to VC investors.

Table 4: Pearson correlation matrix with continuous dependent variables of the OLS specifications

This table reports the Pearson correlations of the main explanatory variable *unionisation* and the continuous control variables used in the OLS models (1) to (4).

Variables	**Union-isation**	**Profit-ability**	**Size**	**Age**	**Leverage**	**Capex-to-sales**	**Dividends-to-equity**
Unionisation	1.000						
Profitability	0.074*	1.000					
Size	0.093*	0.403*	1.000				
Age	0.155*	0.122*	0.384*	1.000			
Leverage	0.235*	0.064*	0.247*	0.143*	1.000		
Capex-to-sales	0.034*	-0.415*	-0.166*	-0.111*	0.099*	1.000	
Dividends-to-equity	0.008	0.022*	0.101*	0.113*	0.038*	-0.004	1.000

Note: * $p < 0.01$

5.2 Logistic Regressions on Firm Mortality

Table 5 reports the results of the logistic regressions with the the dependent variable *firm mortality*. Both models specify a similar set of control variables that are directly related to firm mortality. Both models control for year fixed effects. Model (2) also controls for industry fixed effects. Table 6 reports the Pearson correlation matrix for the continuous dependent variables used in the logistic specifications. The correlation between *size* and *age* is moderate at 0.384, which again follows from the conception that firms grow in size over time. The correlation between *Z-score* and *size* is moderate at 0.400 and implies that larger firms experience less bankruptcy risk. Overall the concerns with regards to multicollinearity are mitigated.

The sign of the coefficient of *unionisation* changes from positive to negative when I control for industry fixed effects. This implies that the effect of increased labour unionisation is positive for the firm survival rate within

Table 5: Effects of unionisation, growth equity and venture capital on firm mortality

Panel A reports the parameter estimates for the logistic specifications with the dependent variable *firm mortality* as a measure of firm performance. The dependent variable takes on the value of one if a company suffers an involuntary death, and zero otherwise. Both models specify a similar set of control variables that are directly related to firm mortality. Both models control for year fixed effects. Model (2) additionally controls for industry fixed effects. Panel B reports the marginal effects for the interaction terms. Robust standard errors are reported between brackets.

Panel A: Main logistic models with marginal effects				
Variables	(1)	Marginal effects	(2)	Marginal effects
Unionisation	0.765^{***}	0.094^{***}	-0.854^{***}	-0.145^{***}
	(0.148)	(0.021)	(0.281)	(0.037)
Growth equity	-0.319^{***}	-0.020^{**}	-0.364^{***}	-0.031^{***}
	(0.089)	(0.009)	(0.087)	(0.008)
Venture capital	-0.427^{***}	-0.068^{***}	-0.261^{***}	-0.044^{***}
	(0.037)	(0.004)	(0.040)	(0.004)
Venture capital $*$ unionisation	-0.631^{**}	below	-0.788^{**}	below
	(0.338)		(0.371)	
Growth equity $*$ unionisation	1.937^{***}	below	1.420^{**}	below
	(0.558)		(0.594)	
Size	-0.333^{***}	-0.049^{***}	-0.442^{***}	-0.061^{***}
	(0.010)	(0.001)	(0.011)	(0.001)
Age	-0.011^{***}	-0.002^{***}	-0.014^{***}	-0.002^{***}
	(0.001)	(0.000)	(0.001)	(0.000)
Market-to-book	-0.034^{***}	-0.005^{***}	-0.028^{***}	-0.004^{***}
	(0.002)	(0.000)	(0.003)	(0.000)
Z-score	-0.059^{***}	-0.009^{***}	-0.071^{***}	-0.010^{***}
	(0.005)	(0.001)	(0.005)	(0.001)
Leverage	1.860^{***}	0.271^{***}	1.959^{***}	0.270^{***}
	(0.062)	(0.009)	(0.067)	(0.009)
Intercept	0.612^{***}		0.849^{***}	
	(0.149)		(0.186)	
Industry fixed effects	No	No	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
No. of obs.	44722	44722	44479	44479
Pseudo-R^2	0.158		0.203	
Panel B: Marginal effects for the interaction terms				
Unionisation				
Growth equity = 0		0.083^{***}		-0.153^{***}
		(0.021)		(0.037)
Growth equity = 1		0.342^{***}		0.040
		(0.073)		(0.080)
Unionisation				
Venture capital = 0		0.130^{***}		-0.115^{***}
		(0.022)		(0.040)
Venture capital = 1		0.025		-0.202^{***}
		(0.040)		(0.050)

Note: $^{*}\,p < 0.1$; $^{**}\,p < 0.05$; $^{***}\,p < 0.01$

Table 6: Pearson correlation matrix with continuous dependent variables of the logistic specifications

This table reports the Pearson correlations of the main explanatory variable *unionisation* and the continuous control variables used in the logistic models.

Variables	**Unionisation**	**Size**	**Age**	**Leverage**	**Z-Score**	**Market-to-book**
Unionisation	1.000					
Size	0.093*	1.000				
Age	0.155*	0.384*	1.000			
Leverage	0.235*	0.247*	0.143*	1.000		
Z-score	0.131*	0.400*	0.200*	-0.073*	1.000	
Market-to-book	-0.090*	-0.024*	-0.054*	-0.084*	0.049*	1.000

Note: * $p < 0.01$

industries. Specifically, the marginal effect coefficient in model (2) of -0.145 implies that firms which experience an increase in unionisation of 10% decrease their chance of experiencing an involuntary death by 1.45%.

For growth equity backing the coefficient is negative and significant at 1% in both models. That is, growth equity financing leads to a lower chance of involuntary firm mortality. This is persistent with the notion that growth equity is positive for firm performance. For the variable *venture capital* the coefficient is negative and significant at 1% in both models. The interpretation is analogous to that of growth equity and consistent with the notion that firms which are backed by VCs experience positive firm performance. The effects of growth and venture financing on long-term firm performance are similar to those found for contemporaneous firm performance.

The interaction term *venture capital* $*$ *unionisation* is negative and significant at 5% in both models. The marginal effects of the interaction term in model (2) are both negative and significant at the 1% level (Panel B). In the second model the marginal effect of unionisation when VCs are absent is -0.115, compared to -0.202 when both labour unions and VCs are present. This implies that when both VCs and unions are present this has a positive effect on firm survival.

The interaction term *growth equity* $*$ *unionisation* is positive and significant in model (1) and (2). The marginal effects of model (1) are positive and significant at the 1% level. When growth equity is absent, the marginal effect of unionisation is 0.083. When both growth equity and labour unions are present, the marginal effect increases to 0.342, implying that the presence of both growth equity and unions increases the chance of an involuntary firm death. After controlling for industry fixed effects in model (2), the coefficient for the interaction term is positive and significant at 5%, but the marginal effect of unionisation conditional on growth equity financing being present is insignificant.

The control variables *size*, *age* and *Z-score* are all negative and significant at the 1% level. This is consistent with the notion that larger and older firms that are less exposed to bankruptcy risks are more likely to survive in the long run. The control variable *market-to-book* is also negative and significant at 1% implying that growing firms are more likely to survive. The coefficient for *leverage* is positive and significant at 1% which implies that firms that take on more debt are more likely to experience an involuntary death. The coefficients for these control variables are in line with those reported by Bhattacharya et al. (2015) and Xing et al. (2017).

6 Additional Tests

This section explores possible biases and tests for robustness of the main results. First, I test for selection biases by constructing variables for firms in the technology industry and firms in the health services industry. Second, I test the robustness of the results by exploring corporate governance as a separate factor.

6.1 Selection Biases

One of the concerns that may skew the analysis for the OLS and logistic regressions is that labour unions, growth equity and venture capital select firms based on specific characteristics. That is, the choices by labour unions, VCs and growth equity funds to become a stakeholder of the firm are unlikely to be random assignments. Rather, VCs select firms in new markets with innovative products and prefer flexible labour markets (Bozkaya & Kerr, 2014); growth equity funds select firms with products that have proven unit economics and operate in more mature industries (Xiao, 2013); and labour unions are known to organise at highly profitable and fast growing firms that pay higher wages (DiNardo & Lee, 2004).

6.1.1 Venture Capital in the Technology Industry

Since VCs prefer to invest in the technology industry (Bertoni et al., 2011) I construct the indicator variable *tech* that has the value of one if the firm is part of the technology industry. The firms part of the technology industry are categorised in the SIC sub-categories of computer hardware, communications equipment, electronics, navigation equipment, measuring and controlling devices, medical devices, telephone equipment, communications services and software.[6]

Table 7 presents the results for the OLS and logit models with the main variables *unionisation*, *venture capital* and the indicator variable *tech*. For the OLS model I use the full specification controlling for industry fixed effects similar to model (4) in Table 3. The interpretation for the main variables *unionisation* and *venture*

[6]The corresponding 4-digit SIC codes are: 3571, 3572, 3575, 3577, 3578, 3661, 3663, 3669, 3671, 3672, 3674, 3675, 3677, 3678, 3679, 3823, 3825, 3826, 3827, 3829, 3841, 3845, 4812, 4813, 4899, 7371, 7372, 7373, 7374, 7375, 7378, 7379.

capital in the OLS model is analogous to that of the main OLS models in Table 3. The interaction term *venture capital* $*$ *unionisation* is still negative, however, specifies only the companies that are not part of the technology industry. The interaction term *tech* $*$ *unionisation* is positive and significant at 1%, consistent with the premise that labour unions select highly profitable and fast growing firms.

In the logit model presented in Table 7, the coefficient of *unionisation* is still negative and significant at 1%, supporting the premise that unionisation can be associated with higher chances of firm survival. The coefficient for venture capital is negative and significant at 1% which implies that VCs are good for firm survival. Interestingly, the coefficient of the interaction term *venture capital* $*$ *unionisation* in the logit model is now positive, implying that for firms outside of the tech industry the interaction between labour unions and VCs increases the chance of an involuntary firm death. This result is consistent with the findings for the models that use contemporaneous firm performance as the dependent variable, and contrary to the findings for the interaction term in the logistic models in Table 5. The three-way interaction term coefficient in the logit model is negative and significant at 1%. This suggests that the interaction between labour unions and VCs in the tech industry can be associated with positive firm performance. Arguably, this result can be attributed to the underlying quality of these tech firms.

6.1.2 Growth Equity in the Health Services Industry

Following the descriptive analysis of the sample in Table 2, growth equity funds prefer to invest in the health services industry. Accordingly, I construct the indicator variable *health* that has the value of one if the relevant firm is categorised in the health services industry. The firms part of the health services industry are categorised in the following SIC sub-categories: offices and clinics of health practitioners, nursing and personal care, hospitals, medical and dental laboratories, home health care services, and health services not elsewhere classified.[7]

Table 8 reports the results for the OLS and logit models with the main variables *unionisation*, *venture capital*, *growth equity* and the additional indicator variable *health*. For both the OLS and the logit model I use unreported control variables that are similar to those used in Table 7. The interpretation for the main variables is analogous to those found in the main results. In the OLS model the interaction terms largely become insignificant after directly controlling for the health services industry; this may be due to a strong correlation between the health services industry and the interaction term *growth equity* $*$ *unionisation*. In other words, this is an indication that these factors largely control for the same effect.

Still, the results presented in the logistic specification are generally significant and carry the expected sign. Specifically for the interaction term of interest, *growth equity* $*$ *unionisation*, the coefficient in the logit model

[7]The corresponding 4-digit SIC codes are: 8031, 8041, 8042, 8043, 8049, 8051, 8052, 8059, 8062, 8063, 8069, 8071, 8072, 8082, 8092, 8093, 8099.

Table 7: Effects of unionisation and venture capital for the technology industry

Table 7 presents results for the main variables *unionisation*, *venture capital* and *tech*. The indicator variable *tech* takes on the value of one if the firm is part of the technology industry. For the OLS model the dependent variable is *Tobin's Q*, with a set of control variables analogous to model (4) in Table 3. For the logistic model the dependent variable is *firm mortality*, with a set of control variables similar to the models presented in Table 5. Both models control for year fixed effects and industry fixed effects. Robust standard errors are reported between brackets.

Variables	OLS Model: Tobin's Q	Logistic Model: Firm Mortality
Unionisation	-1.763^{***}	-1.182^{***}
	(0.141)	(0.325)
Venture capital	0.602^{***}	-0.485^{***}
	(0.036)	(0.055)
Venture capital $*$ unionisation	-2.239^{***}	1.136^{**}
	(0.242)	(0.471)
Tech	-0.075^{*}	-0.180^{***}
	(0.040)	(0.061)
Tech $*$ unionisation	3.208^{***}	1.881^{***}
	(0.357)	(0.532)
Tech $*$ venture capital	-0.241^{***}	0.538^{***}
	(0.055)	(0.079)
Tech $*$ venture capital $*$ unionisation	0.327^{***}	-5.401^{***}
	(0.489)	(0.806)
Size	-0.001	-0.447^{***}
	(0.006)	(0.011)
Age	-0.002^{***}	-0.014^{***}
	(0.000)	(0.001)
Profitability	-0.095^{***}	
	(0.011)	
Dividends-to-equity	2.372^{***}	
	(0.172)	
Capex-to-Sales	0.181^{***}	
	(0.044)	
Leverage	-0.887^{***}	1.962^{***}
	(0.045)	(0.067)
Market-to-book		-0.028^{***}
		(0.003)
Z-score		-0.072^{***}
		(0.005)
Intercept	2.588^{***}	0.908^{***}
	(0.161)	(0.187)
Industry fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
No. of obs.	44722	44722
(Pseudo-)R^2	0.168	0.204

Note: $^{*}\,p < 0.1$; $^{**}\,p < 0.05$; $^{***}\,p < 0.01$

reduces to 1.145 (compared to 1.420 in the main model in Table 5), and is significant at the 10% level.

I also check the results in the logit model by specifying several other indicator variables that encompass the

industries preferred by growth equity investors.[8] I find that the coefficient for the interaction term remains positive in these unreported logit models too. As an additional test I also measure the marginal effects of the interaction term (i.e. the effect of unionisation conditional on growth equity financing) for each of the CIC industries growth equity financing is present in, but do not find any industries to particularly skew the results.[9] In sum, the results in the OLS model point towards a high correlation between the industry fixed effects and the interaction term, whereas the result for the logit model largely sustains main findings.

Table 8: Effects of unionisation and growth equity for the health services industry

Table 8 presents the results for the main variables *unionisation*, *venture capital*, *growth equity* and *health*. The indicator variable *health* takes on the value of one if the relevant firm is categorised in the health services industry, and zero otherwise. For the OLS model the dependent variable is *Tobin's Q* and for the logistic model the dependent variable is *firm mortality*. Both models use a set of unreported control variables similar to those explicated in Table 7. Both models control for year fixed effects and industry fixed effects. Robust standard errors are reported between brackets.

Variables	OLS Model: Tobin's Q	Logistic Model: Firm mortality
Unionisation	-0.925^{***}	-0.825^{***}
	(0.145)	(0.283)
Venture capital	0.480^{***}	-0.264^{***}
	(0.027)	(0.040)
Venture capital $*$ unionisation	-1.573	-0.801^{**}
	(0.200)	(0.372)
Growth equity	0.165^{***}	-0.153^{**}
	(0.046)	(0.087)
Growth equity $*$ unionisation	0.225	1.145^{*}
	(0.246)	(0.589)
Health	0.181	0.675^{***}
	(0.170)	(0.357)
Health $*$ unionisation	0.908	-4.948^{**}
	(1.084)	(2.337)
Health $*$ growth equity	-0.033	-2.428^{**}
	(0.169)	(0.494)
Health $*$ growth equity $*$ unionisation	1.437	11.476^{**}
	(0.159)	(4.655)
Intercept	2.304^{***}	2.588^{***}
	(0.166)	(0.161)
Industry fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
No. of obs.	44722	44479
(Pseudo-)R^2	0.166	0.204

Note: $^{*}\ p < 0.1$; $^{**}\ p < 0.05$; $^{***}\ p < 0.01$

[8] These indicator variables are based on (combinations of the) industry preferences that emerge from Table 2 for growth equity investors.

[9] I measure the marginal effect of unionisation conditional on growth equity financing for each industry in STATA using the *margins, dydx(unionisation) at(growth equity=(0 1) at industry(μ_i))* command, where μ_i represents each CIC industry category.

6.2 Corporate Governance as a Determinant of Firm Performance

This section explores the possibility of corporate governance as a factor that may confound the main results. That is, growth and venture funds may prefer firms with weak corporate governance since they want to exert power as a stakeholder of the firm. Moreover, the effect of corporate governance on the performance of the firm is a matter of much study and debate (e.g. Bebchuk, Cohen, & Ferrell, 2009; Gompers, Ishii, & Metrick, 2003). Gompers, Ishii, and Metrick (2010) present results on the relationship between dual class shares and firm value. They define dual class companies as firms with two stock classes: an inferior publicly traded class with one vote per share, and a superior privately traded class with multiple voting rights per share. Dual class companies essentially embody an extreme form of corporate governance due to the protection from hostile takeovers. In addition, dual class firms are relevant to this analysis since inefficiencies on the managerial level increase as dispersion between voting rights and cash flow rights increases (Masulis, Wang, & Xie, 2012). Therefore, corporate governance may confound the results of the main models presented in Table 3 and Table 5 since growth and venture funds may purposefully select firms with relatively weak corporate governance. In addition, the results may be confounded because corporate governance is identified as a factor that affects firm performance. For this purpose, I define the indicator variable *dual class* that has the value of one if the firm has a dual share class structure. I collect data on the dual class share structure from Ritter's sample of North-American IPOs.

Table 9 reports the results for the OLS and logistic regressions with the additional factor *dual class*. Both models use unreported control variables similar to those in Table 7. The results for the OLS regression remain largely the same as those reported for the main OLS regressions in Table 3. The presented results for the logistic regression also abide to the main results reported in Table 5. I thus conclude that corporate governance as a factor is unlikely to have significant effects on firm performance in the scope of this analysis. It is also unlikely that growth and venture funds use (weak) corporate governance as a main selection criterion.

7 Discussion

This section places the findings previously discussed in light of the relevant literature and the posed hypotheses. First, with regards to the relation between labour unions and firm performance, I hypothesized that firms with (strong) labour unions experience negative post-issue performance (H1). For contemporaneous firm performance I find that the effect of unionisation is negative and significant, consistent with the findings by Chen et al. (2011) and Lee and Mas (2012). Still, for the long-run measure of firm performance (*firm mortality*) the results suggest that unions are good for firm survival. I test this result for possible biases by controlling for the fact that unions may use corporate governance as a selection criterion (Table 9), but I do not find any evidence for this. Similarly, labour unions may also select firms based on their inherent quality in terms of growth and profitability (DiNardo

Table 9: Effects of unionisation, growth equity and venture capital for dual class firms

Table 9 presents the results for the main variables *unionisation*, *growth equity* and *venture capital*. The indicator variable *dual class* takes on the value of one if the firm has a dual class share structure. For the OLS model the dependent variable is *Tobin's Q*. For the logistic model the dependent variable is *firm mortality*. Both models use unreported control variables analogous to those reported in Table 7. Both models control for year fixed effects and industry fixed effects. Robust standard errors are reported between brackets.

Variables	OLS Model: Tobin's Q	Logistic Model: Firm Mortality
Unionisation	-0.902^{***}	-0.873^{***}
	(0.144)	(0.281)
Growth equity	0.173^{***}	-0.364^{***}
	(0.042)	(0.087)
Venture capital	0.481^{***}	-0.262^{***}
	(0.027)	(0.040)
Venture capital $*$ unionisation	-1.582^{***}	-0.782^{**}
	(0.200)	(0.371)
Growth equity $*$ unionisation	0.311	1.363^{**}
	(0.241)	(0.593)
Dual class	0.043^{***}	-0.225^{***}
	(0.027)	(0.060)
Intercept	2.302^{***}	0.841^{***}
	(0.166)	(0.186)
Industry fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
No. of obs.	44722	44479
(Pseudo-)R^2	0.166	0.203

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$

& Lee, 2004). Still, the test that includes the technology industry as a separate factor does not change the the notion that labour unions are apparently good for firm survival (Table 8). It must be considered that the two measures of performance may at least in part capture different things: where *Tobin's Q* is a point measure of firm value, involuntary *firm mortality* essentially aggregates the effects of labour unions and private capital financing to some future event. Accordingly, I assert that (strong) labour unions are bad for contemporaneous firm performance and crudely accept the first hypothesis. Still, it remains unsettled as to why labour unions are apparently good for firm survival, although this may be explained by their inherent preference for high quality companies. Also, it should be considered that the findings for labour unions in the main models may be biased: measuring unionisation at the industry level may capture industry-level factors that affect firm performance, rather than the sole effect of unionisation.

Second, with respect to the relation between VC backing and performance, I hypothesized that firms with venture capital financing experience positive post-issue firm performance (H2). In both the OLS and the logistic specifications the effect of venture capital financing on firm performance is positive and significant, confirming the findings in the literature that venture capital is generally positive for financial performance

(Brav & Gompers, 1997; Puri & Zarutskie, 2012). Accordingly, I accept the second hypothesis.

Third, with respect to the relation between growth equity and performance, I hypothesized that firms with growth equity financing experience positive post-issue firm performance (H3). For the effect of growth equity financing on contemporaneous firm performance (*Tobin's Q*) I find that the effect of growth equity is positive and significant after controlling for industry fixed effects. That is, the notion that growth equity financing can be associated with better firm performance holds *within* industries, but not for any given industry. In the logistic models with *firm mortality* as a measure of firm performance, I find that the effect of growth equity is positive and significant for firm survival. Still the concern remains that growth equity financing is not a random assignment but a specific choice by the investment company; in that case the models would suffer from a selection bias. Even though the descriptive analysis in Table 2 shows that growth equity funds tend towards the health services industry, the additional tests did not elucidate any sign reversal for growth equity investments in the health services industry, nor did any of the main industry categories show major divergences in the marginal effect of growth equity financing on firm performance. Therefore, the finding by Ritter (2015) that growth equity investments result in positive post-IPO performance is sustained; I accept the third hypothesis.

Fourth, I hypothesized that firms which experience a (strong) degree of unionisation and have venture capital financing experience negative post-issue firm performance (H4). In all the OLS specifications the interaction effect *venture capital* $*$ *unionisation* is negative and significant, consistent with the notion that venture capitalists and labour unions as stakeholders are not independent, have opposing interests, and interact with one another in a 'stakeholder society' (Tirole, 2001). In the models that use *firm mortality* as a measure of firm performance, the interaction term has a negative effect on involuntary mortality, and thus a positive effect on long-run firm performance. This result is contrary to the findings for contemporaneous firm performance. This conflicting result may be due to a selection bias caused by venture capital funds and labour unions. I test for this selection bias by interacting the unionisation and VC variables with the indicator variable *tech*. I find that for firms outside the tech industry, the interaction term *venture capital* $*$ *unionisation* has a negative effect on both performance measures, which points towards the existence of a selection bias skewing the results in the main models. Still, after controlling for this selection bias, the premise that the interaction term *venture capital* $*$ *unionisation* is negative for firm performance is sustained. This result is in line with the findings of Xing et al. (2017). I accept the fourth hypothesis by virtue of these results.

Fifth, I hypothesized that firms which experience a (strong) degree of unionisation and have growth equity financing experience negative post-issue firm performance (H5). In the logistic models with *firm mortality* as the dependent variable, the effect of the interaction between growth equity and labour unions is negative for long-run firm performance. Contrarily, in the OLS models with *Tobin's Q* as the dependent variable, the effect on firm performance is positive, though insignificant after controlling for industry fixed effects. Moreover,

the significant negative marginal effect of unionisation on firm performance is moderated when growth equity financing is present in all OLS specifications (Table 3 Panel B). These results imply that the presence of both labour unions and growth equity is not detrimental for firm performance. Furthermore, these findings support the notion that growth equity funds generally invest with non-controlling stakes without the intention to exert decisive control (Ritter, 2015). That is, the stakeholder interaction between labour unions and growth equity is arguably mitigated. They thus appear to operate relatively independently as stakeholders of the firm. It is plausible that the presence of both stakeholders can thus be interpreted as a summation of their effects, compared to the 'clash' that VCs and labour unions experience. The premise that a growth equity stakeholder cannot exit its investment early because it invests in more mature companies (Xiao, 2013) is therefore outweighed by the effect of its non-controlling stake. Nevertheless, the additional tests suggest that the results in the main models may be biased due to the industry fixed effects largely controlling for the same effect as the *growth equity* $*$ *unionisation* interaction term. Due to the equivocal findings and the possibility of biases skewing the results, I reject the fifth hypothesis.

8 Conclusion

This paper researches the effect of labour unions on firm performance, and how venture capital and growth equity shareholders moderate this relationship. This paper specifically extends the current body of research on stakeholder interaction by exploring growth equity financing as a determinant of (long-run) firm performance, and how growth equity moderates the effect of labour unions.

For a sample of 5205 North-American IPOs from 1983 to 2019, the main findings of this study can be summarised as follows. In line with several prior studies I find that labour unionisation is bad for contemporaneous firm performance (e.g. Chen et al., 2011; Lee & Mas, 2012), and find that venture capital financing can be associated with better performance (Brav & Gompers, 1997; Puri & Zarutskie, 2012). Moreover, this research appends the work of Ritter (2015), and presents growth equity financing as a positive determinant of firm performance using *Tobin's Q* and *firm mortality*, whereas Ritter (2015) used BHAR as a measure of performance. In line with the findings of Xing et al. (2017) the results in this paper show that the interaction between labour unions and venture capital funds as stakeholders of the firm leads to negative post-issue performance. This substantiates the notion that venture capitalists and labour unions are powerful actors in a 'stakeholder society' with opposing interests that clash (Tirole, 2001). The effects of their presence is not a mere summation, but the interaction between them is asserted as an additional determinant of firm performance.

Consequently, this paper researches whether the interaction between a growth equity shareholder and a labour union can also be established as a separate determinant of performance. For the interaction between

growth equity and labour unions the results imply that while the presence of a growth equity shareholder is positive for performance, and labour unions are negative for performance, these stakeholders do not 'clash', as suggested for unions and VCs. That is, the results show that the negative effect of unionisation on performance is mitigated by the presence of growth equity financing. This can arguably be attributed to the fact that growth equity funds often invest with non-controlling stakes, and do not have the intention per say to assert decisive power (Ritter, 2015). Accordingly, the fact that growth equity funds cannot exit their investment early due to the maturity of their investment is not a determining factor. Because the interaction between growth equity and labour unions is not established as a separate determining factor for performance, it remains unclear exactly why VCs invest in firms with (strong) labour unions. Therefore, it is suggested to further explore the interaction between labour unions and other financial stakeholders. For example, the interaction between labour unions and leveraged buyout funds could be explored in order to understand whether indeed VCs make investments in unionised firms due to the possibility of an early exit.

The presented research is limited in several ways too. The negative effect of unionisation on contemporaneous performance reverses when I use firm mortality as the dependent variable. This may be due to the fact that *Tobin's Q* and *firm mortality* capture different things. For example, since labour unions are apparently good for firm survival, the notion that labour unions select high quality firms (DiNardo & Lee, 2004) possibly outweighs the negative effects on financial performance. Therefore, it is suggested to research what effects these performance measures exactly capture, thereby clarifying the interpretation of the results presented here. Furthermore, for the interaction between VCs and labour unions I find a selection bias to skew the results in the logistic model (i.e. the results for the technology industry are distinct from other industries). Such a bias has not been unequivocally pinpointed for the interaction between growth equity and labour unions. While the results become largely insignificant for the OLS regressions after separately controlling for the health services industry, this did not happen in the logistic model. Still, there is some indication that industry level factors largely control for the same effect as the posed interaction between growth equity and labour unions. Lastly, since this paper uses an industry-level measure of unionisation, the reported effects of unionisation may capture industry factors rather than the effect of firm-level unionisation. Therefore, it is suggested to explore industry level factors that affect firm performance in the context of this study. For example, the effect of the industry life-cycle has previously been asserted as a determinant of firm performance (e.g. Kukalis, 2010) that could bias the results in the current framework.

References

Acharya, V. V., Baghai, R. P., & Subramanian, K. V. (2013). Labor laws and innovation. *The Journal of Law and Economics*, *56*(4), 997–1037.

Addison, J. T. (2005). The determinants of firm performance: unions, works councils, and employee involvement/high-performance work practices. *Scottish Journal of Political Economy*, *52*(3), 406–450.

Aidt, T., & Tzannatos, Z. (2002). *Unions and collective bargaining: Economic effects in a global environment*. The World Bank.

Altman, E. I. (1968). Financial ratios, discriminant analysis and the prediction of corporate bankruptcy. *The Journal of Finance*, *23*(4), 589–609.

Amit, R., Brander, J., & Zott, C. (1998). Why do venture capital firms exist? theory and canadian evidence. *Journal of Business Venturing*, *13*(6), 441–466.

Banerjee, S., Dasgupta, S., & Kim, Y. (2008). Buyer–supplier relationships and the stakeholder theory of capital structure. *The Journal of Finance*, *63*(5), 2507–2552.

Basker, E. (2007). The causes and consequences of wal-mart's growth. *Journal of Economic Perspectives*, *21*(3), 177–198.

Bebchuk, L., Cohen, A., & Ferrell, A. (2009). What matters in corporate governance? *The Review of Financial Studies*, *22*(2), 783–827.

Behrens, M., Hamann, K., & Hurd, R. W. (2004). Conceptualizing labour union revitalization.

Bertoni, F., Colombo, M. G., & Grilli, L. (2011). Venture capital financing and the growth of high-tech start-ups: Disentangling treatment from selection effects. *Research Policy*, *40*(7), 1028–1043.

Bhattacharya, U., Borisov, A., & Yu, X. (2015). Firm mortality and natal financial care. *Journal of Financial and Quantitative Analysis*, 61–88.

Bozkaya, A., & Kerr, W. R. (2014). Labor regulations and european venture capital. *Journal of Economics & Management Strategy*, *23*(4), 776–810.

Bradley, D., Kim, I., & Tian, X. (2017). Do unions affect innovation? *Management Science*, *63*(7), 2251–2271.

Brav, A., & Gompers, P. A. (1997). Myth or reality? the long-run underperformance of initial public offerings: Evidence from venture and nonventure capital-backed companies. *The Journal of Finance*, *52*(5), 1791–1821.

Calmfors, L., & Driffill, J. (1988). Bargaining structure, corporatism and macroeconomic performance. *Economic policy*, *3*(6), 13–61.

Celikyurt, U., Sevilir, M., & Shivdasani, A. (2014). Venture capitalists on boards of mature public firms. *The Review of Financial Studies*, *27*(1), 56–101.

Chava, S., Danis, A., & Hsu, A. (2017). The impact of right-to-work laws on worker wages: evidence from collective bargaining agreements. *Georgia Tech Scheller College of Business*, *18*(1), 1–70.

Chen, H. J., Kacperczyk, M., & Ortiz-Molina, H. (2011). Labor unions, operating flexibility, and the cost of equity. *Journal of Financial and Quantitative Analysis*, *46*(1), 25–58.

Chen, H. J., Kacperczyk, M., & Ortiz-Molina, H. (2012). Do nonfinancial stakeholders affect the pricing of risky debt? evidence from unionized workers. *Review of Finance*, *16*(2), 347–383.

Connolly, R. A., Hirsch, B. T., & Hirschey, M. (1986). Union rent seeking, intangible capital, and market value of the firm. *The Review of Economics and Statistics*, 567–577.

Da Rin, M., Hellmann, T., & Puri, M. (2013). A survey of venture capital research. In *Handbook of the economics of finance* (Vol. 2, pp. 573–648). Elsevier.

DiNardo, J., & Lee, D. S. (2004). Economic impacts of new unionization on private sector employers: 1984–2001. *The Quarterly Journal of Economics*, *119*(4), 1383–1441.

Fee, C. E., & Thomas, S. (2004). Sources of gains in horizontal mergers: evidence from customer, supplier, and rival firms. *Journal of Financial Economics*, *74*(3), 423–460.

Francis, J., Schipper, K., & Vincent, L. (2005). Earnings and dividend informativeness when cash flow rights are separated from voting rights. *Journal of Accounting and Economics*, *39*(2), 329–360.

Franks, J., Harris, R., & Titman, S. (1991). The postmerger share-price performance of acquiring firms. *Journal of Financial Economics*, *29*(1), 81–96.

Franzese, R. J., & Hall, P. A. (2000). Institutional dimensions of coordinating wage bargaining and monetary policy. *Unions, employers, and central banks: Macroeconomic coordination and institutional change in social market economies*, 173–204.

Freeman, R. B., & Kleiner, M. M. (1999). Do unions make enterprises insolvent? *ILR Review*, *52*(4), 510–527.

Freeman, R. B., & Medoff, J. L. (1984). What do unions do. *Indus. & Lab. Rel. Rev.*, *38*, 244.

Fulghieri, P., & Sevilir, M. (2009). Organization and financing of innovation, and the choice between corporate and independent venture capital. *Journal of Financial and Quantitative Analysis*, 1291–1321.

Galindo, M. Á., & Méndez, M. T. (2014). Entrepreneurship, economic growth, and innovation: Are feedback effects at work? *Journal of Business Research*, *67*(5), 825–829.

Ginglinger, E., Megginson, W., & Waxin, T. (2011). Employee ownership, board representation, and corporate financial policies. *Journal of Corporate Finance*, *17*(4), 868–887.

Goldman, E., Rocholl, J., & So, J. (2009). Do politically connected boards affect firm value? *The Review of Financial Studies*, *22*(6), 2331–2360.

Gompers, P. A. (1995). Optimal investment, monitoring, and the staging of venture capital. *The Journal of Finance*, *50*(5), 1461–1489.

Gompers, P. A., Ishii, J., & Metrick, A. (2003). Corporate governance and equity prices. *The Quarterly Journal of Economics*, *118*(1), 107–156.

Gompers, P. A., Ishii, J., & Metrick, A. (2010). Extreme governance: An analysis of dual-class firms in the united states. *The Review of Financial Studies*, *23*(3), 1051–1088.

Grout, P. A. (1984). Investment and wages in the absence of binding contracts: A nash bargaining approach. *Econometrica: Journal of the Econometric Society*, 449–460.

Hall, P. A., & Soskice, D. (2001). An introduction to varieties of capitalism. *op. cit*, 21–27.

Hellmann, T., & Puri, M. (2000). The interaction between product market and financing strategy: The role of venture capital. *The Review of Financial Studies*, *13*(4), 959–984.

Hellmann, T., & Puri, M. (2002). Venture capital and the professionalization of start-up firms: Empirical evidence. *The Journal of Finance*, *57*(1), 169–197.

Hirsch, B. T. (2004). What do unions do for economic performance? *Journal of Labor Research*, *25*(3), 415–455.

Hsu, D. H. (2004). What do entrepreneurs pay for venture capital affiliation? *The Journal of Finance*, *59*(4), 1805–1844.

Jain, B. A., & Kini, O. (1995). Venture capitalist participation and the post-issue operating performance of ipo firms. *Managerial and Decision Economics*, *16*(6), 593–606.

Kortum, S., & Lerner, J. (2000). Assessing the contribution of venture capital to innovation. *RAND Journal of Economics*, 674–692.

Krishnan, C., Ivanov, V. I., Masulis, R. W., & Singh, A. K. (2011). Venture capital reputation, post-ipo performance, and corporate governance. *Journal of Financial and Quantitative Analysis*, 1295–1333.

Kukalis, S. (2010). Agglomeration economies and firm performance: the case of industry clusters. *Journal of Management*, *36*(2), 453–481.

Lang, L. H., & Stulz, R. M. (1994). Tobin's q, corporate diversification, and firm performance. *Journal of Political Economy*, *102*(6), 1248–1280.

Lee, D. S., & Mas, A. (2012). Long-run impacts of unions on firms: New evidence from financial markets, 1961–1999. *The Quarterly Journal of Economics*, *127*(1), 333–378.

Masulis, R. W., Wang, C., & Xie, F. (2012). Globalizing the boardroom—the effects of foreign directors on corporate governance and firm performance. *Journal of Accounting and Economics*, *53*(3), 527–554.

Metcalf, D. (2002). *Unions and productivity, financial performance and investment: international evidence* (No. 539). Centre for Economic Performance, London School of Economics and Political Science.

NVCA. (2020). *National venture capital association 2020 yearbook.* Retrieved from `https://nvca.org/research/nvca-yearbook/` (Accessed: June 22, 2020)

Puri, M., & Zarutskie, R. (2012). On the life cycle dynamics of venture-capital-and non-venture-capital-financed firms. *The Journal of Finance*, *67*(6), 2247–2293.

Queen, M., & Roll, R. (1987). Firm mortality: Using market indicators to predict survival. *Financial Analysts Journal*, *43*(3), 9–26.

Ritter, J. R. (2011). Equilibrium in the initial public offerings market. *Annu. Rev. Financ. Econ.*, *3*(1), 347–374.

Ritter, J. R. (2015). Growth capital-backed ipos. *Financial Review*, *50*(4), 481–515.

Robb, A., Ballou, J., DesRoches, D., Potter, F., Zhao, Z., & Reedy, E. (2009). An overview of the kauffman firm survey: Results from the 2004-2007 data. *Available at SSRN 1392292*.

Sufi, A. (2009). Bank lines of credit in corporate finance: An empirical analysis. *The Review of Financial Studies*, *22*(3), 1057–1088.

Thompson, C. B. (1916). Relation of scientific management to labor. *The Quarterly Journal of Economics*, *30*(2), 311–351.

Tirole, J. (2001). Corporate governance. , *69*(1), 1–35.

U.S. Bureau of Labor Statistics. (2020). *Union members summary.* Retrieved from `https://www.bls.gov/news.release/union2.nr0.htm` (Accessed: July 12, 2020)

Van der Ploeg, F. (1987). Trade unions, investment, and employment: a non-cooperative approach. *European Economic Review*, *31*(7), 1465–1492.

Venero Capital Advisors. (2018). *Understanding the difference between growth equity and venture capital.* Retrieved from `https://pulse.venerocapital.com/understanding-the-difference-between-growth-equity-and-venture-capital-a4a6adc22902` (Accessed: July 24, 2020)

Visser, J. (2006). Union membership statistics in 24 countries. *Monthly Lab. Rev.*, *129*, 38.

Wang, C. K., Wang, K., & Lu, Q. (2003). Effects of venture capitalists' participation in listed companies. *Journal of Banking & Finance*, *27*(10), 2015–2034.

Williams, R. (2012). Using the margins command to estimate and interpret adjusted predictions and marginal effects. *The Stata Journal*, *12*(2), 308–331.

Xiao, L. (2013). *From growth equity to leveraged buyout: making private equity investments in china* (Unpublished doctoral dissertation). Massachusetts Institute of Technology.

Xing, X., Howe, J. S., Anderson, R. I., & Yan, S. (2017). Labor rights, venture capital, and firm performance. *Financial Management*, *46*(1), 129–154.

9 Appendix

9.1 Appendix 1

This appendix specifies the main steps taken to reconcile the CIC industry across the 1983-2019 period. The CIC codes and industry classifications are identical for the 1983 to 1991 period. The CIC codes and industry classifications are identical for the 1992 to 2002 period. To reconcile the 1983-1991 period with 1992-2002 period, I match them using the crosswalk table; the following changes appear for the 1983-2002 period:

Panel A: Newly Added Industry Categories (CIC) from 2002 onwards	
CIC Category	CIC Code
Apparel and accessory stores, except shoe	623
Radio, TV, and computer stores	663
Miscellaneous entertainment and recreation services	810
Family child care homes	863
Labor Unions	873
Miscellaneous professional and related services	893
Panel B: Removed Industry Categories (CIC) from 2002 onwards	
CIC Category	CIC Code
Horticultural services	21
Not specified professional equipment	382
Not specified electrical and hardware products	522
Commercial research, development, and testing labs	730

Panel C: Changed Mapping for 1991-2001 and 2002 onwards		
CIC Category	CIC Code	1991-2001 CIC Code
Electric light and power	450	460
Gas and steam supply systems	451	461
Electric and gas, and other combinations	452	462

The mapping from 2002 to 2008 is identical. From 2008 to 2009 one CIC Category: 'internet publishing and broadcasting' changes its CIC code from 6675 to 6672. The mapping for 2009 and 2010 is equal to that of 2011 to 2019 except that in 2011 four CIC industry categories are removed:

Removed Industry Categories (CIC) from 2011 onwards	
CIC Category	CIC Code
Not specified type of mining	480
Not specified machinery manufacturing	3290
Internet service providers	6692
Footwear and leather goods repair	8890