

The Contracting and Valuation of Venture Capital-Backed Companies *

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March 21, 2022

Abstract

Fast-growing innovative companies—startups—operate unlike other businesses and raise money in similarly distinctive ways. Eschewing traditional banks and equity markets, they turn to a startup financing ecosystem that includes corporate and institutional VC funds, crowdfunding, angel investors, growth equity, and private equity. We start by discussing key relevant stylized facts and how they lead to contracting frictions. We then discuss the various investment contracts used by startups and their associated cash flow and control rights. Given that startups almost invariably raise multiple rounds of funding, we then discuss contracting issues associated with the evolution of cash flow and control rights. We finally discuss approaches to valuing startups, their financial securities, and the impact of contractual terms on valuation.

*We would like to thank many researchers and industry practitioners for their valuable input. Gornall thanks the SSHRC for its support. Strebulaev thanks the Venture Capital Initiative at the Stanford Graduate School of Business. Gornall: will.gornall@sauder.ubc.ca; Strebulaev: istrebulaev@stanford.edu.

1 Introduction

Venture capital (VC) is a high-touch form of financing used primarily by high-growth, innovative, and risky companies. VC funds invest in these companies on behalf of limited partners, who are mostly large institutional investors. The venture capitalists who manage these funds provide not only financing to companies, but also non-financial support such as mentorship, strategic guidance, and network access. While most VC-funded companies fail, some become runaway successes. The seven largest US companies by market capitalization as of the end of December 2021 (Apple, Microsoft, Amazon, Alphabet (Google), Meta (Facebook), Tesla, and Nvidia) received most of their early external financing from venture capitalists. As Gornall and Strebulaev (2021a) show, venture capital-backed companies accounted for 41% of total US market capitalization and 62% of US public companies' R&D spending as of 2020. Among public companies founded within the last fifty years, VC-backed companies account for half in number, three quarters by value, and more than 92% of R&D spending and patent value. Indeed, the US VC industry is in no small way responsible for the rise of hundreds of new large companies over the life of most recent generations.

Young, innovative companies are unlike most other businesses. Perhaps most importantly, while their investment needs are front-loaded, their cash flows are typically far in the future and uncertain, with success coming from a new product or service that has not yet been rolled out or created. These special circumstances raise numerous economic and business issues and necessitate special forms of financing and particular relationships with financiers. They make it difficult for these companies to access capital through traditional means, such as traditional bank and receivables financing or public equity markets, and cause them to turn to a startup financing ecosystem that includes not just institutional VC funds but also crowdfunding, angel investors, corporate VC, growth equity, and private equity.¹

Startups often write complicated financial contracts tailored to their specific needs. Indeed, existing empirical and theoretical research emphasizes the centrality of contractual terms in evaluating the relationships between institutional VCs and their portfolio companies (Kaplan and Strömberg 2003,

¹We use the term “institutional VC” to distinguish traditional VCs that take money from institutional investors from corporate VCs, captive VC funds run by family offices, and other VC-like intermediaries. Institutional VCs are also sometimes called financial VCs in the industry.

2004). The complex nature of contracts and the economic uncertainty these companies face also require the reassessment of the applicability of and modifications to standard financial valuation methods. In this chapter, we analyze the economic foundations of the contractual relationships between innovative companies and their financiers as well as the valuation of such companies and the financial securities that they issue. We aim to detail the economic nature of contracts used in practice in the US and to relate the existing contractual relationships to the mainstream contract theory. While we concentrate on the recent US landscape, our analysis could also be applied to a broader international context, with some necessary modifications.

A note on interpretation before we proceed. For expositional simplicity, we talk in this chapter about “startups.” We use this term to refer to the young and innovative companies that use contractual arrangements similar to those of typical companies financed by VC funds or companies whose aim is to raise proper VC financing in the future. For example, we include large but private VC-backed companies under this umbrella.

The chapter proceeds as follows. In Section 2 we provide an overview of key stylized facts about startups and how they lead to contracting frictions. In Section 3, we discuss the various investment contracts used by startups and their associated cash flow rights. In Section 4, we extend that discussion to control rights, and in Section 5, we extend it to multiple rounds of financing. In Section 6, we discuss valuation. Finally, in Section 7, we conclude.

2 Contracting Between Startups and Their Investors

By their very nature, startups face many challenges in interacting with investors. In this section, we show that modern economic theories of contracting are ideally suited to understanding both these challenges and how startups and investors respond to them. Principal-agent problems, contractual incompleteness, information asymmetry, insufficient collateral, the inalienability of human capital, and other core contracting frictions bind especially tightly for startups. The startup financing ecosystem,

including not just investment managers but also lawyers and limited partners, has evolved to allocate capital to promising innovative ventures despite these many frictions.

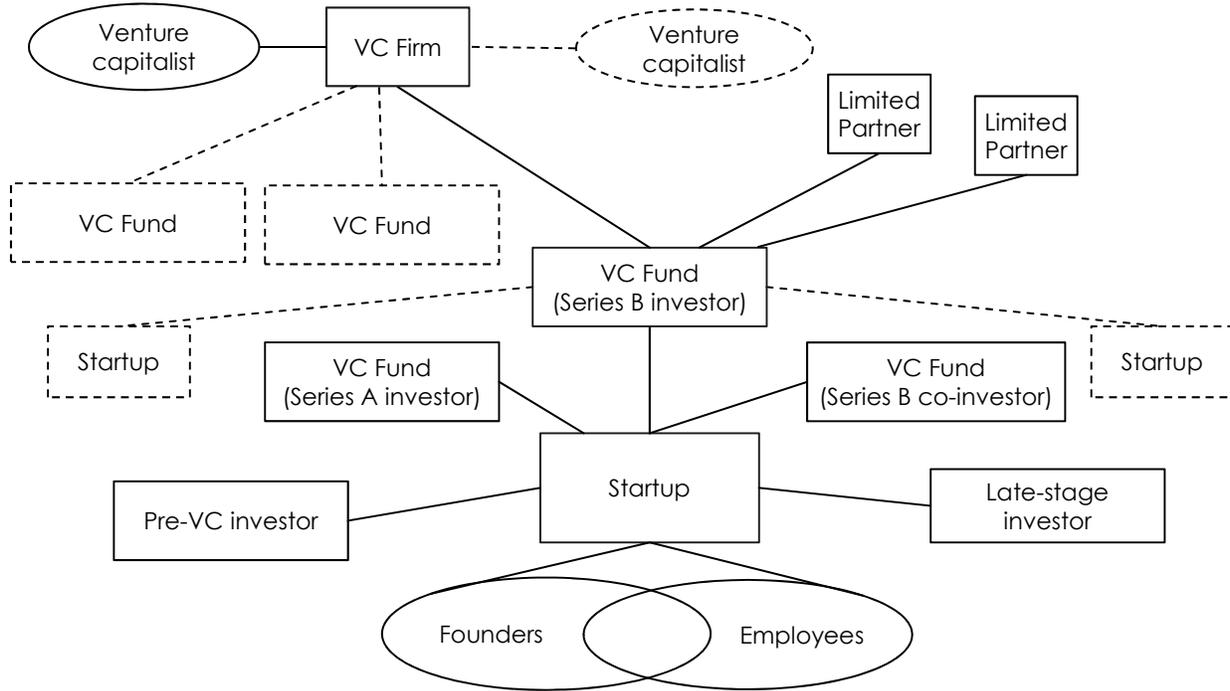
Startups operate within the nexus of complex sets of relationships between many interested parties. Figure 1 shows schematically some of these relationships between company founders and companies, companies and investors, companies and employees, different sets of investors of the same company, and investors and their own investors. All these relationships are interlinked and operate both within the formal contractual relationships as well as informal arrangements based on trust and reputation. Many players in these relationships wear several hats at the same time. For example, a company founder is often both a major common shareholder and a corporate executive, while a VC investor can be a startup board member bound to maximize corporate value, a representative of a VC fund that owns preferred shares in that company on behalf of the fund's investors, and an individual with her own incentives. The player's incentives are never perfectly aligned and the responsibilities of these roles can come into conflict: for example, a potential merger might hurt founders by undervaluing the company while allowing for an early payoff that helps with the venture capitalist's career (Gompers 1995). Although this chapter's remit is to concentrate on a particular set of contractual relationships, that between companies and their investor, it is important to emphasize that these contracts do not and cannot exist in isolation from a broader set of relationships.

2.1 The life cycle of a VC-backed company

A startup's story starts with one or more passionate entrepreneurs. That individual or team develops an initial idea into a business that may one day become a very large company. Even the best innovative ideas are rarely profitable from day one, which means the startup will need external financing. This financing takes several forms, from an initial investment of the founders' own money and energy, to money raised externally, to perhaps an initial public offering (IPO).

Of course, many if not most companies fail on this journey. We use Facebook's financing path to illustrate companies' evolution and the associated financing contracts. There are no hard rules here, with companies raising money in numerous ways, and here we only attempt to lay out the common

Figure 1: Relationships between players in the VC ecosystem: This figure schematically illustrates the key relationships between players in the VC ecosystem. Lines indicate direct relationships, dotted lines indicate relationships tangential to the startup at the bottom-center (for example, a VC investor’s other portfolio companies).



pattern. We approach classifying startup life cycle stages through the lenses of financing; another useful approach could be to delineate stages based on the company’s operational development (Metrick and Yasuda 2010).

2.1.1 Self-funding

In a company’s earliest stage, the founding team develops an idea for a service or a product that they would like to develop and test. This stage may involve product development, market research, building a management team, developing a business plan, and testing the product on a small group of customers.

At this point, the founding team often works for free and usually puts their money into the startup. Family and friends may also contribute. Contracting is generally relatively informal here, with personal relationships helping to deal with the contractual frictions we will later discuss.

In our Facebook example, Mark Zuckerberg, Dustin Moskovitz, Chris Hughes, and Eduardo Saverin all invested time, money, and energy into Facebook's development.² They received common equity - the most basic form of ownership. (We discuss the structure of these and the later-mentioned securities in Section 3.)

2.1.2 Pre-VC financing

A fast-growing company will quickly outstrip the financial capacity of its founders. Although the company may still be small in absolute terms and have large gaps in its organizational structure and capabilities, it may still require hundreds of thousands of dollars or even millions of dollars to develop initial prototypes or provide proof of concept.

Companies have a variety of options to fill this financing gap. Angel investors, who are often wealthy individuals investing their own money in arms-length startups, are a common option. Facebook chose this option and raised its first external financing from a consortium of angel investors led by Peter Thiel in the form of a \$500,000 convertible note with a \$5 million valuation cap.³ Such notes are a common form of angel financing and combine downside protection with upside potential, with similar Simple Agreement for Future Equity (SAFE) securities often used at this stage in recent years. Financing rounds may also involve common equity issuance or the same securities that VCs receive.

Beyond angel investors, there are several other sources of financing at this stage. Business incubators and startup accelerators often provide a small seed investment along with various types of mentorship and other services. Government grants, such as the Small Business Innovation Research program, are often available and are especially important outside of the United States. Product crowdfunding

²See, for example, <https://fortune.com/2011/01/11/timeline-where-facebook-got-its-funding/>.

³<https://www.forbes.com/forbes/2011/0214/features-peter-thiel-social-media-life-after-facebook.html?sh=c245616275d1>.

platforms such as Kickstarter allow startups to presell a product, while equity crowdfunding platforms such as Wefunder or StartEngine allow founders to sell equity to a diverse group of retail investors in a similar manner to an angel round.

Although Facebook raised part of its startup capital from a VC fund, traditional VC funds are less likely to engage at this stage because the scale of investment is too small. Some VC funds do invest at this early stage, potentially to secure access to the company at a later stage of development. More recently, some VC funds focus on this stage, in the form of so-called institutional micro-VC funds.

2.1.3 Early-stage venture capital

A company's Series A round is generally its first VC financing (sometimes the first round is also called Series Seed). This money helps companies continue to grow quickly—developing a product and finding an appropriate market fit, expanding their teams, particularly to include marketing and sales executives, testing their business model, and attracting initial customers.

Facebook's Series A came from venture capital firm Accel Partners, which agreed to invest \$12.7 million out of its VC fund Accel IX at a reported post-money valuation of \$98 million.⁴ This deal came in the form of convertible preferred equity, a type of security that gives investors similar rights to common equity but with additional downside protection and other beneficial provisions.

Many, if not most, innovative companies fail to raise venture capital financing, due to the extreme selectivity of venture capitalists who on average review approximately a hundred investments for every deal they make (Gompers, Gornall, Kaplan, and Strebulaev 2020). Still other companies bypass venture capital money altogether, such as Qualcomm that managed to bootstrap its way into being a major public company. However, the overwhelming majority of successful innovative companies need new funding to finance the next growth stage. While recently, some early-stage companies raised funding from angel investors and others who are associated more with the seed stage, the traditional route is by raising the first round of institutional VC funding. In a successful scenario, pre-VC

⁴See Section 3.1.1 for discussion of this valuation measure. Information on this round and later rounds of Facebook is from Pitchbook.

financing, such as the one accommodated by angel investors, is typically followed by a VC financing round.

As the company continues to mature, its financing needs continue to grow. A Series A financing round is often followed by other venture capital rounds, such as a Series B round in Facebook's case led by another well-known VC firm, Greylock Partners.

2.1.4 Late-stage venture capital

As a company's growth continues, it expands its offerings. Revenue may grow strongly at this time, although many companies still do not show a profit. Companies continue raising VC funding that is used towards building a larger management team, marketing, expanding in their original markets, development of new products, or modification of the existing ones.

While venture capitalists continue to invest at this stage, the company's growth and increased professionalism lead to a larger pool of potential investors. Large corporations, often through their corporate venture capital arms, start to become more active, often investing alongside institutional VC firms. For example, Microsoft invested \$240 million in Facebook's Series C round.

As the company matures further, other investors come into play. For example, a year and a half before its IPO, Facebook raised a \$1.5 billion growth capital round from DST Global, Goldman Sachs, and Goldman Sachs's clients. The expansion in private capital markets has recently led to an explosion of growth equity and private equity funds investing in the asset class (Ewens and Farre-Mensa 2020). Mutual funds have taken on hundreds of direct investments in late-stage VC-backed companies (Chernenko, Lerner, and Zeng (2021), Imbierowicz and Rauch (2020)). Direct investments by large institutional investors, such as the Saudi Arabian Public Investment Fund's \$5 billion investment in Uber, have also become more regular.

Recently, more innovations are taking place in the late-stage funding market, especially for companies that are perceived as very successful. Under a generic rubric of "pre-IPO" markets, these include com-

panies auctioning their common shares to a wider group of investors and the appearance of secondary markets.

2.1.5 Exit

The VC financing model is built around portfolio company liquidity events, with successful companies going public or being sold. As startup investors, including VC funds, typically sell their stake in the startup at or soon after a liquidity event, they consider such events as exits. Facebook's well-known IPO at a valuation of \$81 billion was one of the most successful VC exits ever. Although only a small fraction of VC-backed companies ever become publicly listed, the majority of investor returns and runaway successes in the VC industry come from these companies. In addition to IPOs, companies can go public via direct listings (such as Spotify) or a reverse merger (such as 23andMe's purchase by a blank-check special purpose acquisition company).

Many successful companies are sold, generally to strategic buyers. The sale can take place at any stage of development. At the seed stage, an acquirer may be interested in hiring a management team (the so-called "acquihire"); at a later stage, an established public company may seek to acquire a successful innovative company. From an investor's perspective, a sale could be successful (the investor generates a profit on its original investment) or unsuccessful. Indeed, a large fraction of sales of VC-backed companies are essentially disguised failures.

Failure followed by liquidation is a common outcome because high-growth innovation is inherently risky and uncertain. These failures occur at each stage of development. While earlier stages are more uncertain and lead to more failed outcomes, there are a fair number of companies that failed to demonstrate their potential at the late stage as well.

2.2 Challenging Features of VC Startups

Raising money can be challenging even for mature public companies. High growth, innovative startups face additional hurdles. Most of these are well covered by classic models of contract theory. In this

section, we discuss several characteristics of VC-backed companies that are worth noting to understand the contractual arrangements.

2.2.1 Nature of the Cash Flows

Uncertain outcomes. As Table 1 shows, startups are, above all, about high uncertainty.⁵ A large fraction of VC-backed companies ultimately fail with little or no return to their investors, while a small number are runaway successes. These outliers effectively determine the return of the investor portfolio. All the parties in the VC world thus face extreme uncertainty of outcomes. This uncertainty extends to the cash flows on any single venture and the cash flows of the industry as a whole (Korteweg and Sorensen (2010), Kisseleva, Mjøs, and Robinson (2020)).

Table 1: Startup outcome frequencies: This table presents some evidence on the frequency of startup outcomes.

		IPO	M&A	Failure
Gompers et al. (2020)	Survey	15%	53%	32%
	Venture Source	13%	43%	44%
Puri and Zarutskie (2012)		16%	34%	40%
Ewens and Marx (2018)		6%	41%	28%
Wang et al. (2021)		3%	16%	81%

Scarce initial cash flows. Early-stage VC-backed companies, as a rule, are not profitable and many do not even have revenue. Even in the case of success, their profits are typically not sufficient to cover the investment amounts they received as private companies. For example, the year before its IPO and

⁵The composition of Table 1 reflects both the multitude of VC data sources and the challenges of their interpretation. Gompers et al. (2020) report recent evidence on startup outcomes from the survey of over 800 VCs in 2016-2017, as well as historical data provided by VentureSource, one of the main longitudinal VC data sources available. Puri and Zarutskie (2012) use VentureSource, VentureXpert, and Longitudinal Business Database data for firms that receive their first rounds of VC financing between 1981 and 2005. Ewens and Marx (2018) use VentureSource data on firms founded from 1995 to 2008. Wang, Pahnke, and McDonald (2021) report the data on VC-backed companies provided in Crunchbase, a popular open-source database of entrepreneurial companies. Importantly, while some merger and acquisition (M&A) outcomes are successful, many are not and would have been classified as failures using better data.

a decade after its founding, the electric car maker Rivian invested almost \$1 billion into its business in addition to a \$1 billion loss on its core operations. The value of innovative startups does not come from their short-term profitability. Instead, it lies in the expectation of cash flows in the sometimes distant future. Consequently, investors generate returns by selling their stake in the company rather than by getting access to the company's current assets or cash flows. The scarcity of contemporaneous cash flows makes the requirements of traditional debt instruments, such as maintaining an earnings before interest, taxes, depreciation, and amortization (EBITDA) to asset ratio above a minimum threshold, a nonviable option for VC-backed companies.

Insufficient collateral. High-growth innovative companies develop new products or services, often in novel industries. Most VC-backed companies are in the technology-related sectors. As a result, VC-backed companies tend to be collateral-poor, which effectively prevents them from using many traditional financing avenues, such as bank debt financing. Some of these companies, especially in the healthcare sector, do own intellectual property, but the values of their patents are often speculative and either difficult to establish and verify or not worth much in case of the company failure.

2.2.2 Nature of the Information

Double-sided information asymmetry. Entrepreneurs and managers know more about the project than investors. That is particularly salient in our setting because a large share of information about the business and product is soft and non-verifiable (Amit, Brander, and Zott 1998). Although a company's growth and professionalization reduce information asymmetry, it continues to hold to some degree at all stages of the VC-backed company's life cycle, even for the presumably better-informed investors who are also board members. At the same time, investors are more knowledgeable about the market conditions, the funding environment, and the preferences of prospective investors. Given that VC-backed companies continuously raise funding and the company values greatly depends on the market and funding conditions, investors have an upper hand on relevant non-company-specific information. The resulting double-sided information asymmetry plays a vital role in the dynamics of contractual negotiations.

Differences in opinion. The high degree of uncertainty is often complemented by differences in opinion. This can be reflected in disagreements on the startup's potential, with founding teams often being excessively optimistic, or about the direction that the startup should undertake. The most contentious disagreements are often about the suitability of the founders as corporate leaders, with VCs frequently seeking to replace them with professional managers.

Difficulty in acquiring information. Risky innovative projects are by their nature difficult to evaluate. This raises challenges at many layers, from evaluating startups to reporting unrealized investment performance. A particular challenge this creates is that existing investors are more knowledgeable about the company than prospective investors, which can lead to a holdup scenario, in which existing investors attempt to invest in follow-on rounds at unfair terms to founders or employees.

Contractual incompleteness. VC-backed companies present the case of ultimate contractual incompleteness. They face immense uncertainty and a changing environment that necessitates continuous changes to business and financial strategies. Even describing all such eventualities in a contract is inconceivable. As a result, just dividing future cash flow rights is not sufficient: instead, contracts in VC-backed companies prescribe, in greater detail, a corporate governance structure that is often contingent on future outcomes.

2.2.3 Moral Hazard

Double-sided moral hazard. The incentives of startup founders frequently conflict with those of investors. Founders may enjoy private benefits of control and be subject to the typical host of managerial incentive problems such as shirking or diversion (Kaplan and Stromberg 2001). Beyond these frictions, founder and investor risk exposures are fundamentally different, with investors enjoying diversified portfolios and founders typically having most of their wealth locked into the startup. The financial and non-financial incentives that founders and other employees face play a leading role in contracting and outcomes. Because investor-value add is important, investors, in turn, face their own

set of incentive issues regarding effort provision. Different contractual payoffs may further drive a wedge between founder and investor incentives. Differences between investors and managers often showcase most strongly in decisions on raising additional funding and a company exit. For example, some VC investors may face a strong incentive to take a portfolio company public to cement their reputation and raise follow-on VC funds (Gompers 1995).

Inalienable human capital. Founder quality plays a critical role in the success or failure of VC-backed companies, with VC investors reporting that it is the most important factor in their investment decisions as well as in the outcome of their investments (Kaplan, Sensoy, and Strömberg (2009), Gompers et al. (2020)). Founder departures due to disagreements with investors or other founders lead to the failure of many fledgling startups. Insights from the contracting literature that has been developed on the assumption of inalienability of human capital (Hart and Moore (1994), Bolton, Wang, and Yang (2019)) are therefore very useful for analyzing the contracting arrangements of VC-backed companies.

Multi-layer agency problems. In the entrepreneur-investor relationship, investors act as principals. However, investors representing institutional venture capital or private equity funds (general partners of these funds) act on behalf of their investors, known as limited partners. In the general partner-limited partner (GP-LP) relationship, general partners themselves are agents and LPs are their principals. The agency issues in the GP-LP relationship often reverberate into the company-investor relationship. For example, GPs of VC firms that are in the process of raising a new fund are less likely to write their investments off.

Many principals and conflicts among them. Mainstream contract theory assumes a principal-agent scenario with either one principal or many principals with aligned preferences. However, the nature of fundraising by VC-backed companies naturally leads to a situation where there are many distinct investors (principals) with occasionally divergent interests. The multitude of investors can lead both to horizontal and vertical problems. At a horizontal level, several investors often form a syndicate

at each VC financing round. Members of a syndicate may have divergent interests leading to frictions (Nanda and Rhodes-Kropf 2019). Vertically, investors in early rounds of funding may have entered at much lower share prices than the later round investors did and may face different incentives on whether the company should be sold or go public. Or an investor with another very successful company in her portfolio may exhibit different risk attitudes than an investor with a portfolio of mediocre investments. Thus, entrepreneur-investor conflicts that economic studies of optimal contracts concentrate upon need to be supplemented by the study of investor-investor conflicts. Bartlett (2006) provided the first in-depth analysis of such conflicts within a legal framework.

2.2.4 Ecosystem Structure

Matching frictions. The importance of VC-value add as well as the diversity of expertise, beliefs, and connections imply startup-investor fit has significant importance. These inherent features lend both sides bargaining power in negotiating agreements. While early-stage startups generally struggle to raise money, successful startups at a later stage may have much more bargaining power (Gompers et al. 2020). Regions with relatively more VC and related capital supply, such as the California Silicon Valley, have contracts that are more tilted toward founders, while areas with relatively less investor capital, such as many emerging markets, have contracts tilted toward investors.

Varying market conditions. The VC capital market is marked by feasts and famines, with VC fundraising often precipitously declining during crises (e.g., in 2001 and 2009) and, conversely, often doubling during booms. The availability of capital shifts bargaining power and leads to significant shifts in both contractual arrangements and total fundraising. Funding downturns are marked by intense competition among startups vying for investors, while booms are marked by “money chasing deals,” where investors vie for access to companies perceived to be poised for success.

Illiquidity. VC-backed companies are private entities, and investor ownership positions are subject to substantial illiquidity. This illiquidity, present in all closely held companies, is exacerbated in

VC-backed companies due to a high degree of asymmetric information. More recently, VC-backed companies have tended to stay private for longer and in response, the secondary market for trading their shares has been steadily growing. Yet, this secondary market is in its relatively nascent form, and fundamental economic factors may prevent it from developing fully. For most VC investors, the only viable option of exit is when the company is sold or goes public.

2.3 Process of contracting in VC-backed companies

While public equity issuance is broadly standardized, startup equity issuances are highly bespoke. Under the Anglo-Saxon legal system, parties to a contract are free to innovate and modify a contract to suit their specific needs within a wide spectrum of possible options. Startups and VCs take full advantage of such flexibility and consequently negotiation over contractual arrangements is an important part of VC fundraising.⁶ Although there are several common contract templates,⁷ in practice contracts vary widely from one instance to another not just in terms of superficial structure but also in the underlying economics. These are the fruit of intense negotiations, bargaining power and knowledge of all the parties, and time constraints.

Investors negotiate sophisticated contract terms, including cash flow, control, and voting rights. Kaplan and Strömberg (2003, 2004) describe many of these terms and examine the determinants of the contractual provisions in VC contracts. Gompers et al. (2020); Gompers, Gornall, Kaplan, and Strebulaev (2021) show that VCs consider investor-friendly contractual features, such as pro-rata rights and liquidation preference, of the utmost importance in the negotiation process.

Financing rounds commonly involve many investors investing together as part of a syndicate. Generally, one of these syndicate members is a lead investor and is responsible for setting terms and taking an ongoing active governance role. Importantly, there are often investors on both sides of the negotiating table—with any new investment diluting the claims of previous investors. In fact, existing owners

⁶As Kaplan, Martel, and Strömberg (2007) show, experienced VCs across countries appear to use US-style contracts. Bottazzi, Da Rin, and Hellmann (2009) argue legal protections lead to both non-contractible support of startups and contracted downside protections.

⁷See, for example, the National Venture Capital Association model legal documents available at <https://nvca.org/model-legal-documents/>. Some law firms have their own standardized templates.

frequently increase their stake as part of a financing round, meaning they are simultaneously adding to their stake and diluting it. This helps mitigate some of the information conflicts inherent in fundraising.

It is common for one of the parties to offer a term sheet that summarizes the proposed terms of investment. The term sheet could be offered both by a company and by an investor. For many seed-stage companies, the companies led by founders offer the proposed terms to prospective investors, such as angels. When companies raise institutional VC funding, it is more common for the lead VC investor to propose a term sheet. In either case, the offer of a term sheet is an invitation to the negotiating table rather than a legally binding commitment of financing. Although some term sheet provisions are binding, these provisions cover the process of negotiations (for example, preventing the company from signing multiple term sheets with different investors) or information non-disclosure of the proposed deal terms. The provisions of the term sheet covering the terms of the investment are usually not legally binding. In seed and early-stage financings, the due diligence process is often largely concluded before the term sheet signing. In late-stage financings, comprehensive due diligence is often initiated after the signing of the term sheet.

Term sheets differ on the completeness of the terms they cover. Negotiations often concentrate on a small number of contractual provisions perceived as important by contractual parties. Negotiating parties also need to take into account that other parties may have a veto over the contract in some circumstances. For example, some existing investors may not participate explicitly in the negotiating process over the new financing round, but their existing contractual rights include the veto power allowing them to prevent a financing from taking place unless specific conditions are met. If negotiations succeed and the deal is implemented, a comprehensive set of legally binding documents is signed. In a typical VC financing, these documents almost always include the stock purchase agreement, the voting rights agreement, the investor rights agreement, etc. It is also common for specific investors to negotiate a side letter, giving them additional protections. Seed stage financings often use a simpler structure with only one signed contractual document, whether a convertible note or a SAFE.

The entire process leads to substantial cross-sectional variation in contracts at all stages of the company life cycle. Financial securities issued by different companies, whether convertible preferred stocks or convertible notes, vary widely from one company to another across a wide spectrum of contractual provisions, both in cash flow and control rights. Financial securities issued by the same company in different financing rounds may also vary substantially. To provide but just one example, Uber Technologies gave its Series C preferred investors dramatically fewer governance rights than its Series B preferred investors (among other provisions, just one-tenth the voting power of what Series B received), while at the same time increasing their ownership rights by offering them 1.25 times their money back in the event of a sale.

2.4 Economic features of VC contracting

In this section, we briefly discuss several important common economic features of financial securities issued by VC-backed companies.

Separation of cash flow and control rights. As the Uber case illustrates, control rights and cash flow rights are frequently separate. A powerful founder may raise money using securities that give new investors fewer rights relative to their underlying economic interest, such as Uber's dual-class voting structure introduced for their Series C round. Alternatively, and more commonly, investors may have additional control rights and minority protections, such as Uber's Series A investors having a guaranteed board seat and various protective provisions. Divides between cash flow and control rights can be even more extreme. Minority investors commonly have veto rights over specific decisions and outcomes. In some cases, as was the case with Uber's founders, a single group of minority owners might control the board of directors.

Contingent provisions. Many of the contractual terms of the financial securities issued by VC-backed companies are contingent on a specific event occurring in the future. One common yardstick is the share price of the next funding round relative to the share price of the current funding round. Both

cash flow rights and control rights of existing claim holders may depend on whether the share price in the new round is below the share price of securities issued in previous rounds. For example, ubiquitous “anti-dilution” provisions entitle existing owners to more shares if the price of the new round falls below the price at which they invested. Contingent provisions are also widespread in contracts VC-backed companies sign with founders and employees, often in conjunction with a funding round. For example, a common contingent provision is vesting of the founder and employee shares: if a founder or employee leaves the company within a certain period, she forfeits a portion or the entirety of her shares or stock options.

Multi-stage financing. VC-backed companies are prolific fundraisers. Multiple financing rounds are common both for successful companies on an upward trajectory and for struggling companies that need to secure funding to avoid failure. Many contractual terms, therefore, consider the impact of future financing. Each round of financing leads to a new round of negotiations between the management team, existing investors, and prospective investors. The flexibility of the contractual environment means that each new round is generally associated with a new financing contract, giving new investors different rights compared to those given in any previous financing. Renegotiations of existing contracts take place often, and therefore investors and other contractual parties expect that provisions they negotiated in the past may be renegotiated in the future. The accretion of these bespoke financing contracts leads to complicated financial structures, especially at a later stage. Understandably, existing investors are interested in protecting their rights *ex-ante* in anticipation of future fundraising rounds as well as ensuring their right to co-invest in the future again. Multi-stage financing highlights the importance of dynamic contractual thinking as well as real optionality attitudes on behalf of involved parties. Anti-dilution mentioned above is one such commonly used term. Another one is a protective clause that entitles existing investors to veto any financing that would infringe on some specific rights they are entitled to. For example, an investor class may be able to veto the issuance of any securities that are senior to them in the priority ranking.

Hybrid equity-debt instruments. Common equity and straight debt instruments dominate traditional financial markets, yet are rarely issued to investors in VC-backed companies. Instead, startups issue convertible preferred stock and convertible notes which are hybrid instruments that combine the elements of both equity and debt securities. In particular, like equity, these securities enable investors to benefit from upside realizations of company value, and, like debt, offer investors a degree of downside protection.

Significant minority ownership. VC investors typically aim to be significant minority owners. Unlike private equity funds, they rarely take controlling stakes. Yet unlike the typical mutual fund, they are not content with owning a tiny fraction of any company they invest in. These considerations stem from the double-sided moral hazard problem discussed above: investments are structured to give both founders and investors strong economic incentives. In early financing rounds, investors typically jointly hold minority cash flow rights and voting rights. In response, minority investors tend to negotiate an extensive set of protective provisions that aim to prevent their expropriation. Many of these protective provisions are state-contingent and cover specific decisions. As the company evolves, the accumulated dilution created by repeated minority stakes typically shifts the bulk of both cash flow rights and the majority of control rights to investors. Successive financing rounds dilute the ownership of founders of successful companies from 100% initially to an average of just 12.5% at the time of IPO (Kaplan et al. 2009).

3 Dividing cash flows

In this section, we discuss how financial contracts divide the cash flows of VC-backed companies. We introduce the main types of financial security used by VC-backed companies in their contractual arrangements with investors, founders, and employees. It is important to emphasize that, while for the benefit of exposition we leave the discussion of control rights until the next section, in reality, cash flow provisions and control provisions are closely intertwined and thus any discussion focused solely on cash flow rights, without considering control rights, is necessarily incomplete.

We start with some notation, which we take from Gornall and Strebulaev (2020). Consider a single VC-backed company. The company has raised money over a series of rounds, with the round i investors being issued security Z_i in exchange for an investment of I_i . The company is currently raising round n by issuing security Z_n in exchange for an investment of I_n . After that issuance, the startup may issue more securities (Z_{n+1}, \dots, Z_N) in exchange for additional investment (I_{n+1}, \dots, I_N) . Each issuance impacts the payoff of all existing securities.

At some future date T , after raising N funding rounds, the company will experience a liquidity event, such as an IPO or M&A exit, and all of the company owners will be paid out. The payoff of a security depends not just on its terms and the company exit value X_T , but also on the terms of the other securities outstanding at the exit time. We write the payoff of security i as $\pi_i(X_T, \mathbb{Z}_T)$, where the set of securities outstanding at time t is denoted by $\mathbb{Z}_t = (Z_0, Z_1, \dots, Z_k)$ for the largest k such that $t_k < t$.

While this setup can accommodate any financial contract, Table 2 shows the main financial instruments used in VC-backed companies as well as the qualitative assessment of frequency with which different types of securities are owned by various claim holders. As the table illustrates, there is a clear separation line: in practice, investors rarely own common equity-like securities, while founders and employees tend to have received common shares and related equity-like ownership claims. We now discuss all of these securities in detail.

3.1 Convertible preferred stock

Most venture capital investors receive convertible preferred shares or a variant of these, thus that is where we start our discussion. While the formal name of these securities in financial contracts is usually “preferred stock,” in reality the conversion features they possess are so critical that we will call them convertible preferred stock to emphasize the stylized fact that VC investors rarely receive the traditional preferred stock used by many publicly listed companies.

Table 2: Contract usage: This table provides types of securities typically held by different claim holders in startups. Entries in **bold** are the ones used most often in practice.

	Founders & Employees	Pre-VC Investors	VC Investors	Late-Stage Investors
Common equity	Yes	Sometimes	Rare	Sometimes
Common stock options	Yes	Rare	Rare	Rare
Straight preferred stock	Rare	Rare	Rare	Rare
Convertible preferred stock	Rare	Yes	Yes	Yes
Straight debt	Rare	Rare	Rare	Rare
Convertible notes	Rare	Yes	Sometimes	Sometimes
SAFE	Rare	Yes	Rare	Sometimes
Venture debt	Rare	Rare	Sometimes	Sometimes
Warrants	Rare	Rare	Sometimes	Sometimes

These convertible preferred stocks follow a basic form and are supplemented with frequent adornments. Table 3 shows the frequency of these terms in various samples.⁸ We start by discussing the most important cash flow terms of convertible preferred stock.

3.1.1 Conversion

Investors who own convertible preferred stock have the right to convert their preferred stock into common stock at any time of their choice. This feature is known as optional conversion. As conversion is irreversible (an investor cannot “unconvert” common shares back into preferred shares), in practice, conversion takes place in conjunction with a liquidity event or, sometimes, for strategic considerations. In addition, preferred stock may be forced to convert into common shares under some conditions, such as the company undertaking an IPO. The forced conversion is known as automatic or mandatory conversion.

⁸The data for the NVCA/AUMNI20 entries are taken from version v2.0 of “NEW Enhanced Model Term Sheet” dated July 2020, published by the National Venture Capital Association and Aumni, and available at <https://www.aumni.fund/resources/enhanced-model-term-sheet> (accessed February 1, 2022).

Table 3: Convertible preferred stock terms: This table shows the frequency of contractual cash flow terms in convertible preferred stocks issued by startups. Values are rounded and given in percentages. n.d. means no data. KS2003 is Kaplan and Strömberg (2003), GS2020 is Gornall and Strebulaev (2020), GS2021 is Gornall and Strebulaev (2021b), NVCA/AUMNI20 is a range across funding rounds from the NVCA/AUMNI “NEW Enhanced Model Term Sheet v2.0”.

	KS2003	GS2020	GS2021	NVCA/AUMNI20
Liquidation multiple > 1	71	16	4	1–6
Participation	41	20	28	4–11
Cumulative dividend	44	10	n.d.	n.d.
IPO ratchet	n.d.	17	n.d.	n.d.
Redemption	79	n.d.	n.d.	6–12
Seniority	n.d.	48	32	n.d.
Automatic conversion	95	100	n.d.	n.d.
Automatic conversion exemption	n.d.	68	n.d.	n.d.
Anti-dilution	95	n.d.	n.d.	n.d.

To see how conversion (either optional or mandatory) works mechanically, we introduce two further definitions. We define a fully-diluted basis as the condition that assumes the conversion into common stock of all outstanding securities at the time that are convertible into common stock. A fully-diluted basis assumes that all convertible preferred stock is converted into common stock, and it also assumes that all options and warrants, including the option pool, and which are discussed below, are exercised. We also define post-money valuation (PMV) as the product of that round’s share price (when the security in question is issued) and the company’s total number of shares on a fully-diluted basis, that is the number of common shares assuming the conversion of all outstanding securities convertible into common stock. PMV is a widely used term in the VC industry, and the PMV of a financing round is often equated to the “value” of a company (more on the valuation in Section 6).

Consider a simple example, in which a company raises a single round of convertible preferred stock from a single investor and subsequently has a liquidity event. The investor paid I_1 for a contract Z_1

at some PMV P_1 . At the time of a liquidity event, if the investor converts her preferred stock into common stock, she will get the following payoff:

$$\pi_1(X_T, Z_T) = \omega_1 X_T, \quad (1)$$

where the fraction of the company that investor owns at time T upon conversion is

$$\omega_1 = \frac{I_1}{P_1} \quad (2)$$

and $Z_T = \{Z_0, Z_1\}$, where Z_0 are the common shares owned by founders and employees. Conversion allows the investor to gain from high-value exits. Straight debt without a conversion option is standard for most companies but is challenging for startups because of their high failure probabilities. Because these failures often result in an almost total loss for investors, long-term investments without a conversion option would require exorbitant interest or dividend rates. This explains why non-contingent securities, such as straight debt or vanilla preferred stock, are rarely used by such companies, especially in earlier phases of their life cycle.

This explains the essence of the convertibility option inherent in the securities VC investors receive. As we discuss in Sections 3.4 and 3.5, other securities that investors receive, such as convertible notes and SAFEs, also feature a similar conversion provision.

In addition to optional conversion, most share issues include mandatory conversion terms which can allow a majority of investors to force all investors to convert. These terms arise to prevent a single owner from refusing to convert her shares, which could block or derail a value-creating IPO exit. Such an exit would generally create value but would entail all convertible preferred stock being converted into common stock which could hurt some of the preferred investors. These investors may have an incentive to block that conversion, which could delay or derail the IPO process. This issue is averted using mandatory conversion terms, which allow a majority of other shareholders to force the conversion of any recalcitrant holdouts, subject to some conditions. The conditions often take the form of the minimum share price, company value, or net IPO proceeds. As can be expected, mandatory conversion

reduces the bargaining power and expected payoff of those shareholders who are more likely to be forced to convert against their wishes (most importantly, those who benefit from strong contractual terms or recent investors who may not have met their return targets), and therefore some investors negotiate exceptions to mandatory conversion either based on votes or a class-specific return target. Some mandatory conversion terms are associated with so-called ratchets that guarantee investors a certain minimum return in IPOs. For example, late-stage investors in a well-known VC-backed company Square negotiated the IPO ratchet, which resulted in a wealth transfer from other shareholders to them when the Square IPO was priced below the original share price they paid. We discuss automatic conversion further in Section 4.1.4.

3.1.2 Liquidation preference

A liquidation preference provides investors with downside protection by allowing them to take a fixed payout in lieu of their conversion option. Because automatic conversion forces investors to convert in most IPOs, this term is relevant for exits where the company is liquidated or acquired. The industry standard is a 1x liquidation multiple, which entitles investors to their money back before common shareholders receive anything, while, more generally, an Lx liquidation multiple entitles investors to receive L times their investment back. In practice, L can be above 1 in times when companies struggle to secure funding or in later funding rounds when the company is not doing well; L is almost never below 1.

By making their claims senior to those of common equity, liquidation preference provides convertible preferred stockholders with downside protection in less favorable outcomes. In exits when the investor can choose either to exercise her conversion right or to stick to her liquidation preference, the investor chooses the strategy that maximizes her payoff. To illustrate, consider again the single round example introduced above. If the investor has a liquidation multiple of L_1 , her payoff in an M&A or a liquidation is

$$\pi_1(X_T, Z_T) = \max \left\{ \underbrace{\min \{L_1 I_1, X_T\}}_{\text{Liquidation preference}}, \underbrace{\omega_1 X_T}_{\text{Converted payoff}} \right\}. \quad (3)$$

For sufficiently high exit values, the investor converts. For intermediate exits, the investor waives the conversion option and receives her liquidation preference. For exits below the investor's liquidation preference, the investor receives the entire exit payoff.

There are several economic explanations for the seniority of VC investors over founders. To start with, there are classic stories about why debt-like securities may be preferred to equity-like securities, ranging from asymmetric information (Myers and Majluf 1984) to agency costs (Jensen and Meckling 1976). Giving a guarantee to investors makes the ownership retained by founders more sensitive to their effort and inside information and thus reduces these important frictions.

Furthermore, there are several VC-specific phenomena worth discussing. First, there may be a tax benefit to issuing securities other than common shares. As discussed by Gilson and Schizer (2003), the preferential treatment of capital gains over income may give VC employers an incentive to issue in-the-money stock options to their employees in lieu of cash compensation. Tax regulation attempts to prevent the issuance of such in-the-money options; however, the complexity of the capital structure of VC-backed companies gives them substantial leeway in issuing these options (Gornall and Strebulaev 2021b). Companies may use liquidation multiples and other preferred features that effectively obfuscate their capital structure while enabling this tax-preferred compensation.

Second, the investor may want protection from the different risk preferences and discounting rates of founders. The seniority of investors prevents founders from opting for a quick sale at a price the VC investor may be unhappy with. To illustrate, imagine that the VC invests \$10 million at the PMV of \$40 million for one-quarter of the company on a fully diluted basis, with the remaining three-quarters belonging to the common shareholders. The next day, the founders (who control the company) receive an offer to sell the company for \$8 million. If the investor does not have a liquidation preference, she will get \$2 million in such a sale and the founders will get \$6 million. Although this is a negative expected value trade, impatient or risk-averse founders might choose the potentially life-changing \$6 million and leave the VC with a loss of \$8 million. A liquidation preference prevents this trade and leaves the founders with nothing if the company is sold for less than \$10 million.

Third, the founders may be (or rather, almost certainly are) irrationally optimistic about the startup’s potential.⁹ Contracts where founders bear more of the downside risk emerge naturally from such a difference in beliefs, either genuine or signaled. Moreover, these conversion options may help attenuate a founder’s desire to window-dress between financing stages (Cornelli and Yosha 2003).

Finally, liquidation preferences, along with all terms that benefit the current investor, increase the value of preferred shares and along with them the share price and reported PMV (Gornall and Strebulaev 2021b). This may lead to higher prices paid by investors in these financing rounds, either to play off founder biases, avoid a perception the company is struggling, or avoid triggering terms contingent on share price declines (see Section 5.1.1).

3.1.3 Participation

Participation rights entitle an investor to both her liquidation preference and her converted payoff. Liquidation preferences are satisfied first, and the residual exit proceeds are then shared among shareholders as if any participating investors had converted. In the VC industry, participation is informally known as “double-dipping,” because it entitles the investors to both downside protection and upside participation.

Continuing our single round example but adding participation, the investor’s payoff in an M&A exit or liquidation is

$$\pi_1(X_T, Z_T) = \underbrace{\min\{L_1 I_1, X_T\}}_{\text{Liquidation preference}} + \underbrace{\omega_1 \max\{0, X_T - L_1 I_1\}}_{\text{Participation}}. \quad (4)$$

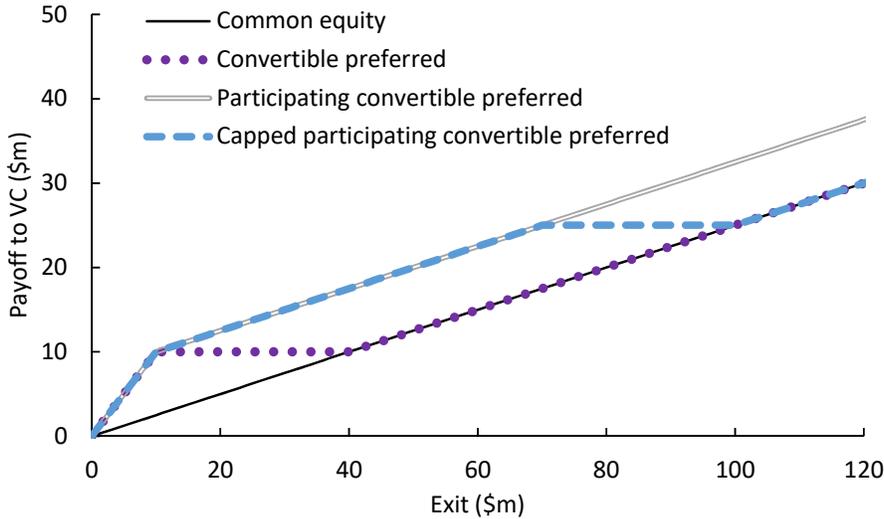
Figure 2 illustrates the hypothetical payoffs of a convertible preferred stock with and without a participation feature. It is clear that participation increases the payoff of investors, and its effect is relatively large at the intermediate exit values. In practice, the management and existing shareholders are averse to participation; many founders consider it unfair. Negotiations around the participation

⁹For example, Camerer and Lovallo (1999) found that entrepreneurs choose to enter a market even when the expected value of entering is negative, reflecting the tendency to overestimate their own prospects for success. Studies with related findings include Cooper, Woo, and Dunkelberg (1988), Lee, Hwang, and Chen (2017), and Arabsheibani, De Meza, Maloney, and Pearson (2000).

often coalesce at an intermediate solution, participation with a cap. As the name suggests, the cap implies that the participation feature is applied as long as the total payoff to the investor is equal to the product of the original investment and the cap. Adding a cap of C changes the above formula to

$$\pi_1(X_T, Z_T) = \max \left\{ \underbrace{\min\{L_1 I_1, X_T\}}_{\text{Liquidation preference}} + \underbrace{\omega_1 \min\{\max\{0, X_T - L_1 I_1\}, (C - L_1) I_1\}}_{\text{Capped Participation}}, \underbrace{\omega_1 X_T}_{\text{Converted payoff}} \right\}. \tag{5}$$

Figure 2: Impact of conversion, participation, and participation cap on payoffs: This figure shows the payoff of an example investment of \$10 million at a PMV of \$40 million using common equity, convertible preferred equity, participating convertible preferred equity, and capped participating preferred equity with a cap on total unconverted payout equal to 2.5 times the invested amount.



As with liquidation preferences, one economic rationale behind participation is to allow the strategic obfuscation of capital structure and inflation of reported post-money valuations. Additionally, participation could create value by strengthening investor value-creation incentives for intermediate exits,

while the standard convertible preferred stock may make investors insensitive to exit value increases in this range (e.g., exits between \$10 million and \$40 million in Figure 2).

3.1.4 Seniority

In a liquidation or sale where there is insufficient value to satisfy all liquidation preferences, $X_T < \sum_{j=1}^N L_j I_j$, contractual terms that define the relative seniority of investors come into play. While almost limitless complexity is possible, in practice, most seniority structures fall into two categories. First, preferred securities in different funding rounds are “pari passu,” that is, they are paid out in proportion to their liquidation preference:¹⁰

$$\pi_i(X_T, Z_T) = X_T \frac{L_i I_i}{\sum_{j=1}^N (L_j I_j)}. \quad (6)$$

Second, each new round is senior to all prior rounds and has its liquidation preference satisfied before the previously issued securities are paid:

$$\pi_i(X_T, Z_T) = \min \left\{ L_i I_i, \max \left\{ 0, X_T - \sum_{j=i+1}^N (L_j I_j) \right\} \right\}. \quad (7)$$

In practice, companies combine these two structures; for example, a company might initially raise three rounds that are pari passu and later raise two rounds that are each senior to all previous rounds. As shown by Gornall and Strebulaev (2021b), granting seniority to new rounds significantly impairs the value of previous rounds. As such, the terms we see in practice result from a tradeoff between the presumed information asymmetry between investor classes (which seniority alleviates) and the bargaining power of the potentially subordinated existing investors.

¹⁰Note that all preferred securities are still senior to common shares.

3.1.5 Other cash flow provisions

Private VC-backed companies rarely generate cash flows as they use all their cash flow from operations and more, to scale and grow. Thus, they tend not to pay cash dividends and, in most cases, dividends do not play an important role in these contracts. Contractual provisions covering dividends typically state they are paid out when declared by the board and that any dividends paid to common stock are junior to preferred equity. Such “non-cumulative” dividends are rarely declared, and so are generally immaterial.

Cumulative dividends can have a large impact; however, they are relatively rare. Such dividends are calculated for each period (typically, one year) and the right to receive the dividend is carried forward either until it is paid or until such right is terminated or modified. As startups rarely pay cash dividends, these cumulative dividends accrue and are paid out at the time of exit. While there are many ways these payouts can be structured, one common way is for them to effectively increase liquidation preference over time. Cumulative dividends may be payable only in certain exits, commonly liquidations and sales. In practice, late-stage investors and investors in struggling companies are more likely to negotiate and receive cumulative dividends.

Another typical contractual provision is redemption. Redemption entitles investors to demand the original investment amount back from the company under certain circumstances. As VC-backed companies are usually cash-poor, this provision is unlikely, outside some exceptions, to lead to investors demanding redemption in anticipation of receiving their investment back. Rather, it may provide a bargaining chip to investors in a future round of negotiations. We discuss redemption further in Section 4.4.

Preferred equity typically also contains so-called anti-dilution protections which provide price adjustments in the event of unfavorable future financing rounds. We discuss these terms in Section 5.1.1.

3.2 Common equity

Although investors rarely get common equity at the time of their investment in VC-backed companies, common equity plays a critical role for two reasons. First, as discussed above, investors receive securities that convert into common equity. Second, founders and employees get compensated with instruments derived from common equity, whether common equity itself, restricted stock units, or options on common equity.

The cash flow rights of common equity are largely standard and similar to a traditional common equity security. An important exception is vesting, which is ubiquitous to founder and employee securities. Vesting means that the receiver of shares will gain ownership of them over time by satisfying certain conditions. For example, an employee who joins a startup may get an initial option grant that vests over time with their continued employment which is partially forfeited if that employee quits. Similarly, when founders of the company raise funding from institutional investors for the first time, if not earlier, their ownership is subject to vesting so that they lose shares if they quit or are fired. Economically, these terms align the incentives of employees with those of their employers. If the receiver leaves the company early, she faces a financial penalty by forgoing the unvested portion of her stock compensation. To consider an extreme example, a founder of a startup that raises a first VC round may lose her entire ownership stake in the company if she quits immediately after the round. Founders commonly negotiate for a fraction of their shares to be excluded from such vesting requirements.

This vesting has historically taken place over four years and can happen at a time-varying rate. In a cliff vesting, a large fraction of stock ownership is vested on a particular date. In a step vesting, a smaller fraction of shares is vested according to a pre-specified plan, usually monthly or quarterly. In practice, many contracts feature both cliff and step vesting. For example, a common four-year founder vesting plan entitles the founder to a 25% vesting in one year (meaning the founder vests 25% of the total package in one year), with the rest vesting monthly in equal installments for the remaining three years.

Additional “trigger” terms determine what happens to unvested ownership after a sale (when the underlying shares cease to exist). Single-trigger acceleration means that the entire unvested portion of the stock plan is vested upon a pre-specified triggering event. Most commonly, such a triggering event is a sale of a company. Another single triggering event could be the involuntary termination of an employee. A double-trigger acceleration means that for the unvested stock to vest, two triggering events must take place. For example, the company is sold and the employee is terminated. These double-trigger clauses are the most common in employment contracts. One reason is that to the extent human capital is expected to be an important asset at the time of the company sale, the acquirer would be wary of acquiring a company where key employees will have no incentives to stay or where there will be additional costs for the acquirer to provide further incentives to retain key employees. Along these lines, acquirers may insist that key employees be subject to “revesting” at the time of an acquisition so that they face a financial penalty if they quit.

3.3 Stock options

Employees joining a VC-backed company often receive an option grant, which allows them to acquire the company’s common shares in the future at a certain price by exercising vested options. Stock options are allocated from an option pool, which is an amount of common stock reserved for future employees. The option pool is one of the contractual terms most negotiated between companies and investors because larger option pools at a given PMV mean investors get more shares. It is typical for a company to increase or top-up its option pool at each financing round.

To prevent firms from transmuted an employee’s heavily-taxed ordinary income into lightly-taxed capital gains, tax regulations require option grants to have a strike price equal to or above the value of the underlying stock. In recent years, this value has been determined based on compliance with Section 409A of the Internal Revenue Service code. Compliance with this regulation can provide option recipients the ability to defer tax and claim it at the lower capital gains rate, in the form of

incentive stock options. Other options, such as those given to non-employees, have less favorable tax treatment and are referred to as non-qualified stock options.¹¹

Employees who leave the company or are terminated typically must exercise the vested portion of their options within a short period or let them expire. This post-termination exercise period is usually 90 days and the forced early exercise of options significantly decreases the value of these options to employees.¹²

Employees of VC-backed companies, especially in a later stage of their life cycle, often receive Restricted Stock Units (RSUs) or Restricted Stock Awards (RSAs) rather than stock options. RSUs are also subject to time-based vesting arrangements similar to the ones stock options have. Moreover, RSUs can be trigger-based, with a trigger like a sale of the company or an IPO. RSAs entitle the employee with the right to purchase the shares at a specified price on the grant date, without vesting. However, the company may have the right to repurchase shares under RSAs at a pre-specified price if employees leave or are terminated. Economically, therefore, the vesting process of RSAs and RSUs can be similar. Restricted stock also faces different tax treatment from stock options.

In addition, employee-owned options, RSUs, and common stocks are often subject to various transfer restrictions, such as rights of first refusal (ROFR, see Section 5.2.2) and buyback provisions, which may further lower the value of these assets.

3.3.1 Warrants

VC-backed companies sometimes utilize warrants as a supplementary funding option. A warrant issued by a company is a contract, according to which the warrant holder has the right to buy the company's common or preferred shares at a specified price over a specified period. Once a warrant holder exercises her warrant, she receives shares of stock in the company. In this way, warrants are economically similar

¹¹The discussion of tax issues related to employee compensation in VC-backed companies is beyond the scope of this chapter. See, for example, <https://www.cooleygo.com/isos-v-nso-what-the-difference/> for further details.

¹²Carta's 2021Q2 State of Private Markets report shows 90% of the stock options of terminated employees had a less than 95 day post-termination exercise period.

to stock options. However, they are usually issued to investors rather than employees. They can also be issued to other parties, such as suppliers or customers.

One difference between a stock option and a warrant is that companies issuing warrants are not restricted by the 409A rule; thus, they can set any exercise price. Warrants are often used in combination with other securities or transactions and provide an additional incentive to contracting parties. Examples include a warrant issued in conjunction with a convertible note, a bank loan, or a commercial agreement.

Warrants can be issued both on common stock and preferred stock. Warrants have a specified maturity, up to which they can get exercised. Like preferred stock, warrants may need to get exercised and then converted in a liquidity event, such as a sale or an IPO. Warrants may have vesting arrangements similar to those of stock options.

3.4 Convertible notes

A convertible promissory note is a debt instrument with two primary elements: debt repayment and equity conversion rights. These notes are frequently used to finance pre-seed, seed, and early-stage companies, which are typically developing and refining their product concepts. Often, convertible notes are the first external financing utilized by these companies. Convertible notes are also sometimes used in later-stage financings, for example where existing investors are providing temporary financing while the company is raising a new round of funding (also called “bridge” financing).

The debt repayment element of a promissory note defines the principal, interest rate, maturity date, and default provisions with related remedies. The equity conversion element of the note defines the specific event or events that trigger conversion (e.g., a qualifying equity financing round or liquidation), the formula used in converting the debt to equity (i.e., a valuation cap and/or a discount to the per-share price being paid in the next financing round), the type of equity to which the debt would be converted (common stock versus preferred stock, for example), and any additional equity rights attached to the shares converted from the debt such as voting rights and dividend rights. The terms

of the convertible note do not establish a specific valuation for the company, rather, they establish a formula (or a choice of formulae) for conversion based on a future event such as a future convertible preferred equity issuance.

A convertible note is typically not secured by the assets of the company, unlike secured bank loans or secured convertible debt instruments. Like convertible preferred stocks, convertible notes are not standardized, uniform financial instruments. Rather the terms discussed below are negotiated by the parties. A common area of negotiation is the conversion terms, meaning the circumstances under which the note will convert into equity securities of the company. Convertible notes can be designed to convert into equity based on a number of potential triggering events, including an equity-financing round (whether a qualified financing or non-qualified), a sale or other change of control of the company, default, or upon maturity. Entrepreneurs and investors will negotiate and agree on conversion terms, including any discount rate (the percentage by which the conversion price per share may be reduced below the price per share of the equity financing) and valuation cap (the maximum company valuation to be used to calculate the conversion price per share).

3.4.1 Principal

The principal of a convertible note is the amount of investment provided by the noteholder to the company through the convertible note. If the note does not convert, it is the amount that the company needs to repay to the investors (plus any accrued interest). If the note is converted, the principal (plus any accrued interest) is the amount used to calculate the number of shares that the note will be converted into. In this latter case, the investor forgoes the principal repayment in exchange for the shares.

3.4.2 Interest Rate

Convertible notes, like most debt instruments, feature interest. The early-stage companies that issue convertible notes rarely pay that interest in cash. Rather, the notes accrue the interest, that is, interest

is paid via increasing the amount of the note so that, at conversion, the interest also converts into equity securities of the company on the same terms as the principal. At maturity, the total sum of the outstanding principal and accrued interest is due. Upon conversion, the same total sum would typically convert into stock.

3.4.3 Conversion

Convertible notes convert automatically into equity if certain triggers take place. A common trigger that leads to a conversion of principal and accrued interest of the note is an equity financing round. Typically, the equity financing round needs to reach a certain size to be a “qualified financing” to trigger conversion. An additional requirement for qualified financing could be that preferred equity needs to be issued in the financing round. Conversion takes place into the equity issued in a qualified financing round.

A second common conversion trigger is a change in control or a liquidation event. In this case, the note can either be automatically converted into equity or it may simply trigger a repayment event at the greater of principal plus interest or the conversion amount or a multiple of the principal. Conversion can also take place on the maturity date of the note as discussed in Section 3.4.5.

3.4.4 Conversion Price, Discount, and Valuation Cap

Conversion associated with a financing round generally occurs at a price lower than that paid by investors in the qualified financing round. For example, with a typical discount of 20%, if investors in the qualified round agreed to pay \$1 per share, noteholders will convert at the price of \$0.80 per share. This conversion discount is often justified on the grounds of additional time exposure and higher uncertainty facing noteholders compared to investors in the qualified financing round.

Many notes also feature valuation caps. The valuation cap is a term that imposes a ceiling on the price at which a convertible note would convert into the equity security sold at the qualified equity financing. In seed-stage financing, a valuation cap is one of the most important terms of a convertible

note. In practice, many variations of a valuation cap are possible and the exact specifics of conversion math are often complicated. Abstracting from those complications, here is a simple example of a valuation cap.

Suppose a convertible note of \$1 million specifies a valuation cap of \$10 million. If the company raises its next round of financing at a pre-money valuation of \$8 million¹³ – that is, lower than the valuation cap – with a per-share price of \$1, the convertible note would be converted at the same per-share price of \$1. If, on the other hand, the company’s next round of financing has a pre-money valuation of \$20 million – that is, twice the valuation cap – with a per-share price of \$1, the convertible note would be converted into equity as if the pre-money valuation is \$10 million. The adjusted conversion price is then calculated as \$10 million divided by \$20 million, which is \$0.5 per share. This means that the \$1 million convertible note would be converted into 2 million shares, as opposed to 1 million shares without a valuation cap.

The valuation cap mechanism enables the convertible note investor to benefit from the upside of the company after the trigger event occurs. Convertible notes often feature both conversion discount and a valuation cap, which means that the per-share conversion price is the lowest of the discounted per-share price in the next qualified round price per share or the per-share price implied by the valuation cap.

3.4.5 Maturity Date and Repayment

A note’s maturity date is when the principal is due to be repaid along with any accrued but unpaid interest if the note is still outstanding. Some convertible notes have specific terms that call for automatic conversion into equity on the maturity date or entitle the noteholder to an optional conversion into common or preferred equity if the note is still outstanding on maturity. An alternative to repayment or conversion is for the company to negotiate an extension of the maturity date with the noteholders. In practice, such extensions are often granted by investors, because it provides them with the option

¹³Pre-money valuation means the agreed valuation of a financing round, excluding the money invested by the new investors. Complications arise as the amount of note may or may not be included in that pre-money valuation.

to convert into the company's stock at a later date if a financing round takes place. However, if the investors refuse to extend the maturity date or the company does not request an extension, the repayment of the note is due at maturity. If the company is unable to repay the note, investors as debt holders can pursue a liquidation process for the company, in which they have seniority relative to any equity outstanding.

3.4.6 Non-priced Round

Convertible note rounds are often referred to as “non-priced” rounds because they do not explicitly set a share price and, thus, do not have the associated PMV. Instead, their share price is a function of the future financing round that triggers the note conversion. Deferring pricing in this manner allows the notes to be contingent on the future resolution of uncertainty. However, most of these convertible notes have valuation caps, which anchor the expectations of value for founders and investors. The presence of valuation caps effectively implies the pricing of the round, even though the contractual language around these caps often provides subsequent investors the flexibility to dilute noteholders. Without valuation caps, the conversion deferral can create perverse incentives for investors, as, in many cases, their ownership is a decreasing function of the future round's price, and for managers, who may benefit from deferring a qualified round to dilute the company's noteholders.

3.5 SAFEs

A SAFE is an agreement between an investor and a company that converts into equity at the next financing round if certain conditions are met. SAFEs were developed as an alternative to convertible notes in circa 2012 (Coyle and Green 2014). They were developed by a team of lawyers working for Y Combinator and intended to be a more straightforward alternative to convertible notes for companies to understand, negotiate, and implement.

As with a convertible note, a SAFE provides for conversion events, and can also provide for priority ahead of other equity holders in the event of liquidation. However, unlike a convertible note, a SAFE

is not a debt security, and, unlike convertible preferred equity, it is also not an equity instrument. It does not accrue interest or dividends, and it does not generally contain a maturity or repayment date.

A SAFE investment will generally only convert into equity when the company raises a future equity round satisfying certain conditions or in the event of a sale of the company. It is possible that after SAFE financing a company never raises additional equity capital and never sells itself or goes public. In that case, the SAFE holders would continue to hold their securities, earning no interest, receiving no dividends, and never realizing a return of their original investment.

As with other securities we discuss, the specific terms used in SAFEs vary. The investor receives the right to stock in the company at a later date, in connection with specific, agreed-upon triggers. A typical trigger is the sale of equity by the company. The qualified round may include only preferred or both preferred and common equity.

A SAFE, like a convertible note, may feature both a valuation cap and a discount to the conversion price at the time of the triggering event. One of the key benefits of a SAFE is that, in part, because there is a widely available and adopted standard form, it generally requires less negotiation before the investment. A SAFE is a single-document solution that only requires the selection among the several versions of SAFEs the company is going to use as well as the amount of the investment and the valuation cap that applies to the conversion price calculation. Because SAFEs also defer pricing, they give rise to the same incentive issues as convertible notes.

3.6 Venture debt

Venture debt is a type of debt offered by banks, specialized intermediaries, and other creditors to finance VC-backed companies (Davis, Morse, and Wang 2020). In practice, venture debt complements equity financing using convertible preferred stock. It is frequently set up as a bridge loan, to be repaid either in an imminent liquidity event or at the time of the next financing round. Venture debt typically comes with warrants on common equity that enable the creditor to benefit from the upside of the company's value. While venture debt is senior to any common or preferred equity, it typically does

not require physical collateral. Venture debt is often issued by companies that have already raised several equity financing rounds.

4 Dividing control

Founders, employees, and investors have diverse interests, beliefs, information, and incentives. These differences make the allocation of decision-making authority critical for startups of all stages. The structure of corporate governance—the allocation of control and voting rights between various stakeholders—is a central topic in startup contracting.

An important distinction between startups and the typical large public company is that startup investors, such as venture capitalists, are active investors who negotiate and exercise substantial corporate governance rights. These investors operate in the context of extreme uncertainty, information asymmetry, institutional constraints, and various underlying agency problems. As a result of negotiations that reflect investor concerns and requirements, the final contractual structure of investment often leads to a separation between cash flow rights and corporate governance rights in an entrepreneurial firm.

For example, early on in the life cycle of a startup, founder-managers are typically majority shareholders and investors are minority shareholders. Keeping much of firm ownership with founders is important given the necessity of raising further funding rounds and the dilution of founder-manager ownership and thus incentives that those rounds entail. However, a minority claim on a company controlled by an often unorthodox founder-manager gives strong impetus for investors to negotiate additional control rights in order to protect their interests. We see the potential for founder-managers to expropriate minority shareholders being checked by an extensive set of negotiated contractual protective provisions. As startups mature and raise further funding rounds, the initially negotiated relationship between investors and founder-managers is further complicated by the addition of new investors eager to negotiate their own control provisions. This means governance disputes arise not just between founder-managers and investors, but also between different classes of investors, for example,

between early-stage and late-stage investors who provided funding to the same startup at different prices and with different cash flow rights. In recent years, there have been a lot of calls to improve the corporate governance of large publicly traded companies.¹⁴ This was undoubtedly caused by high-profile scandals that demonstrated to a wider public what defective corporate governance could lead to. A number of high-profile startups also went through tough times recently and were criticized for poor corporate governance. Well-known examples include Uber, Theranos, and WeWork. These and other examples provide powerful anecdotal evidence for the importance of corporate governance.

In this section, we discuss how the entrepreneurial environment shapes corporate governance. We define corporate governance as a set of principles and mechanisms that balances the interests of company stakeholders and affects control over company decision-making. These stakeholders are not only shareholders, whether preferred or common, but also employees, customers, suppliers, regulators, and society at large. Our discussion encompasses both formal mechanisms laid down in laws, precedents, or private contracts, and informal mechanisms such as reputation, entrenchment, and mutual consent.

The structure of cash flow rights (Section 3), namely that investors receive preferred shares, also plays an important corporate governance role. In the incomplete contracts approach, Aghion and Bolton (1992) and their followers forcefully put forward an explanation for debt financing existence and optimality, in which debt provides a “contingent and thus more flexible governance structure for the firm, one which is more responsive to whether good or bad states of the world materialize in the future” (Aghion and Holden 2011). In the same vein, preferred stock provides contingent financing and, together with many additional corporate governance mechanisms that we discuss here, serves to respond to the challenges the entrepreneurial firm faces.

A traditional perspective on corporate governance is that of a need to resolve multifaceted conflicts of interest between a manager or a founder-manager and an investor. That easily translates to the startup setting, where an entrepreneur, rich with ideas but financially constrained, contracts with

¹⁴There has been a steady rise in corporate governance research in publicly traded firms. For example, Gompers, Ishii, and Metrick (2003) construct an index of shareholder rights based on governance rules in 1500 public firms and find that firms with stronger shareholder rights had higher firm value, higher profits, higher sales growth, and lower capital expenditures, and made fewer corporate acquisitions. Bebchuk, Cohen, and Ferrell (2009) develop this idea further and construct an “entrenchment” index based on rules that limit shareholders’ rights, confirming the previous findings.

an investor, lacking ideas yet with abundant financial resources. While much of the theoretical and empirical work on agency conflicts in an entrepreneurial setting has been along these lines, more recently evidence of conflicts between investors emerged as an important distinctive feature of a VC setting and one that plays an important economic role (Bartlett 2006). In a public companies context, the conflict is between the managers and dispersed shareholders, acting through the board of directors. In the VC setting, however, there is a small number of minority investors, most of which hold a non-trivial stake in the company and many of which are represented on the board. These investors acquire their stake at different funding rounds, paying different prices and negotiating investor-specific contracts and protections. This leads to inter-investor conflicts that are not part of the traditional agency conflict framework pioneered by Jensen and Meckling (1976) and subsequently applied to the VC setting (Admati and Pfleiderer 1994; Bergemann and Hege 1998; Berglof 1994; Cornelli and Yosha 2003; Hellmann 1998; Schmidt 2003).

It is useful to split formal corporate governance mechanisms into several interconnected categories: shareholder voting, board control, and shareholder protective provisions.

4.1 Shareholder voting rights

In startups, especially those that are backed by VC investors, the voting rules could be structured very differently from those in other privately owned corporations or publicly traded companies. One such difference is the identity of shareholders who have the right to vote. We start with a brief description of shareholder voting.

By default, US corporate law makes a number of corporate decisions subject to a shareholder vote, for example, the merger with another entity. Above all, a change of the rules listed in the charter requires shareholder approval. Corporate charters frequently make other decisions subject to shareholder approval as a result of negotiations between founder-managers and various classes of investors. Importantly, most of the cash flow rights discussed in Section 3 are spelled out in the corporate charter. As a result, shareholder voting rules, which determine the process by which shareholders approve these

decisions, play an important role. Some examples of provisions that are set out in a corporate charter are as follows:

1. Cash flow rights, such as liquidation preference, conversion rules, and dividend rights;
2. Restrictions on the sale, liquidation, or restructuring of the company;
3. Ownership structure including the classes or series of company shares and the number that can be issued;
4. Board of Directors election procedures; and
5. Protective provisions of specific shareholder classes.

Other decisions do not typically require shareholder approval, including the day-to-day management of company affairs, the allocation of the option pool among the employees within the authorized number of shares set in the corporate charter, and, perhaps most importantly, the firing and hiring of corporate executives, including the CEO.

Corporate votes are undertaken by shareholders. The shares a company issues, and consequently the potential votes, are limited by a company's corporate charter. This document indicates authorized shares (also known as authorized stock or authorized capital stock), which is the maximum number of shares of each class that a company is allowed to issue without further approval by shareholders. The listing of the number of authorized shares in the charter serves as a powerful shareholder protection, as it may prevent the company decision-makers from issuing more shares and thus diluting (some of) the existing shareholders.

Although the number of authorized shares is given in the corporate charter, the number of issued and outstanding shares is not. Issued shares are those that the company has issued to its shareholders. The number of issued shares of each class cannot be above the number of shares that are authorized to be issued for that class. Issued shares could either be outstanding shares or treasury shares. Outstanding shares are owned by shareholders, such as investors or employees. Such ownership may include shares

that are in the process of being vested. Outstanding shares that are transferred back to the company are called treasury shares.

The number of authorized common and preferred shares may also contain an additional buffer, which is effectively how many more shares the company can issue without the need to amend the corporate charter. For preferred shares, the buffer usually allows the company to continue fundraising for the same series of preferred stock for some time after the funding round has been agreed upon and, for example, raise money in sequential tranches with the same conditions as already issued preferred shares. For common shares, the authorized number is a bit trickier. First, it takes into account all the conversion options. For example, preferred shareholders should have the ability to convert into common without the need to amend the corporate charter. Second, the authorized number of common shares also includes the agreed-upon employee stock option pool that has not yet been allocated to specific employees, and these shares thus have not yet been issued. Again, the company board would like to be able to issue those shares without amending the charter.

With these preliminary considerations out of the way, we are ready to discuss which shares have the right to vote and, equally important, which shares do not carry such voting rights. This discussion will also help to emphasize the difference between the corporate governance of startups and “traditional” companies, such as public companies or the typical private corporation. Outstanding common shares have the right to vote, as in traditional companies, with the exception of so-called non-voting common shares. (Note that these shares would have similar or identical cash flow rights to voting common shares). In practice, non-voting common shares are often given to employees who join at a later stage of the company development, with the rationale being not to dilute the voting rights of existing shareholders.

In traditional companies, preferred stockholders do not have the right to vote. In fact, the Securities and Exchange Commission (SEC) chose the distinction in voting rights as the main defining difference between common and preferred stocks.¹⁵ The SEC distinction makes the voting rights of preferred

¹⁵See <https://www.investor.gov/introduction-investing/investing-basics/investment-products/stocks>. “Common stock entitles owners to vote at shareholder meetings and receive dividends. Preferred stockholders usually don’t have voting rights but they receive dividend payments before common stockholders do, and have priority over common stockholders if the company goes bankrupt and its assets are liquidated.”

shareholders in startups stand out. Specifically, the convertible preferred shares issued to investors, as a rule, carry voting rights. Preferred shares usually vote on the so-called “as converted basis.”¹⁶ An as converted basis means that preferred shareholders have the same voting rights that they would have if they were to convert into common shares (without actually having to convert). This implies that only preferred shares that could be converted carry voting rights. Note that preferred shares receive the voting rights of the underlying common shares even without converting, allowing them to retain their other preferred rights.

Restricted stock units—company shares that are issued to employees as a part of compensation—have the same right to vote as the shares that these restricted stock units represent (typically, common shares). Again, not infrequently, these would be non-voting common shares, which would preclude them from voting. If an employee’s shares can vote, that employee can vote them regardless of whether the shares are vested. As discussed in Section 4.3, founders typically agree to have most of their stock subject to vesting, so that they lose many of those shares if they quit within a period after the financing. Unvested shares may be subject to loss; however, they carry the right to vote alongside other shares.

In addition to non-voting common shares, authorized but not yet issued shares do not carry voting rights until after issuance. Treasury shares, stock options, stock warrants, and debt also do not have voting rights.

4.1.1 Supermajority and supervoting

Startups impose a variety of voting rules. Commonly, a majority of all eligible votes should be in favor for the proposal to be approved, where a majority here means 50% plus one. An alternative structure requires a majority of eligible votes to be cast (a quorum) and a majority of those cast votes being in favor, although these structures are close to equivalent given the highly-motivated and concentrated ownership. Supermajority thresholds, requiring votes in excess of a majority, are frequently established in the corporate charter. These typically apply only to certain scenarios and certain investor classes (as discussed below). The existence, frequency, and specificity of these voting thresholds indicate the

¹⁶Some charters give each preferred share a fixed number of votes.

extent to which shareholders consider supermajority an important protective mechanism. In practice, the selection of a specific threshold often reflects the ownership stake the investor maintains in a specific class of shares upon which such a supermajority voting threshold is imposed. Importantly, as it is common for investors to form syndicates in VC financing rounds, specific thresholds are often set to give a minority investor veto power (see Section 4.1.2).

Standard voting rules imply that one common share has one vote and, similarly, that one preferred share has one vote per common share into which it converts. Alphabet, Meta, and other public companies feature dual-class structures where there are two or more classes of common stock with identical cash flow rights but different voting rights. Such supervoting shares also exist for startups.¹⁷ In recent times, supervoting has generated debates in the VC industry, as a number of companies with supervoting, such as Uber, WeWork, and Theranos, have encountered major scandals.

Supervoting shares entail one class of shares having more votes than another voting class of shares. From the point of view of corporate governance, the critical implication of supervoting is that it leads to further separation between cash flow and voting rights. In practice, supervoting is rarely initiated at the outset of company formation or the first funding round, but rather, as an indication of the bargaining power of founder-managers, it is introduced later in the startup's lifecycle. Founder-managers who are with the company at that time are the main beneficiaries of supervoting arrangements, which would typically involve a reorganization that creates two classes of common shares. One of these classes has substantially more votes per share than the other, with the founder-managers receiving the class of shares with more votes. Existing investors are often grandfathered in in this arrangement and thus also receive supervoting preferred shares. Other common shareholders (such as employees and founders who left the company) and new investors see sometimes dramatic dilution of their voting power. These arrangements commonly give 10 votes to the high-vote shares, although in some cases, such as that of Theranos, the founder(s) receive 100 votes per share, which all but eliminates the voting power of other shareholders.

¹⁷For the avoidance of confusion, we prefer not to call this a dual-class structure, as startups, of course, have many classes of shares to start with.

How widespread is supervoting? Some of the most prominent startups, such as Alphabet, Meta, and Uber, featured this governance structure. However, the exceptional nature of these companies is part of the reason they had this voting structure—only the “hottest” startups with the most powerful founders are able to negotiate stronger control rights. These companies are exceptional both in governance and (perceived) performance.

4.1.2 Class-level voting

Investors in startups often negotiate specific voting provisions that give them the right to block an action. These are implemented through differential voting scenarios in which separate classes of shares have to approve a proposal. The voting basis is the arrangement of the shareholder classes voting, and such bases may lead to substantial additional voting power for a specific share class.

There are three common voting basis scenarios. In the first scenario, preferred and common shareholders vote “as a single class,” meaning that the approval requires the (super)majority of total votes, resulting from adding all common and preferred (on an as converted basis) shares. In the second scenario, preferred shareholders vote as a separate class. In this scenario, without the affirmative vote of the (super)majority of all preferred share votes, voting together but separately from common shares, the proposal cannot be approved.¹⁸ In the third scenario, a subset of preferred investors vote together as a class. This could be a single series of preferred (e.g., Series A) or multiple series (e.g., Series A and B). Such votes exclude not only common shareholders but also other preferred shareholders (e.g., a hypothetical Series C).

In all scenarios, the voting within a basis follows the same majority, supermajority, and supervoting rules discussed in the previous section, with the contract either specifying some fraction of eligible votes being in favor or requiring a quorum and specifying that a (super)majority of the cast votes be in favor of the action. Being part of a narrow voting basis affords substantial control to those investors

¹⁸Theoretically common shares also can be entitled to vote as a separate class, but such a provision is exceedingly rare in practice apart from the election of directors, which we discuss separately.

and, not surprisingly, these provisions are heavily negotiated and precisely delineated in the corporate charter.

To provide a specific example of the protective provisions for which investors negotiate special voting bases, consider the 2015 corporate charter of Blue Apron at the time it was still a startup.¹⁹ In Blue Apron's case, a basis of all preferred shareholders voting together (second scenario) had to approve by vote the following corporate actions:

1. Liquidate the company;
2. Amend the corporate charter;
3. Increase or decrease the authorized number of preferred or common shares;
4. Create new series of stock, unless junior to the preferred with respect to liquidation preference;
5. Declare any dividend;
6. Issue any debt exceeding \$10 million;
7. Increase the number of shares reserved under the equity incentive plan;
8. Increase or decrease the size of the board of directors; and
9. Permit any subsidiary to do any of the above.

As can be imputed from this list, the majority of preferred shareholders of Blue Apron effectively controlled many of the most important corporate decisions, particularly financing decisions. Without their approval, the company could not raise a non-trivial amount of financing, pay dividends, or change the size of its board. Such provisions inevitably shift power away from founder-managers to investors. Analysis of these corporate charters indicates that there is substantial heterogeneity among types of protective provisions given to preferred shareholders. Blue Apron's list is by no means atypical, and most startups afford preferred investors similar protections.

¹⁹Fifth Amended and Restated Certificate of Incorporation of Blue Apron, Inc., 05/08/2015.

The third scenario is the one where a specific series or several series of preferred shareholders must approve an action by voting as a separate class. The frequency of such provisions indicates the perceived potential for a conflict between different classes of investors. Coming back to the example of Blue Apron, Series C Preferred Stock of Blue Apron had to approve the following actions as a separate class (at the time, Blue Apron had four series of preferred stock, Series A, B, C, and D):

1. Create new series of shares of stock that are senior to Series C in liquidation preference or that are convertible into Series C;
2. Increase or decrease the authorized number of shares of Series C preferred stock; and
3. Amend the corporate charter in a way that adversely affects Series C preferred stock.

Given that such provisions give an inordinate degree of influence over corporate decision-making to a specific class of shareholders (and therefore, often, to a specific investor), they are limited to specific actions that act against the interests of the protected class. For example, in Blue Apron's example, the first two provisions prevent the dilution of the ownership stake of the Series C existing shareholders, unless they assent to such a dilution.

Different series of preferred stock may have distinct protective provisions that correspondingly change the voting basis. For example, Series D preferred stock of Blue Apron had the same three provisions that Series C had (in relation to Series D) and additionally had a fourth provision, which in effect made any corporate transaction that constituted a company liquidation (such as a sale) subject to the affirmative vote of Series D preferred shareholders, unless those shareholders' exit proceeds at least equaled their investment amount. Series D therefore had a veto on any company sale in which they would not fully recover their investment—a powerful right.

Academic research has not yet studied the fair value implications of complicated voting structures in the VC setting. Available evidence from public companies suggests that the voting premium effectively bestowed by class voting rules can be very substantial. For example, Rydqvist (1987) and Zingales (1995) have used the Shapley value to measure the value of voting rights in publicly traded firms with more than one class of shares.

4.1.3 Protective provisions

The above examples from Blue Apron's corporate charter are protective provisions. These provisions are contractual clauses that have the goal of preventing the company and its shareholders from taking certain actions without getting the explicit consent of the investors protected by those specific provisions. They thus aim at protecting minority investors against expropriation. Such protective provisions can be very elaborate and diverse (Bengtsson 2011).

Such protective provisions are in addition to other control rights that VCs negotiate, the most important of which are board seats, as discussed in Section 4.2. One advantage that they offer is a specifically and clearly stated protection in a corporate charter. Such provisions could be verified in court and corporate charters are considered of more import in a court of law than other contracts that firms enter into (Bartlett and Talley 2017). Another advantage is that the actions of investor directors must be in the company's interest, while the exercise of class rights does not have to be. This means that protective provisions allow investors to capture value in a way that is deleterious to the company, something they may not be able to do as board members (See Section 4.2.2).

A related contractual protection is the information rights negotiated by investors (especially those who are not entitled to designate board seats: see Section 4.2.1). Given the private and often secretive nature of startups, management prefers not to divulge information, including financial status and projections, to all investors. Often, a requirement on the minimum number of shares of company ownership is imposed in order to limit information provisions to a smaller group of larger investors.

Bengtsson (2011) shows that most corporate charters include covenants. Moreover, he identified 12 distinct covenant groups. Tellingly, VC contracts never include financial covenants that force a company to maintain specific levels of interest coverage, working capital, or net worth. The absence of such covenants, the use of which is standard in bank loans and corporate bond contracts, underlies the uncertainties associated with the financial performance of startups and the verifiability of their financial statements. Instead, Bengtsson (2011) shows that all the observed covenants are of negative covenant nature, that is, they are protective provisions and give investors the right to veto a specific

corporate action. Some provisions, such as rights to veto changing the size of the board of directors, liquidate a company, or pay dividends to common or preferred stock, are always present. Other provisions, such as veto rights on issuing debt or issuing equity securities junior to preferred shares, are present for the majority of contracts. Other protective provisions, such as changing the current line of business, acquiring other companies, licensing out technology, or changing stock option plans, are included in the minority of contracts. Some protective provisions are rare and company-specific, emphasizing that protective provisions are negotiated as a function of company- and investor-specific determinants.

Research has shown a conflicting relationship between protective provisions and other rights. On the one hand, contracts that provide more preferential cash flow rights to investors have more protective provisions. On the other hand, contracts that give investors more board control lead to fewer protective provisions. Kaplan and Strömberg (2003), Bengtsson (2011), and Bengtsson and Sensoy (2011) also show that the number of protective provisions and cash flow contingencies increases with a startup's age and the stage of its lifecycle.

4.1.4 Automatic conversion

An important protective term concerns automatic conversion. In addition to optional conversion provisions where investors have the right to convert preferred stock into common stock at the time of their choice (see Section 3.1.1), startups typically also have automatic conversion provisions where preferred stock can be forced to convert into common stock under certain conditions. Forced conversion, if implemented, means that investors give up all the rights of preferred stock (both cash flow and control rights) and instead, obtain only rights associated with the ownership of common stock (Black and Gilson 1998). As the rights of preferred stock are superior to those of common stock, automatic conversion acts as an important check on preferred stock's economic and corporate governance rights. As such, conditions under which automatic conversion is permitted become of crucial importance. Most often, these conditions relate to an IPO and require a minimum common stock price, dollar amount of proceeds, and/or market capitalization for the company. Kaplan and Strömberg (2003) find that

IPO-related automatic conversion is present in 95% of the financing rounds in their sample. They also find that often the IPO conditions are set at or above the company's PMV at the financing round, implying that the preferred investors protect themselves from expropriation by other shareholders in less favorable outcomes.

Automatic conversion provisions can be both strengthened and weakened. In some cases, automatic conversion can be initiated outside the IPO if there is a (super)majority of shareholder votes. On the other hand, automatic conversion may be limited to IPOs meeting certain performance milestones, such as a valuation or fundraising target. It may even be separately negotiated for different series of investors, with some investors negotiating automatic conversion only if approved by their class or only if the exit meets a lofty performance target. In a sample of highly-valued companies, Gornall and Strebulaev (2020) found that such automatic conversion exemptions were common, especially among later-stage investors.

The importance of automatic conversion provisions stems from the observation that in order to undergo an IPO, it is a standard industry practice for all preferred stock to convert into common in conjunction with the IPO process. Thus, even a small preferred shareholder, by withholding the conversion decision, has the power to control the exit outcome. As such, these provisions point to the resolution of inter-investor conflicts. This especially concerns investors entering at very different price points. While a preferred shareholder with the original issue price of \$1 would likely be content with the IPO price of \$20, the same cannot be asserted about a preferred shareholder whose price entry point into the company was \$30. In addition, investors frequently target cash-on-cash multiples, and an immediate exit at a high internal rate of return (IRR) but a low cash-on-cash multiple may conflict with their goals. This also explains why automatic conversion exemptions are negotiated by later-stage investors as they tend to pay more per share—at least in successful companies.

A related provision is what is known as “drag-along” rights. If certain conditions are met these terms allow a qualified majority of preferred shareholders to force common shareholders to sell their shares as part of a sale of the company. This allows an acquirer to get complete ownership of the company and prevents minority shareholders from obstructing a deal. Once again, the drag-along provision aims

at resolving the agency conflicts that could arise between investors and founder-managers. Williams (2017) finds that almost 60% of preferred equity financings feature a drag-along provision.

4.2 Board of directors and control rights

The board of directors is the second major corporate governance mechanism. The board of directors is a group of individuals that represent shareholders in major corporate decisions; indeed, corporate law identifies boards as the main corporate decision-making body. The role of corporate boards in public companies has received substantial attention from corporate governance research (see, for example, Adams (2017)). One of the critical board responsibilities is the oversight of management. In particular, management serves at the pleasure of the board, meaning that the board can relieve any CEO—regardless of whether she is a founder—of their duties at any time, unless such an action is specifically allocated away from the board in the corporate charter. In startups, investors play an active part in corporate governance by serving as board members. Investors report that they interact with their portfolio companies and management frequently, often weekly (Gompers et al. 2020). Startup boards, in their oversight of the CEO and the senior management team, frequently remove founder-managers from their executive positions.

Other functions of boards include monitoring and assessing corporate performance, providing strategic guidance, developing corporate policy, approving budgets, and fundraising.²⁰ While all corporate boards have similar responsibilities, they play a larger role in startups for several reasons. First, the dynamic nature of startups and their innate uncertainty amplify potential conflicts. Second, founder-managers are frequently relatively inexperienced and face the especially challenging task of managing rapid growth. Finally, the numerous active owners and the complex web of financial and governance controls give them a significant intermediation role.²¹ For example, Hellmann (1998) shows that board control can be a prerequisite for VC investment, since without that control, the entrepreneur may hold up the value generated by the venture capitalist. As Lerner (1995) and Hellmann (1998)

²⁰See Knowles (2009), which lists functions that are central to the board role.

²¹Gao and He (2019) argue that the governance role of boards in private firms is more important because other governance mechanisms are lacking. As we show here, other mechanisms, such as shareholder voting rights and protective provisions, act jointly with board governance for startups.

argue, allowing the board to monitor and replace the founder-manager reduces agency costs and is strongly preferred by VC investors.

Much of the existing evidence underlines the distinctions between the structure and the role of the board in public companies and startups. For example, earlier survey evidence by Fried, Bruton, and Hisrich (1998) showed that boards of startups are more involved in both strategy formation and evaluation. Baker and Gompers (2003) show that at the time of the IPO firms backed by VC investors have different board sizes and compositions than other newly public firms. Hochberg (2012) also compares VC-backed and non-VC-backed public firms following their IPOs and finds that VC-backed firms have lower levels of earnings management, more positive reactions to the adoption of shareholder rights agreements, and more independent board structures than similar non-VC-backed firms, which is consistent with better governance.

4.2.1 Election of startup boards

The importance of boards in startups is underlined by the observations that the rules on the election of directors are heavily negotiated and their structure differs markedly from those of traditional companies. In public companies, the candidates for directors are proposed by the nominating committee of the board, approved by the board, and then voted on by all the common shareholders at the annual shareholder meeting (usually by simple majority, even though the multi-class structure may give certain shareholders a blocking power to nominate directors). Contrary to this practice, early-stage companies use often intricate rules that specifically allocate board seats to different groups of owners. Specifically, investors often negotiate for the right to elect one or more directors all by themselves, and the first VC investors typically make financing contingent on receiving a board seat.

The board composition of Uber as of May 2016, when it was still a private company, offers an example of board structure.²² Uber's corporate charter provided for a board of directors comprised of eight

²²Some board details are taken from Complaint, Benchmark Capital Partners VII, L.P., v. Travis Kalanick and Uber Technologies, filed in the court of the chancery of the state of Delaware, 08/10/2017.

voting directors. A separate voting agreement between shareholders detailed who had the right to designate voting directors. These eight were as follows:

- i) One seat was contractually allocated to Series A Preferred stock (and designated by Benchmark, a VC firm that held a majority in Series A);
- ii) One seat was contractually allocated to Series C-2 Preferred stock (and designated by TPG Equity Holdings, a lead investor in Series C-2); and
- iii) Six seats were contractually allocated to Class B Common Stock (out of which one was designated by Expa-1, an accelerator, where the founding partner, Garrett Camp, is also Uber's co-founder; one was held by Ryan Graves, another of Uber's co-founders; one was reserved for Uber's CEO (at the time of the voting agreement it was Travis Kalanick, Uber's leading co-founder); and three seats were unfilled).

Uber had by this time a supervoting share structure, with Kalanick owning about 35% of Uber's supervoting Class B common stock. This gave him substantial influence (but not the outright majority) over whom to appoint as directors on behalf of Class B common stock. According to the lawsuit filed by Benchmark, Kalanick had also approximately 16% of the total voting power, while Benchmark has 20% of the voting power (when voting along with common as a single class) and 36% of the preferred stock voting power. Note also that at the time Uber had four additional classes of stock (Series Seed Preferred Stock, Series B Preferred Stock, Series C-1 Preferred Stock, and Class A Common Stock) that contractually were excluded from voting in an election or removing any of Uber's directors.²³

Uber illustrates the degree to which various stakeholders can be entrenched on the board. It further illustrates a critical feature of corporate governance arrangements in startups, according to which the number of board seats and the allocation of board seats are contractually determined in the corporate charter and a voting agreement. Board size contractual determination means that any change in

²³In fact, to emphasize such exclusion and to avoid any potential lingering uncertainty, Uber's corporate charter had the following provision: "Notwithstanding anything to the contrary contained herein, neither the holders of Series Seed Preferred Stock, Series B Preferred Stock, and Series C-1 Preferred Stock, nor the holders of Class A Common Stock will be entitled to vote in the election or removal of any directors of the Corporation" (Uber Certificate of Incorporation, 07/31/2013, Page 17).

the number of directors should be approved by shareholders and, moreover, that various classes of shareholders not infrequently have veto rights over this change. Note that as startups raise successive funding rounds, additional board seats are added ad hoc as new investors negotiate a board position.

The contractual allocation of a board seat to a specific class of stock is difficult to rescind. Furthermore, a party with control over the designation of a board member (usually a lead investor of the round in the case of a preferred stock allocation of the board seat) may replace a board member and designate another board member representing its interests at any time without any need for the approval of other shareholders or board members. All this evidence points to the utmost importance of board control and composition.

In addition to the board size and composition, investor contractual agreements often specify the requirements for the composition of various board committees. A frequently encountered requirement is that any board committee (such as the compensation, the investment, and the audit committees) must have either a representative or a majority of directors that represent a specific set of shareholders. Not surprisingly, most often this set of directors is representing the preferred shareholders, that is, investors. This provides further protection to startup investors.

4.2.2 Types of board members

Both academic and industry literature on the corporate governance of publicly traded companies commonly classifies directors into insiders or executive directors, who are the company's senior executives, and outsiders or non-executive directors (Adams 2017). Such a distinction is less informative in the startup setting, given the board membership allocation and active participation of investor board members. Instead, it is more fruitful to classify directors into the following groups.

Common directors. Common directors are designated by common shareholders. In startups, especially at an early stage, these directors are typically company founders. An important negotiating issue in the first investor round is often whether all company founders become directors, as adding common directors dilutes the power of investor directors. As a result, the number of common directors

is often limited.²⁴ In the case of multiple founders, there are often agreements between founders that spell out who will become a board member representing common stockholders. Such an agreement could be a formal legal contract or could be more informal. Later in the life of the company, people other than founders are often selected to represent common shareholders. If there is more than one class of common shareholders then, as in the example of Uber, it is often the case that only specific classes have the right to designate a director.

Investor directors. Investor directors represent preferred shareholders. Such directors could be designated by all preferred shareholders voting as a single class or, more often, designated by a specific series of preferred shares. In the former case, a separate voting agreement supplements the corporate charter by frequently identifying a specific investor who will have the right to nominate a director.

In practice, lead early-stage investors usually join the boards. For example, when a company raises its first VC round (say, through issuing Series A preferred stock), the lead investor, often a VC fund, will typically have the right to designate at least one director. Often, when a syndicate of investors participates in the round, two or more co-lead investors have the right to designate one director each. Alternatively, they may need to decide through the voting agreement who will become a director representing this series of preferred stock. Kaplan and Strömberg (2003) found in their sample that VC investors obtain the right to a board seat in over 40 percent of financing transactions. Evidence given in Ewens and Malenko (2020) suggests that lead early-stage VCs typically obtain a board seat.

Joint directors. Joint directors, often called independent directors in the VC literature, are appointed by the mutual agreement of common and preferred shareholders (founder-managers and investors). Often they are outside directors, meaning directors whose sole involvement with the company is in their role as a director. Startups often have joint directors, especially at a later stage of their lifecycle. To what extent joint directors could in practice be designated by a specific class of share-

²⁴Anecdotally, some solo founders may seek co-founders to ensure they can negotiate two board seats for common directors.

holders or to what extent some shareholders have an unequal power of say in the appointment of joint directors is an unsettled issue.

CEO directors. Voting agreements often reserve a separate board seat for the CEO. Note that, at an early stage, it is often one of the founders who becomes the CEO of the company. That founder thus may become a board member by virtue of being the CEO, while another founder may be designated by common shareholders. One difference is that if the CEO is replaced, the previous founder-CEO automatically loses the board seat but not the seat designated by common shareholders. For this reason, in the case of a solo founder, that founder is designated by common shareholders, and the CEO board membership is not needed.

Non-voting directors In addition to full voting board members, startups also may have non-voting directors or, as they are often called, board observers. Board observers have the right to participate in (most) board deliberations and receive the same information from the company as full voting board members. However, they have no right to vote as board members. Given the importance of access to information, many investors who do not get to nominate a board member negotiate the right to designate a board observer. In practice, this is especially common in later rounds of funding.

In some cases, there are voting board members who may have “conditional” access to information and “contingent” voting rights. This means that during discussions of some pre-specified topics they cannot participate and are excluded from information sharing. These contingencies would be carefully negotiated and specified clearly in contracts. An example is an investment by a corporation either directly or through a corporate venture fund, in which a board member representing their interest “leaves the room” during a discussion of a company sale to a potential competitor.

4.2.3 Board structure

Evidence on board composition suggests that startups have plenty of director representation. In their sample, Kaplan and Strömberg (2003) find that VCs hold approximately 41% of the total board seats,

founders (including the CEO as a director) hold 35%, and independent directors hold the remaining 23%.

Despite specific board members being elected by a particular group of shareholders, all board members owe a fiduciary duty of loyalty to the entire company under corporate law. Important corporate actions frequently create a conflict between the economic interests of the firm and one or more classes of shareholders, and the differentially impacted classes may control a board seat. Because board members owe loyalty to the corporation, an investor or other owner could support (oppose) an action as a board member but oppose (support) it as a shareholder during the shareholder voting process or through the other control channels we discuss in this section. However, there is a clear potential for this conflict of interest to bias board member decisions, although this has only recently received particular attention from the courts. Bartlett and Talley (2017) discuss a particular relevant Delaware legal case, which was decided only in 2013. The board of Trados, the startup at the heart of that case, consisted of seven directors, two of whom were company executives, four represented VC investors or had close ties to them, and one was a jointly appointed independent industry expert. Given bleak growth prospects, the board sought to sell a company at a value, in which only preferred shareholders and select executives (through the management incentive plan implemented to incentivize these executives to facilitate the sale of the company) received any proceeds. Common shareholders, who received nothing, sued, alleging that the board violated its fiduciary duties by selling the company rather than continuing to operate it. The court ruling identified a number of problems with the decision-making process of the board and the actions of VC investors on the board. While the court concluded that the fair valuation analysis showed that common stock had no economic value and thus found the board not liable in that specific case, this recent ruling posits an important development in the treatment of frequent conflicts arising in startups.

Another phenomenon underscores the relationship between the board structure in publicly traded companies and startups. In corporate governance discussions of board roles in publicly traded companies, “few features of board structure have generated as much debate in recent years as the staggering of director elections” (Adams 2017). A board is staggered if only a subset of directors is up for (re-) election every year. Note that by this definition all boards of startups are staggered because seats des-

ignated by specific classes of shareholders are not up for re-election at a fixed frequency. Interestingly, evidence from young publicly traded firms, many of which were VC-backed, suggests that one purpose of staggered boards may be to allow founders to continue to influence the firm. For example, Field and Karpoff (2002) document that 36.2% of firms in their sample of 1,019 IPOs from 1988–1992 have staggered boards. Most of the academic research on the relationship between staggered boards and performance is, however, not applicable to startups.

4.2.4 Board control

With respect to the boards of publicly traded companies, corporate governance research distinguishes between independent and captured boards, the latter being the boards in which a majority of directors are either appointed by management or not truly independent of the management. The nomenclature of captured and independent boards is thus less relevant to early-stage startups because most board members have a substantial financial interest in the company. Instead, in thinking about various board control scenarios, we distinguish between founder-controlled boards, balanced boards, and investor-controlled boards.

A founder-controlled board has the majority of its directors designated by founders (most often through their ownership of the majority of common shares). Evidence suggests that early on in the life of startups, founder-controlled boards are most common. Conversely, an investor-controlled board has the majority of directors appointed by investors. A balanced board is a board in which neither investors (preferred shareholders) nor founders (common shareholders) by themselves constitute a majority of the board, principally due to the presence of joint directors.

The control of the board gives the controlling party an important right to initiate corporate actions. Considered in this light, protective provisions that allow a shareholder to block an action are complementary to the board control. For example, board control may facilitate the ability of investors to sell the firm without internalizing the residual claim of common shareholders (as argued by Broughman and Fried (2010), though see the discussion of recent legal cases above) or make it easier for VC

investors to exit their investment over the possible objections of other stakeholders (Fried and Ganor 2006).

The broad economic mechanisms underlying the control allocation in the firm also apply to board control. For example, as Aghion and Bolton (1992) show, it is beneficial to award control to the founders, if possible, in order to protect founders' private benefits. The opposing factor is the investor participation constraint that may lead to the necessity of investor control. Numerous academic studies have applied economic theories of control to startups, mostly through the prism of an investor holding preferred stock (e.g., Kirilenko (2001), Schmidt (2003)). However, the issues specific to board control in the startup setting have been scantily discussed in the academic literature to date. A notable exception is the attention paid to these issues by some legal scholars. For example, to explain the existence of joint directors and balanced boards in startups, Broughman (2010) develops an argument, according to which these directors act as an unbiased third party that can prevent opportunistic behavior that would occur in investor-controlled or founder-controlled companies. In this context, jointly appointed directors act as the tie-breaking vote. This limits the opportunism of the founder-manager directors and investor directors and causes them to seek compromises.

Note that disagreements may arise not only between founders and investors, but also between investors and other investors. A common conflict arises between directors representing early rounds and those representing later rounds on the target exit timing, type, and value. Early-stage investors may prefer a faster sale because their earlier (and lower-priced) entry means they have made significant returns but are now winding down their funds. Late-stage investors may prefer to hold out for a potentially higher-value IPO exit because their shares were acquired more recently at a higher price. Indeed, in many cases, the original issue price of early-stage directors is so low relative to that of later rounds that these preferred shareholders may be more attuned to the interest of common shareholders than that of other preferred shareholders. These inter-investor disagreements may play an important role in the board dynamics and resulting control over board decisions. We explore this more fully in Section 5.

Empirical evidence suggests that board control is often exercised by VC investors. Kaplan and Strömberg (2003) found that VC investors controlled the startups' boards in 25% of their sample, while founders controlled the board in 14% of companies. Notably, in the rest of the sample (61%) jointly appointed directors are tie-breaking, resulting in balanced boards. Broughman (2010) found similar distribution in a smaller sample of Silicon Valley startups.

4.3 Founder and employee restrictions

The quality of human capital is key to the outcomes of entrepreneurial companies. VC investors regularly perceive management teams to be the most important factor in their due diligence of investment opportunities (Gompers et al. 2020). Arguably more than in a public company setting, if a startup's management team is disincentivized to provide a high level of effort or leaves the startup altogether, the damage to the company's prospects is substantial if not lethal. As a result, the provision of proper efforts is an important part of negotiations between founder-managers and investors and can be traced to many aspects of contractual arrangements. Of those we already discussed, founder-managers tend to own common shares and thus are junior shareholders relative to the preferred shares owned by investors. In the bad state of the world, seniority of the preferred shares implies that the common ownership of founder-managers may be wiped out. Investors also share in corporate governance and often orchestrate a removal of the CEO (often a company founder) by the board.

In addition to the provisions we discussed, the structure of founder-management compensation (and, to a lesser extent, of the compensation of most employees in startups with perceived important human capital) reflects an attempt to resolve agency conflicts. A large fraction of compensation is tied to the performance of the firm. In the case of founders and senior managers, a share of contingent compensation dominates a noncontingent salary compensation. Foremost among the compensation structure elements is the vesting arrangement, according to which founder-managers receive stock options or shares of restricted stock that vest over time. This vesting arrangement extends to founder equity, implying that if the startup founder opts to leave the company soon after receiving the first round of VC investment, the founder forfeits the entire ownership stake in the company. Shares vest

over time according to a pre-specified vesting schedule, with a typical duration of three to four years. The vesting schedule often includes two components: cliff vesting and incremental vesting. During the initial period of employment (or, for founders, during the initial period after the first VC round, for example, for the first year), no shares vest; instead, a large fraction of shares vest at the same time in a cliff. Subsequently, shares vest incrementally, monthly or quarterly, for the remaining duration of the vesting schedule.

Such a compensation arrangement aligns incentives of the founder-managers and investors and minimizes incentives for managers to shirk or to engage in activities to derive private benefits at the expense of other shareholders. The cliff vesting ensures that if the founder-managers leave firms early on, their entire share ownership is forfeited. Kaplan and Strömberg (2003) find that it is common for startups to include such vesting provisions, especially in first VC financings.

In addition, investors may insist on founder-manager employment contracts including non-compete provisions. These prohibit the founder-manager from working for another firm in the same industry for a specified period of time after they leave the firm. Kaplan and Strömberg (2003) find that non-compete clauses are used in approximately 70% of the financings.²⁵ Both vesting and non-compete provisions, by making it more expensive for employees to leave the firm, aim to resolve the hold-up problem (Hart and Moore 1994) that could be particularly severe in an early-stage firm.

4.4 Redemption rights

Redemption rights entitle preferred shareholders to force the company to repurchase their shares under certain conditions, typically at the price they originally paid for those shares or their liquidation preference. From an economic viewpoint, such redemption is similar to demandable debt where creditors can demand the repayment of principal at pre-specified times. Although these terms are cash flow rights in form, the fact that startups are generally either wildly successful (making the right irrelevant) or cash-poor (making a cash return impossible) means they function more like control rights in

²⁵Ewens and Marx (2018) use the changes in state non-compete laws to explore founder replacement and startup performance. They observe that states that are home to many startups, such as California and New York, do not enforce non-compete contracts.

practice and add to investors' arsenal of bargaining tools. Such rights can force the sale of startups that are not on the path to high growth. For example, if an initially promising startup transitions into a so-called "lifestyle business" that supports employee wages and gives the managers control benefits but affords no possibility of high return, redemption rights allow investors to force a sale or a change in strategy. More broadly, redemption rights mitigate founder-manager moral hazard.

Kaplan and Strömberg (2003) find that almost 80% of financings in their sample featured redemption rights, which is similar to 78% found by Williams (2017) on a larger and more recent sample. At the same time, given the potential potency of these rights, two conditions often must be met before investors can utilize redemption provisions. First, redemption rights can be triggered only after a certain period of time, giving founder-managers some breathing room. Kaplan and Strömberg (2003) find a typical maturity of five years. Second, a certain percentage of preferred shareholders are often required to vote in favor in order to trigger redemption rights, indicating the importance of inter-investor conflicts that are associated with redemption.

4.5 Informal control mechanisms

The nature of startups means that control can extend far beyond formal legal rights. Founder-manager power is constrained by the power of the purse. While founder-managers provide key human capital, investors provide financial capital. Founder-managers who defy the will of their investors may find themselves cut off from funding from those investors. The important signaling role of reinvestment and pro-rata rights means this can completely shut a firm out of fundraising (Rajan 1992).

Investor power is similarly constrained through several mechanisms. First, a founder-manager's human capital can give them outsized bargaining power above and beyond any contract. The departure (or even reduced effort) of a visionary leader could cripple a fast-growing firm, and as such, VCs are unlikely to force the hand of the founders of successful firms. Second, reputation is of paramount importance in the VC world given the fact that VCs rely on deal flow from networks to generate returns (Gompers et al. 2020) and syndication from friendly firms (Hochberg, Ljungqvist, and Lu 2007; Nanda and Rhodes-Kropf 2019). A VC firm that routinely pushes the limits of its control rights

in conflicts with founders or other investors can build up a negative reputation in a business where reputation is key to success. Third, the inevitable dilution and renegotiation of future rounds offer multiple opportunities for an unhappy founder-manager (if they remain with the firm) to undermine investor returns.

4.6 Legal system

Beyond specific contractual rights, the legal system provides investors and managers with a variety of standard protections. Investors have some degree of protection against deceit and expropriation by majority owners.²⁶ Founders and other common equity holders benefit from some legal precedents that prioritize their claims above those of preferred investors.²⁷ Although public legal battles may cause reputational damage and therefore are detrimental to success in the entrepreneurial ecosystem, these rights bound the actions taken by the parties involved. The potential for lawsuits could have a chilling effect on actions taken or give parties bargaining power beyond their contractual rights. For example, some acquirers insist on an overwhelming shareholder vote (say, 90%) in favor of the sale out of fear the dissenting shareholders may initiate the legal action. Many of these issues are guided by legal precedents, potentially offering scope for further careful empirical work.

4.7 Across investor variation in control rights

Most of our discussion of control rights has focused on founder-managers and VC investors. This is natural because these parties tend to have the most active corporate governance roles. However, startups have numerous other stakeholders with varying degrees of control.

While early-stage VC investors typically take a major governance role, the angel investors who immediately precede them frequently have little in the way of governance rights. Because debt typically has

²⁶For example, see the description of the entire fairness doctrine in <https://rc.com/documents/Primer on Business Judgment Rule.pdf>

²⁷For example, the Trados court argued that “it is the duty of directors to pursue the best interests of the corporation and its common stockholders, if that can be done faithfully with the contractual promises owed to the preferred.” (In re Trados Inc. Shareholder Litigation, C.A. No. 1512-VCL, mem. op. (Del. Ch. Aug. 16, 2013))

limited control rights outside of distress and covenant violations, angel investors using the debt-like convertible notes end up with relatively little power. The main lever at their disposal is their right to the return of their principal at the maturity of the notes—which gives rise to a similar power as redemption rights. Investors using SAFEs have even less power because these investments lack even the principal repayment of the convertible notes. Angel rounds using preferred equity can have the same control rights as VCs; however, most convertible notes and SAFE issues offer little in the way of control rights. Angel-led preferred equity investments can come with a board seat; however, this is not typical. Late-stage investors may have different preferences still. For example, Chernenko et al. (2021) show that mutual funds receive redemption rights and IPO-related rights but rarely receive board seats.

4.8 Relationship between cash flow and corporate governance rights

Cash flow rights and corporate governance rights are closely linked. Economic mechanisms may lead to either complementarity or substitutability of these rights in startup financing. For example, an investor may exert a larger degree of control over corporate actions, while providing founder-managers with stronger cash flow rights and relying to a lesser degree on protective covenants. Indeed, Bengtsson (2011) shows evidence that contracts providing preferential cash flow rights to investors or those that do not lead to investor-controlled boards also have more protective provisions. Bengtsson and Sensoy (2011) show that more experienced VC investors, whom they estimate to have superior abilities and who are more frequently joining the boards of their portfolio companies, obtain weaker downside-protecting contractual cash flow rights than less-experienced VC investors. The authors conclude that investors with better governance abilities focus less on obtaining downside cash flow rights, which entail risk-sharing costs, and more on governance aspects of the contract, such as obtaining board representation, during negotiations with entrepreneurs. Similarly, Bottazzi, Da Rin, and Hellmann (2008) show, on the sample of European VC firms, that more experienced investors are substantially more likely to be active, including in taking board seats in portfolio companies. Gompers, Kovner, Lerner, and Scharfstein (2010) find that successful serial entrepreneurs do not receive more favorable valuations from VC investors even though their subsequent companies are more likely to be successful.

However, Bengtsson and Sensoy (2011) show that serial successful entrepreneurs do, in fact, raise capital at more attractive terms (lower effective valuations) because the VC investors obtain weaker downside protections. This finding underscores the importance of interconnection between cash flow rights and corporate governance.

Empirical evidence by Kaplan and Strömberg (2003) and subsequent researchers shows that both cash flow and control rights can be separated and made contingent on the future states of the world, including observable and verifiable measures of performance. While these provisions are correlated, correlations are far from perfect. For example, Kaplan and Strömberg (2003) show that board control and voting rights are correlated, implying that if investors have the majority of the board, they also tend to have majority share voting rights. They also find that in their sample control rights and cash flow rights are positively correlated as well, even though there is a cluster of companies in which there is a clear separation of the parties' cash flow and control rights. Taken together, these results point out the interconnection between cash flow and corporate governance provisions in startups.

5 Evolution of cash flow rights and control

Successful startups almost invariably raise multiple rounds of funding, with each additional financing round dramatically complicating the company's capital structure. Startups have stayed private longer over the past decade (Ewens and Farre-Mensa 2020), leading to more financing rounds and increasingly complex capital structures.

Airbnb, shown in Table 4, offers an example of a successful company's fundraising path. It raised multiple rounds from different sources, with round sizes and prices increasing as the company scaled. Each of these rounds in general leads to the dilution of existing ownership claims (Section 5.1), with each new round reducing all existing shares ownership claims. Shareholders mitigate this through a number of channels, most importantly through reinvestment into successful startups (Section 5.2). Beyond cash flows, each round changes the governance structure of the firm, transferring control from the founders and existing investors toward new investors (Section 5.3).

Table 4: Airbnb major financing rounds: This table presents Airbnb’s major financing rounds, as reported by Pitchbook. Valuation is the reported or estimated PMV. n.d. means no data. N/A means data are not available.

Date	Round	Lead investor(s)	Investment (\$m)	Valuation (\$m)
Nov 2008	Accelerator	Y-Combinator	\$0.02	n.d.
Apr 2009	Series Seed	Sequoia	\$0.6	n.d.
Nov 2010	Series A	Sequoia and Greylock	\$7	\$67
Jul 2011	Series B	Andreessen Horowitz	\$112	\$1,300
Feb 2013	Series C	Founders Fund	\$200	\$2,500
Apr 2014	Series D	TPG	\$475	\$10,000
Nov 2015	Series E	Hillhouse Capital and others	\$1,600	\$25,500
Jun 2016	Debt	JPMorgan and others	\$1,000	N/A
Sep 2017	Series F	CapitalG and TCV	\$1,000	\$31,000
Apr 2020	Growth Equity	Silver Lake and others	\$2,000	\$18,000
Dec 2020	IPO		\$3,490	\$41,000

5.1 Dilution

One of the most important features of multiple financing rounds is that each round dilutes the ownership of all existing shares. Using the notation from Section 3, the fully diluted ownership claim of securities i at the time of exit is equal to their initial ownership claim (I_i/P_i) , diluted by all future issuances $(1 - I_j/P_j)$:²⁸

$$\omega_i(\mathbb{Z}_T) = \frac{I_i}{P_i} \prod_{j=i+1}^N \left(1 - \frac{I_j}{P_j}\right). \quad (8)$$

Kaplan and Strömberg (2003) find that as the number of rounds progresses, investors, considered as a single class, tend to increase their cash flow and control rights at the expense of common shareholders and thus founder-managers. While this finding has been supported by more recent research, a caveat

²⁸Option pools and anti-dilution terms, which we discuss in Sections 3.3 and 5.1.1, respectively, may impact this dilution further.

to keep in mind is that investors do not represent a monolith but rather, as the company raises more financing, their body becomes more dispersed, with often diverging preferences (Bartlett 2006).

Investors use multiple avenues to protect themselves from such dilution. First and foremost, they frequently reinvest (Section 5.2), which allows them to counteract dilution by buying more shares. Beyond that, at the time of negotiating their original investment, they often insist on protective provisions and shareholder voting rights that effectively allow them to block a future financial transaction that is substantially adverse to their economic interests. If investors join a syndicate, they may negotiate the pay-to-play provisions, thus increasing incentives for all the investors in the round to provide financing in the future (see Section 5.2.3). Finally, investors routinely negotiate so-called anti-dilution rights that offer protection against dilution in unfavorable financing rounds. We discuss this now.

5.1.1 Anti-dilution

An ideal investment would see the startup posting strong growth, increasing its value, and issuing each subsequent financing round at a higher price in the lead up to a fabulous exit. In practice, this is, of course, not always the case and even successful startups (such as Airbnb) stumble. Poor company performance or changes in the overall market can force a company to raise money at a lower PMV, if it does not fail entirely. As shown in Equation (8), the lower the PMV of a financing round, the more dilution it creates for existing owners. This impacts both cash flow rights which we discuss here, and control rights which we discuss later. Raising a financing round at a lower price than the preceding round is called a “down round.”

Investors routinely negotiate for anti-dilution rights that offer protection against dilution in unfavorable financing rounds. Anti-dilution protection is triggered whenever the company issues a new series of preferred shares at a price below that paid by the protected investors. In that event, these provisions increase the number of common shares the protected investor gets upon conversion by adjusting the price at which they convert into common shares.

To show how anti-dilution protection works, consider the most common form of anti-dilution, broad-based weighted average anti-dilution. After each subsequent round $j > i$, the ownership share of existing securities with weighted-average anti-dilution protection (A^{AD}) increases to

$$\omega'_i = \max \left\{ \omega_i \left(1 - \frac{I_j}{P_j} \right), \omega_i \left(\frac{\frac{\omega'_0}{\omega_0} + \frac{I_j}{P_j}}{1 + \omega_i I_j / I_i} \right) \right\} \text{ for } i \in A^{AD}, \quad (9)$$

and the ownership of securities without anti-dilution protection is correspondingly reduced to

$$\omega'_i = \omega_i \frac{1 - \frac{I_j}{P_j} - \sum_{k \in A^{AD}} (\omega'_k)}{1 - \sum_{k \in A^{AD}} (\omega_k)} \text{ for } i \notin A^{AD}, \quad (10)$$

where ω_0 is the ownership of common equity.²⁹

Weighted average anti-dilution protection adjusts the conversion price of the protected securities downward to a value between the price paid by the protected investor and the price paid by the investors in the current round. A stronger form is known as “full ratchet anti-dilution protection,” which adjusts the conversion price downwards all the way to the price of the shares issued in the new round. Kaplan and Strömberg (2003) find that almost 95% of preferred stock financings include some form of anti-dilution protection. Using a more recent sample, Williams (2017) similarly finds that anti-dilution protection, mostly broad-based weighted average, is present in approximately 92% of preferred equity financings.

Whether preferred shares feature weighted average anti-dilution or the more extreme full ratchet anti-dilution, common equity does not have anti-dilution protection and therefore typically bears the brunt of these anti-dilution adjustments to conversion prices. To the extent that common stock is owned by founder-managers or employees who are still instrumental to the startup’s success, incoming investors often renegotiate anti-dilution protection and may threaten to withdraw their investment offer if existing investors exercise their anti-dilution rights. As a result, anti-dilution protections are often waived by investors or their impact is attenuated through renegotiation. As an alternative, anti-dilution exercise could coincide with a stock grant of shares to the continuing senior management,

²⁹In practice, these formulas are expressed in terms of conversion prices rather than ownership fractions.

thus providing protection to existing investors and current managers at the expense of other common shareholders, especially the founders who are no longer with the company.

5.1.2 Dilution of downside protections

Beyond dilution of raw ownership, future rounds also dilute the downside protections of existing investors. In a liquidation or sale where there is insufficient value to pay off all investor claims, new investors directly impair the value of existing investors. For example, if all rounds are *pari passu*, the payoff becomes as follows, with each round diluting downside protection:

$$\pi_i(X_T, Z_T) = X_T \frac{L_i I_i}{\sum_{j=1}^N (L_j I_j)}. \quad (11)$$

New rounds that are senior or have high liquidation multiples lead to even more dilution of downside protection for existing preferred shareholders, as Gornall and Strebulaev (2021b) show. This significantly reduces the *ex-ante* value of investor downside protections.

Beyond just dilution, sometimes the previous series are stripped of their contractual protections. The most extreme form of this is a recapitalization or “cram-down,” where preferred shareholders are converted into common equity. These transactions, which typically occur for distressed companies whose investors would otherwise write off the investment, wipe out special contractual provisions of preferred investors.

5.2 Reinvestment

Our Airbnb example shows that investors frequently reinvest in startups. In this section, we discuss the reasons for that investment structure (Section 5.2.1) and how investors protect their right to invest (Section 5.2.2) or even partially commit to re-investing (Section 5.2.3).

5.2.1 Staging

VCs and many other investors aim to stage their investments in a startup. “Staging” means that at the initial round of investment, the investors inject funding that they know to be insufficient for the company to succeed in the majority of even good states of the world. As a result, investors expect to facilitate further financing in the future, which they make implicitly and explicitly contingent on the interim company performance (Gompers 1995). Staging serves to protect investors by limiting the exposure to companies that face a high uncertainty and a large probability of failure. From one angle, therefore, staging can be seen as a real option: by investing the small amount necessary to keep the startup exploring its product and business model while uncertainty is partially resolved, investors buy an option to continue investing in the entrepreneurial project in the future.

The VC environment adds two wrinkles beyond a traditional real option setting. First, VC investors tend to form investment syndicates. In the next rounds of funding new investors often enter the fray and lead negotiations. This can dilute existing investors’ cash flow and governance rights. Second, VC investors often utilize new financing rounds to renegotiate control rights, especially if the company is not performing as expected. This is consistent with an incomplete contracts framework in which future control rights are contingent on future realizations.

Staging provides strong performance incentives to founder-managers who may have to meet agreed-upon milestones to secure future financing and to ensure they have a higher chance of staying at the helm of the company. These beneficial aspects of staging must counterbalance with a well-known deficiency of dynamic financing, in which the investor does not or cannot commit to providing future funding. Agency conflicts or changing funding market environment may lead to inefficient liquidation in cases in which it would be optimal for the companies to continue operations in the first best case (Holmström and Tirole 1998).

A related aspect of staging is the information asymmetry between insiders (including existing investors) and outsiders (including new investors). This may lead to a hold-up by existing investors; indeed, if

an existing investor refuses to fund the company, it sends a strong negative signal to any potential incoming investor who, as an outsider, is by nature less informed (Rajan 1992).

An investor needs to ensure that when the time comes for the next fundraising, she has enough funds at her disposal to participate in the financing round if she wishes to do so. Thus, at the time of an initial investment, investors, especially VC funds, allocate a portion of their capital in anticipation of future fundraising. This is known in the industry as “dry powder.” For VC funds, which are constrained with respect to both time (because of a limited fund horizon imposed by limited partners) and capital (because of a limited fund size), the dry powder allocation decision is a critical consideration. In addition, anecdotal evidence suggests that VC investors consider their ability to fulfill their implicit commitment to their portfolio companies to be a critical component of their reputation, which allows them to secure access to promising investments in the future.

5.2.2 Pro-rata rights

Pro-rata rights give investors the right, but not the obligation, to invest in future rounds at the same terms as newly incoming investors. They are entitled to invest up to their current ownership share on a fully diluted basis. This allows them to stave off ownership dilution created by future rounds. Investors that utilize pro-rata rights in follow-on rounds thus end up holding preferred shares of different series, even though their fractional ownership of these series varies. For example, a lead investor holding the majority in a specific series of preferred stock may subsequently acquire minority ownership positions in subsequently issued series of preferred stock.

Reinvesting serves several purposes. First, it allows investors to capitalize on their inside information and reinvest in companies they see as undervalued. Second, it allows them to maintain a governance stake. Third, it puts them on both sides of the transaction and partially mediates the effects of mispriced rounds or downside protection dilution.

Existing owners who use their pro-rata rights reduce the amount of the financing round available to the new investor. In many cases, the lead new investors will insist on adjusting special class voting

thresholds to ensure they hold the class voting privileges. In others, negotiation can lead to some earlier investors partially waiving their pro-rata rights.

A related contractual term often negotiated with common equity holders (and sometimes with preferred equity holders as well) is the so-called “Right of First Refusal” (ROFR). ROFR means that if shareholders desire to sell their shares and find a willing buyer, they must provide the company with a notice of proposed sale, and then the company or some of its designated investors may have the right to exercise the ROFR and purchase the shares at the negotiated price.

5.2.3 Pay to play

Pay-to-play terms penalize existing investors who opt not to participate in future financing rounds. The penalty may range from the loss of anti-dilution protection or other preferred shareholder rights to the automatic conversion of that investor’s preferred stock into common stock. These terms are observed only in transactions in which a financing round is organized by a syndicate of investors. In this case, it may be insisted upon by some syndicate members as a protection against other members of the syndicate refusing to finance the company in the future.³⁰ The pay-to-play provision helps align incentives by making it costly for investors to shirk from providing financing. As such, this provision signals inter-investor conflicts of interests.

Pay-to-play provisions are less frequent than might have been expected, given the prevalence of investor syndicates in financing rounds of startups. Williams (2017) finds that approximately 9% of preferred equity financings feature a pay-to-play provision. Within that sample, conversion of preferred shares to common is the most frequent punishment for investors refusing to participate in the subsequent financing rounds. Bengtsson and Sensoy (2015) find that pay-to-play provisions are more frequently observed in down rounds and flat rounds compared to up rounds. This suggests that the likelihood of investors abandoning the company in the future in the down round is higher, necessitating contractual intervention to align incentives.

³⁰See Blaydon (2002) and LeClaire, Kendall, and Taft (2005) for practitioner discussion of pay-to-play.

5.3 Control

Startups issue more preferred shares with each successive round of equity funding. New investors gain voting privileges and some may even join the board of directors. As a result, common shareholders, including founder-managers, see their control diluted over time unless they initiate corporate governance changes to retain control rights, such as supervoting. Kaplan and Strömberg (2003) show that founders' voting and board rights decline over financing rounds, while investor rights increase. The board control is more likely to shift from common or founder-controlled to investor-controlled boards (Ewens and Malenko 2020). Given the contingent nature of many contractual provisions as well as the dependence of bargaining power of new investors on the evolution of company fortunes, we should expect that the evolution of control is contingent on company-specific dynamics. For example, down rounds should lead to a higher likelihood of founder-managers rescinding control of the company (Ewens and Marx 2018). Bengtsson and Sensoy (2015) show that new lead VCs are weakly more likely to take a board seat if the company performs poorly.

As discussed in Section 4.1, shareholder voting rights typically offer vetoes to specific classes of investors over specific actions. In the early stages of a company's lifecycle, this mostly protects investors against the rent-extracting behavior of founder-managers that is adverse to investors. In later stages, inter-investor conflicts gain importance as investors differ more and more in terms of economic preferences and contractual rights. The fact that each subsequent fundraising results in the issuance of a stand-alone class of shares (typically in the form of a series of preferred stock) underlines the importance of inter-investor differences.

The most consequential decisions are also the situations in which the divergence of interests among investors is at its highest: the choice of the company's exit strategy and the timing and conditions of subsequent fundraising. The nature of preferred stock inherently leads to a difference in outcomes for a particular class of investor over a potentially wide range of company exit values depending on whether such exit is a sale (in which case preferred rights, such as liquidation preference, are more protected) or a public listing (in which case automatic conversion ensures the loss of preferred rights). Some investors, especially the late-stage investors investing at higher price points than previous shareholders, demand

substantial protective rights against an unfavorable outcome, including a veto in certain cases, or expect a discount to take into account the future value extraction and a value transfer from them to earlier investors and common shareholders.

A prominent example of this is the class-level automatic conversion exception, in which a class of investors can effectively block an IPO unless they receive a certain minimum return on their investment. The veto right over an IPO completion arises because it is the universal practice in the industry that all the convertible preferred stock should convert into common stock in the IPO process. This is contractually accomplished by automatic conversion, which enables the company to force all the preferred shareholders to convert into common stock under certain conditions. Contractual terms can exempt investors from that unless additional, substantially stringent, conditions are met. In the realm of highly valued startups, which are thus closer to the IPO eventuality, these automatic exemption clauses are not infrequent.

6 Valuation of venture capital securities

Valuing assets is central to finance. In the VC context, it facilitates allocating funding to entrepreneurs and investment managers, managing risk, and trading in secondary markets. Unfortunately, startups are fundamentally difficult to value, especially at an early stage of their life cycle. First, given that their profits occur well into the future, their cash flows are inherently difficult to forecast, as discussed in Section 2. Second, as we have discussed at length, startups tend to raise funding numerous times using a variety of complicated contracts. For these reasons, startup investors use various rules of thumb and simplified versions of more traditional financial valuation methods.

We discuss first the valuation of startup cash flows (Section 6.1) before moving on to how valuation is impacted by the contractual terms that we have discussed in the previous sections (Section 6.2).

6.1 Valuing innovative projects

Innovative high-growth startups usually lose money in their early years. These early losses are offset against large future profits that are in the relatively distant future and may not occur at all. In fact, many startups have no real revenue at the time of the first external financings and no profit in the foreseeable future. These properties make it not only difficult to forecast cash flows but also mean that small changes in discount rates have large impacts on valuation. Some of the core parameters of common valuation models in finance (such as β) are non-trivial to estimate for VC as an asset class, let alone at the level of a particular startup (Korteweg 2019).

Beyond the nature of the cash flows, startup investors struggle to gather information. The founder-managers, who are often the most knowledgeable about the product and customers and thus presumably in the best position to estimate future cash flows, have conflicted incentives in their negotiations with investors. Founders of startups are also well-known to be case studies in irrational exuberance. For example, Gompers et al. (2020) show that less than a third of early-stage startups ever meet revenue forecasts. As a result, investors routinely discount founder-manager optimistic expectations. Of equal importance, core determinants of success are perceived to be generally intangible qualities such as managerial ability (Gompers et al. 2020).

These challenges have led VCs and other early-stage investors to eschew the sophistication of traditional valuation approaches and instead to adopt a radically simple, yet powerful, set of valuation techniques. We will discuss three broad families of valuation models used by investors to value startups as stand-alone companies: cash flow-based models, market comparables approaches, and non-quantitative methods. It is important to emphasize that our discussion will be particularly relevant to early-stage startups. As startups mature, traditional valuation methods start playing an increasingly important role in their valuation. The robustness and applicability of these methods depend in large part on the predictability of cash flows, which is naturally greater for more developed companies.

Although these simplified valuation techniques are inherently inaccurate, several channels mitigate the real impact of this inaccuracy. First, staging (Section 5.2.1) attenuates the noise in valuation. For

example, an investor who overpaid for Series A may pay a fair price or even a lower than fair price for a subsequent Series B round raised by the same startup (see, for example, Admati and Pfleiderer (1994)). Second, especially in early funding rounds, the valuation is just one component among the multitude of contractual terms and contractual downside protections (e.g., anti-dilution) which reduce the cost to investors of pricing errors. Third, startup investors, whether angel investors or VCs, diversify their holdings across multiple startups, leading to pricing errors balancing out further. Note that many of these channels are not available to other claim holders, such as founders and employees.

Beyond these considerations, it is important to note that there is no well-functioning market for startup shares and valuations are outcomes of negotiations between investors and founder-managers (and, more broadly, between investors and a startup's existing claim holders), implying that the bargaining power of the involved parties, as well as the local fundraising environment, are particularly relevant. The notional monetary component of valuation is thus only one ingredient in a complicated contractual outcome, as we show later.

6.1.1 Cash flow-based valuation

The classic method of valuing and discounting cash flows is net present value (NPV) analysis. Early-stage startup investors, such as VCs, adapted the NPV method in several ways to be applicable in their context.

VCs that do use the classic NPV method typically use large discount rates in the range of 25–30% or higher. These discount rates at face value are much higher than those that one would estimate using methods prescribed in classic finance textbooks and are broadly unrelated to academic assessments of the risks that VCs face.³¹ As argued by Gompers et al. (2020), VCs effectively think of IRRs conditional on successful projects. Using excessively high IRRs thus allows VCs to continue using somewhat optimistic cash flow projections and achieve a more realistic aggregate IRR in the face of numerous portfolio company failures. Thus, the discount rates used are designed to partially capture

³¹For assessments of the risks and returns that VCs face, see, for example, Cochrane (2005), Harris, Jenkinson, and Kaplan (2014, 2016), Kaplan and Schoar (2005), Korteweg and Nagel (2016), Korteweg and Sorensen (2010, 2017), Korteweg (2019) and Gupta and Van Nieuwerburgh (2021).

the high level of project-specific idiosyncratic risk by stripping out the individual project characteristics with that of the portfolio of highly uncertain investments. In addition, higher discount rates may also compensate for the fees charged in the VC industry, making the net returns comparable to market alternatives to investors of institutional VC funds (see, for example, Litvak (2009) and Metrick and Yasuda (2010)).

To appreciate a common adaptation to the NPV method in startup valuation, consider a classic NPV problem, where an investor must pay I in exchange for some cash flows X_1, X_2, \dots at later dates. The startup is high-risk and has q probability of failing in each year, in which case it stops generating cash flows. Suppose the appropriate risk-adjusted discount rate for the project is r , perhaps coming from a capital asset pricing model. A classic NPV analysis would simply discount these cash flows based on their probability:

$$NPV = -I + \sum_{t=1}^{\infty} X_t \left(\frac{1-q}{1+r} \right)^t. \quad (12)$$

Venture capitalists frequently make two key simplifications to this approach. First, they ignore intermediate cash flows and instead focus on the startup's liquidity event. Writing $R = \sum_{s=0}^{\infty} X_{t+s} \frac{(1-q)^s}{(1+r)^s}$ as the value of the startup's discounted cash flows at year T , this simplifies the NPV expression to the following:

$$NPV = -I + R \left(\frac{1-q}{1+r} \right)^T. \quad (13)$$

Ignoring intermediate cash flows is justified in the VC context because these cash flows are generally relatively small. Startups rarely pay dividends and instead the major cash flow the investor will receive is simply the exit payoff, whether a sale or IPO.

A second major simplification is to bundle failure probabilities into the discount rate. This allows VCs to focus on the upside success in their discounting and offset idiosyncratic risk through an inflated discount rate:

$$NPV_{VC} = -I + R \left(\frac{1}{1+r_{VC}} \right)^T, \quad (14)$$

where r_{VC} is the “VC-specific” discount rate, equal to

$$r_{VC} = \frac{1+r}{1-q} - 1. \quad (15)$$

Several commonly applied VC-specific valuation approaches, such as the so-called “Venture Capital Method,” utilize these two adaptations.³² To summarize, these approaches use two modifications. First, they ignore intermediate cash flows, which is realistic given that most of the startup monetization outcomes that matter for VCs are exit outcomes such as sales or IPOs. Second, the discount rate used by VCs (that they also often call the IRR) includes both the risk-adjusted component r and the risk-unadjusted probabilistic distribution of future cash flows. This explains why, in surveys, VCs report much higher required IRRs (Gompers et al. 2020).

This mechanism also helps explain perhaps the most popular approach to valuation in the VC industry, which seemingly ignores the time value of money completely. Rather than discounting to the initial date, VCs instead set a valuation based on a targeted cash on cash multiple, such as 5 or 10. Cash-on-cash multiples are effectively (expected, required, or realized) multiples of invested capital (MOIC), which is measured as $MOIC = \frac{R}{I}$. Again, note that this measure ignores the intermediate cash flows and the probabilistic distribution of outcomes. However, while it can be perceived that the use of the MOIC valuation completely abstracts from both the time value of money and risk, it is not the case. Using Equation (13), we can define the break-even required MOIC as

$$MOIC = \left(\frac{1+r}{1-q} \right)^T. \quad (16)$$

Using an investment rule based on such an MOIC, VC investors can expect to break even on average in their portfolio, taking into account both risk and time discounting. In practice, additional considerations, such as the already alluded to economics of VC funds, lead to higher MOIC than break-even ones. Importantly, the fact that VCs require much higher MOIC than could otherwise be expected

³²Sahlman (2009) discusses in detail these valuation approaches. In addition, he also considers the impact of dilution, as investors expect that the return R they receive in the case of success will depend on future funding rounds the startup raises.

simply means that, in the “VC financial language,” the MOIC measure encapsulates risk and time components. To give a simple quantitative example, if we assume the risk-adjusted cost of capital of $r = 15\%$, exit time of $T = 5$ years, and an ultimate probability of success in the 5-10% range (all the parameters arguably in the reasonable empirical range), then the break-even MOIC are between 5 and 10, matching those frequently required by early-stage startup VC investors.

6.1.2 Market multiples valuation

The market multiples (also known as market comparables) approach to valuation involves valuing a subject company by comparing it to other similar businesses, often through a so-called value multiple. The idea behind multiples is that similar assets should sell for equivalent prices.³³ In the case of companies, it is common to measure the market price as a multiple of some form of earnings or revenue variable. Common valuation multiples, in practice, include the ratio of enterprise value (the total market value of all securities of the company including common stock, preferred stock, and debt) to EBITDA, earnings before interest and taxes (EBIT), or revenue. For example, investment bankers use the market multiples method valuing an M&A transaction using public company comparables with often sophisticated adjustments.

As in the case of the NPV method, a typical VC application of the market multiples method is also adapted to fit the context in which startups operate. First, startups typically have negative EBITDA and negative profit at the time of a VC investment. In their place, VCs use revenue, if there is any, and, if not, monthly active users or other metrics deemed appropriate for the startup in question. The underlying assumption here is that the company will pivot toward profitability at some later point, justifying a valuation based on revenue for a currently money-losing venture or a non-financial metric intended to capture the startup’s progress and the scale of eventual success.

Second, when performing a market multiples analysis, the key assumption (and a potential source of error) comes from the selection of the similar or comparable businesses (so-called “comps”) used to

³³For a practitioner-oriented introduction to the market multiples valuation method see Koller, Goedhart, Wessels, et al. (2010) and Damodaran (2006).

value the company of interest. The intent is that these comps should have a comparable form to the subject company. Embedded in each company's valuation multiple are the market's perceptions of the company's future growth prospects, profit margins, and risks. However, no two companies are identical, so identifying appropriate comparable companies requires reasonable judgment about the similarity of the comps to the subject company. In the case of startups, the public company peers traditionally used for market comparables may not be suitable. This applies not only to startups in emerging industries that lack public peers; even public peers in ostensibly similar industries have inherently different growth rates, profitability, and risk. Instead, VCs either look at comparable transactions of other early-stage startups to imply valuation or adjust the public comparables for the differential growth rates.

Third, the unaudited financials of a fast-growing startup are inherently less reliable than those of more mature publicly traded companies. This challenge applies to both the startups themselves and any privately held comparables selected for valuation (that often do not release revenue or valuations). In response, VCs often resort to rules of thumb (e.g., a valuation of 60x monthly recurring revenue), gut feel, and judgment.

Beyond explicitly using multiples of specific comparable companies, valuation is often based on the perception of the value of a segment of broadly comparable companies. For example, if early-stage pre-revenue software-as-a-service startups have secured a PMV of around \$10 million in a certain geographical area in the past several months, investors will tend to offer valuations around that number.

6.1.3 Non-quantitative approaches to valuation

The challenges of valuing (especially very) early-stage startups mean that valuation is triangulated from applying judgment-based rules. For example, based on their experience VCs may have a specific target ownership stake on a fully diluted basis. The minimum investor ownership stake may be viewed by investors as necessary to maintain control rights in light of expected future dilution and is often determined by the economic considerations of VC funds rather than a specific startup. The ceiling

on the target ownership stake is designed to preserve founder-manager incentives and ensure interest on behalf of future investors. In the very first VC rounds, the ownership stake has historically been within the range between 15% and 30%. In addition, while the expected future cash flows are difficult to estimate, investors can forecast expenses (and thus the amount they need to invest) for the relatively short period of time (typically until the next investment round, that is, over a 12- to 18-month horizon) with much better precision. The PMV then follows from effectively reversing the ownership calculations under contracting (Equation (2)):

$$\text{Post-Money Valuation} = \frac{\text{Investment Amount}}{\text{Investor Fully Diluted Ownership Stake}}. \quad (17)$$

For example, given a target ownership share of 20% and a company's cash needs of \$5 million, VCs triangulate to a PMV of \$25 million.

Another approach that might be used in some cases utilizes scoring rules of varying sophistication. They may be entirely qualitative (e.g., the so-called Berkus method³⁴) or a mixture of quantitative and qualitative techniques (e.g., adjusting local valuation norms based on startup quality, as in Bill Payne's scorecard valuation³⁵).

Another approach used frequently by angel investors is to defer valuation using SAFEs or convertible notes. This can be a partial deferral, as with a convertible note with a cap, or a full deferral with an uncapped convertible note. Although superficially appealing, deferring valuation creates its own set of issues and in many instances leads to the implied valuation range, as discussed in Sections 3.4 and 3.5.

6.2 Valuing contractual claims

Much of the academic work on VC valuation has focused on the question of how a startup's financial structure impacts the value of the financial securities it issues. This question lends itself to more formal analysis because we can often start with an observed price or prices, such as the price of a

³⁴See <https://berkonomics.com/?p=131>.

³⁵See <https://altitudeaccelerator.ca/wp-content/uploads/2012/02/Valuation-Worksheet.pdf>.

security issued in the latest round of funding. Given the price of one security, it is possible in principle to determine the value of the other securities that the company issues, ranging from stock options to common shares to other preferred securities.

Although, in principle, such a value decomposition could be performed at any time, in practice most startups lack a liquid market in *any* of their securities. As such, methodologies that value contractual claims generally price securities using the issuance price of the most recent financing round. For example, at the time SpaceX issued its Series M Preferred Stock, the price that investors paid for that stock was observed, which made it possible to back out the price of SpaceX's Series B Preferred Stock, consistent with the price of Series M shares.

6.2.1 Ignoring contractual terms

In practice, investors not infrequently ignore contractual terms when valuing securities issued by startups. This would mean, for example, assuming that SpaceX's Series A Preferred Stock and its common stock had the same value as SpaceX's Series M Preferred Stock at the time of the Series M issuance. Agarwal, Barber, Cheng, Hameed, and Yasuda (2017) show that mutual funds frequently employ this strategy. Gornall and Strebulaev (2020) report that many finance professionals, both inside and outside of the VC industry, think of the PMV as a fair valuation of the company.

Underlying this strategy is the idea that contractual terms do not matter. Although theoretically incorrect, this may not be an entirely unreasonable assumption in practice. First, the VC investment model is premised on massive successes and abject failures. Given that many contractual terms have value in intermediate and less-than-successful exit outcomes, to the extent investors rely only on extremely successful outcomes, the quantitative implications of some contractual terms may be of lesser importance. Second, the VC investment model is premised on multiple rounds of financing. Indeed, Jenkinson, Rauch, and Fu (2019), Bengtsson and Sensoy (2015), and Gornall and Strebulaev (2021b) argue that future round terms may impair the value of securities issued in previous rounds. To the extent that pattern holds more generally, the value of some contractual protections is subject to dilution and is thus less relevant for contemporaneous valuation.

Another consideration, which, in practice, is arguably the most important one, is that the strategy of ignoring future rounds simplifies the task of valuing complicated securities, which could severely tax even knowledgeable experts. Finally, to the extent that market participants are worried about valuation manipulation in illiquid opaque markets, this approach's simplicity seems to tie the hands of fund managers. It is not uncommon for fund managers to mark securities they have in the company to the price established in the most recent round.

However, ignoring contractual terms is not only indefensible on theoretical grounds, but also often leads to substantial mispricing of the company's outstanding securities. To see a clear illustration of this, consider Square Inc.'s October 2014 Series E financing round, in which the company raised \$150 million by issuing 9.7 million Series E Preferred Shares for \$15.46 per share to a variety of investors.³⁶ These shares had the same payoff as common shares if the company did well but additional protections if the company did poorly. The Series E investors were promised at least \$15.46 per share in a liquidation or acquisition and at least \$18.56 per share in an IPO, with both of those claims senior to all other shareholders. These Series E shares joined Square's existing common shares and Series A, B-1, B-2, C, and D Preferred Shares. Each of these classes of shares had different cash flow, liquidation, control, and voting rights.

After this round, Square was assigned a so-called PMV, as discussed in Section 3.1.1. This PMV is calculated as the product of the most recent round's per-share price and the fully diluted number of common shares (with convertible preferred shares and both issued and unissued stock options counted, based on the number of common shares into which they convert). Square had 253 million common shares and options and 135 million preferred shares following its Series E round financing, for a total of 388 million shares on a fully diluted basis. Multiplying these yields a PMV of \$6 billion:

$$\begin{aligned}
 \$6 \text{ billion} &= \underbrace{\$15.46}_{\text{Series E price}} \times \underbrace{388 \text{ million.}}_{\text{Total number of shares in all classes}} && (18)
 \end{aligned}$$

³⁶This example is taken from Gornall and Strebulaev (2020).

This PMV formula works well for public companies with a single class of shares, as it produces the company's equity market capitalization. Ignoring the contractual terms is equivalent to assuming that this same formula applies to startups such as Square and that a PMV equals the equity value of the company. Our previous discussion of cash flow and control rights shows that this is not the case. For example, Square's November 2015 IPO price was \$9 per share, over 40 percent less than the Series E price. Series E investors, on the other hand, were contractually protected and received additional shares until they received \$18.56 worth of common stock. Series E shares must have been more valuable than other shares, as they paid out more in downside scenarios and at least as much in upside scenarios. The PMV formula ignores this difference in value. By assigning convertible preferred shares and common shares the same value, the PMV formula ignores the option-like nature of shares and overstates the value of common equity, previously issued preferred shares, and the entire company. The impact on PMV may be enormous. In the case of Square, Gornall and Strebulaev (2020) show that after accounting for contractual terms in a contingent claims framework, the company's fair valuation following its Series E financing round was approximately \$2.2 billion, not the \$6.2 billion implied by the PMV. Square's reported PMV was 171% higher than the company's implied fair value. In Section 6.2.3, we discuss this framework.

6.2.2 Probability weighted expected return method

The probability-weighted expected return method (PWERM) is a way of valuing securities that is similar in spirit to the intuitive cash flow-based valuation approaches discussed in Section 6.1.1. It involves projecting several scenarios out of a startup's possible probability distribution of outcomes, each with the assigned valuation outcome and a probability weight. For each scenario, given the valuation outcome and the financial structure, we can calculate the resulting cash flow "waterfall," determining security-level payoffs. By weighing all these scenarios given the probability weights, the relative value of securities can be inferred.

While intuitive, this method's weakness is that it is almost entirely ad hoc. Deriving scenarios and appropriately weighing them probabilistically requires a large degree of subjective judgment. This

makes it difficult to apply PWERM in a consistent and rigorous way and it also may make it open to manipulation.

6.2.3 Contingent claims valuation

The contingent claims methodology takes into account the complicated financial structure of startups and enables the estimation of individual security values using option pricing models. In our context, an important feature of these models is their ability to parsimoniously take into account the entire probabilistic distribution of a startup's future exit scenarios. Beginning with Black and Scholes (1973) and Merton (1974), researchers and practitioners have used share prices to value warrants, options, bonds, and other contracts. Metrick and Yasuda (2010) pioneered this idea in the VC context and showed that by using option pricing models and modeling the exit distribution, one can move between the value of a security and the value of a company (and vice versa). Gornall and Strebulaev (2020) take this approach further and develop an option pricing methodology that takes into account the most frequently used and consequential cash flow contractual terms. This method is also now widely applied by practitioners, who commonly take the pricing of the most recently issued security and “backsolve” to get the company value; they then use that value to back out the value of each outstanding security.

We now discuss a contingent claim valuation framework for valuing startups, as developed by Gornall and Strebulaev (2020). The basic setup was discussed in Section 3. To discount future cash flows at the time of exit, we need to make assumptions about the company's exit value and exit time. As is common in contingent claims models, we assume that the company's fair value $X(t)$ evolves according to a geometric Brownian motion with volatility σ that grows at the risk-free rate r_f under the pricing measure. This assumption is foundational to many areas of corporate finance and asset pricing. The time to exit is independent of $X(t)$ and exponentially distributed, $T \sim EXP(\lambda)$, where λ is the exit rate (and $1/\lambda$ is the average exit time). As Gornall and Strebulaev (2020) show, these assumptions are reasonable for VC-style investments.³⁷

³⁷Although we assume an immediate exit, VCs hold shares past the IPO in practice and even generate value by doing so (Gompers and Lerner 1998).

Consider pricing a round i , in which the company raises I at the PMV of P . We assume that this is the last round before the company's exit and that the round is fairly priced, so that the investment amount I equals the investors' payoff discounted under the pricing measure:

$$I = \mathbb{E} \left[e^{-Tr_f} \pi_i (X_T, \mathbb{Z}_T) \right]. \quad (19)$$

Because $X(t)$ is a geometric Brownian motion, we can rewrite Eq. (19) in terms of a standard normal random variable Z :

$$I = \mathbb{E} \left[e^{-Tr_f} \pi_i \left(X(0) e^{\sqrt{\sigma^2 T} Z + (r_f - \sigma^2/2)T}, \mathbb{Z}_T \right) \right], \quad (20)$$

The company's time 0 value is simply the value of $X(0)$ that solves Eq. (20) and fairly prices the round. As an example, consider a standard convertible preferred equity issued in the only financing round. If the round's investors convert, they are entitled to own I/P fraction of the company's common shares. If they do not convert, they retain a claim of I that is senior to common shares. The investors' payoff can be written as

$$\pi_i (X(T), \mathbb{Z}_T) = \max \left\{ \frac{I}{P} X(T), \min \{I, X(T)\} \right\}. \quad (21)$$

As discussed in Section 4.1.4, most convertible preferred equity shares are also subject to automatic conversion clauses that force these shares to convert into common shares when a trigger event occurs. The trigger event is commonly an IPO that raises a sufficiently large amount of money, referred to as a qualified IPO. In a qualified IPO, preferred shares must convert into common shares, even if doing so reduces their payout (e.g., the IPO share price is below the share price at which the preferred shareholders invested).

To model automatic conversion, we treat the payoffs in the IPO and the M&A separately and write the total payoff of investors in this round as the sum of the payoff in an IPO, $\pi^{IPO} (X(T), \mathbb{Z}_T)$, and the payoff in M&A or liquidations that cannot trigger automatic conversion, $\pi^{M\&A} (X(T), \mathbb{Z}_T)$. We then weight these payoffs by the probability of each outcome conditional on the exit value, $p^{IPO} (X(T))$

and $1 - p^{IPO}(X(T))$:

$$\pi_i(X(T), \mathbb{Z}_T) = p^{IPO}(X(T)) \pi_i^{IPO}(X(T), \mathbb{Z}_T) + (1 - p^{IPO}(X(T))) \pi_i^{M\&A}(X(T), \mathbb{Z}_T). \quad (22)$$

The payoff in an M&A exit is just Equation (21). If an IPO triggers automatic conversion, investors instead get their converted payoff:

$$\pi_i^{IPO}(X(T), \mathbb{Z}_T) = X(T) \frac{I}{P}. \quad (23)$$

If an IPO does not trigger automatic conversion, investors get the same choice between conversion and the liquidation that they would get in an M&A exit. Common practice dictates that all investors must convert prior to the IPO, so we assume that if an investor is not forced to convert and they do better in an M&A exit, they are able to force an M&A exit.

With this setup in place, the model can accommodate any cash flow contractual terms, including all of those discussed in Section 3, such as liquidation preference, automatic conversion exemptions, IPO ratchets, cumulative dividends, etc.³⁸ Table 5 (which is reproduced from Table 1 in Gornall and Strebulaev (2020)) shows the impact of contractual terms on valuation in a representative numerical example and calibrated values of parameters: volatility, σ , is 0.9; the exit rate, λ , is 0.25 (implying the average exit value of 4 years); the probability of an IPO exit is an increasing function of X_T (with the specific empirical specification given by Equation (17) in Gornall and Strebulaev (2020)); and the risk-free rate, r_f , is 0.025.

Table 5 considers a startup that is raising \$100 million of new VC investment at \$1 per share in a Series B round, with a PMV of \$1 billion, using standard preferred shares with a conversion option, automatic conversion in IPOs, a guaranteed return of initial investment in M&A exits and liquidation events, and no additional provisions. In the past, this company raised \$50 million of VC investment in a Series A round, with a PMV of \$450 million, using the preferred shares with the same rights

³⁸As this model assumes no future rounds, it accommodates no realistic anti-dilution protection and ignores the dilution imposed by future rounds. Gornall and Strebulaev (2021b) discuss these assumptions and incorporate future financing rounds in a contingent claims framework.

and terms as, and pari passu seniority with, the newly issued shares. Using subscripts to denote the different rounds, $P_A = 450$, $P_B = 1,000$, $I_A = 50$, and $I_B = 100$ (all values in millions). After the current round, if all shares convert, the new investor owns 10% of the total shares, the old investor owns 10%, and the current common shareholders own the remaining 80%.

We define the company's overvaluation, Δ_V , as the ratio of the PMV to the implied fair value. We define the common shares' overvaluation, Δ_C , as the ratio of the most recent round's share price to the fair value of a common share. The results show that a fair value of \$771 million correctly prices a VC round with a PMV of \$1 billion. The PMV exaggerates the company's value by 30% and the value of common shares by 28%.

The table also shows the impact of specific contractual terms on PMV. A 1.25X liquidation preference increases overvaluation from 30% to 42%, and giving the new investor a 2X liquidation preference increases overvaluation to 94%. A larger option pool increases overvaluation as well. Making the new investor senior increases company (common share) overvaluation to 36% (35%). Giving the new investor participation without a cap leads to a dramatic increase in overvaluation, from 30% to 53%. Caps reduce that overvaluation only slightly in this example.³⁹ Overvaluation of 55% results if the new investor is exempted from converting in all down-exits. Even exemptions that bind only on low IPOs, such as those below 50–75% of the PMV, lead to 47%–54% overvaluation. Valuation is also impacted by the size of the investment. A substantial investment of $I_B = \$400$ million leads to an overvaluation of 14%. At the other extreme, if the new investor only invested \$10 million, the overvaluation rises to 43%.

To summarize, the conclusion is that contractual terms can have a quantitatively significant impact on the PMV. Gornall and Strebulaev (2020) apply this framework to the sample of 135 highly valued US startups (the so-called “unicorns,” that is, private companies with reported PMVs at or above \$1 billion). They find that for this sample PMVs average 48% above fair value, with 14 being more than 100% above.

³⁹The effect is small in this example because we consider a highly valued company for which successful exits are likely to be high-value IPOs and in which convertible preferred equity is automatically converted. For a smaller company, caps can have a large impact on overvaluation.

Table 5: Impact of contract terms on fair value. This table shows the fair value that produces a PMV of \$1 billion for a startup raising a \$100 million round using different contract terms. The “Company” columns report the PMV of the new round (PMV) in millions of dollars, the fair value of the company that makes that round fairly priced (FV) in millions of dollars, and the percentage by which the PMV overstates the fair value (Δ_V). The “Common share” columns report the share price of the round (PMV) in dollars, the fair value of the common shares (FV) in dollars, and the percentage by which the share price overstates the value of common shares (Δ_C).

Scenario	Company			Common share		
	PMV (\$m)	FV (\$m)	Δ_V	PMV (\$)	FV (\$)	Δ_C
Baseline	1,000	771	30%	1	0.78	28%
Liquidation multiple						
1.25X	1,000	705	42%	1	0.70	43%
2X	1,000	515	94%	1	0.48	109%
Option pool						
0%	1,000	810	23%	1	0.78	28%
10%	1,000	732	37%	1	0.78	28%
Seniority						
Junior	1,000	811	23%	1	0.82	22%
Senior	1,000	737	36%	1	0.74	35%
Participation						
With no cap	1,000	653	53%	1	0.64	56%
With 2.5X cap	1,000	666	50%	1	0.65	53%
IPO Ratchet						
At 1X	1,000	640	56%	1	0.62	60%
At 1.25X	1,000	573	75%	1	0.55	83%
At 1.5X	1,000	508	97%	1	0.47	114%
Automatic conversion veto						
At 1X	1,000	646	55%	1	0.63	59%
At 0.5X	1,000	680	47%	1	0.67	50%
Investment amount						
\$400 million in round B	1,000	875	14%	1	0.85	17%
\$10 million in round B	1,000	698	43%	1	0.72	39%
\$400 million in round A	1,000	885	13%	1	0.87	14%
\$10 million in round A	1,000	745	34%	1	0.76	32%

One challenge of the valuation framework we presented is that it does not consider the impact of future dilutive rounds. Gornall and Strebulaev (2021b) extend the framework to incorporate the prevalence of multiple rounds of financing. They find that while the pricing of most securities, in practice, is quantitatively relatively unaffected by future rounds, some specific contractual terms (such as liquidation multiples) become dramatically impaired by expectations of future issuance.

The contingent claims methodology is arguably more complicated than other valuation approaches. This complexity means that VC investors, in practice, apply it infrequently. At the same time, the variant of this methodology is now at the center of 409A tax appraisals, used by privately held companies to determine the cost of employee compensation (see Section 3.3).

We have concentrated on studying the influence of cash flow terms on valuation. Although control rights are of extreme importance in startups, the opacity of the VC environment and their qualitative nature has made valuing these terms challenging. While it is clear that control rights can benefit investors and result in non-trivial value transfers, the quantification of that value is, as of yet, not fully known. More research is needed on these, as well as other, issues related to startup valuation.

7 Conclusion

In this chapter, we have discussed the economics of contracting between startups and their investors. We have paid particular attention to the ways contractual terms reflect specific contracting frictions that startups, their founder-managers, and their investors face in practice. The opacity of the startup financing ecosystem has meant that many major theoretical and empirical insights have been developed only recently. Given the importance of startup financing for the broader economy and economic growth, we expect waves of further productive research soon. To that end, we have outlined many issues that warrant further investigation.

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