

Convertible Securities and Venture Capital Finance*

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enture capital financing relies heavily on convertible securities; the most common type is convertible preferred stock. Venture capital contracts also specify control rights

that describe who gets to make the firm's decisions. The recent literature has provided some theoretical explanations for the use of these two features. Underlying these explanations is the idea that individuals can take actions that affect the firm's performance but that these actions cannot be specified in a contract. In this article, Yaron Leitner focuses on venture capital contracts, but the ideas presented can be applied to other contracting problems in which individuals must be given incentives to take appropriate actions.

Venture capital is a type of private equity capital typically provided to early-stage, high-potential-growth companies that are not publicly traded. By providing funds, the venture capitalist hopes to eventually generate a return through an event such as an initial public offering (IPO) or sale to another company. A contract between a venture capitalist and an

entrepreneur has many special features; for example, a venture capitalist typically provides capital in stages and can abandon the venture at any time. The venture capitalist provides not only capital but also advice on how to manage the venture.¹

Unlike debt, which characterizes most bank financing, venture capital

financing relies on equity-like and convertible securities that provide the venture capitalist with a share of the profits (the upside). The most commonly used security is convertible preferred stock.² Convertible preferred stocks were used in 204 of the 213 real-world venture capital investment contracts analyzed by Steven Kaplan and Per Strömberg.³ Sometimes the convertible preferred stock was used in combination with other securities, but in 170 financing rounds (almost 80 percent), convertible preferred stock was the only security used.

Real-world venture capital contracts also specify control rights that clearly describe who gets to make the firm's decisions. These control rights often depend on the firm's performance. The recent literature has provided some theoretical explanations for the extensive use of convertible preferred stocks in venture capital contracts and for the use of contingent control rights. Underlying these explanations is the idea that individuals (the entrepreneur and the venture capitalist) can take actions that affect the firm's performance but that these actions cannot be specified explicitly in a contract.

This article focuses on venture



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¹ An excellent, accessible account of what venture capitalists do can be found in the *Business Review* article by Mitchell Berlin. An account of the history of venture capital can be found in the introduction to the book by Paul Gompers and Josh Lerner.

*The views expressed here are those of the author and do not necessarily represent the views of the Federal Reserve Bank of Philadelphia or the Federal Reserve System.

² The government is now using this type of security to recapitalize banks under the Capital Assistance Program. For more details, see the regulatory agencies' joint press release from February 23, 2009 at <http://www.federalreserve.gov/newsevents/press/bcreg/20090223a.htm>.

³ Their sample largely reflects financing rounds completed between 1996 and early 1999 (166 cases). Of the remaining cases, 34 were completed between 1992 and 1995 and 13 were completed before 1992.

capital contracts, but the ideas presented here can be applied to other contracting problems in which individuals must be given incentives to take appropriate actions.

After explaining what a convertible preferred stock is, we will describe some of the theoretical explanations and some empirical facts.

WHAT IS A CONVERTIBLE SECURITY?

In exchange for putting money into a firm, a venture capitalist usually receives convertible preferred stocks. Because these are complicated securities, I will first explain what *preferred stock* is and then explain what *convertible preferred stock* is.

Preferred stock has some features that resemble debt, but legally, it is an equity security. As with a debt contract, the company needs to make fixed payments (dividends) to the holder of the preferred security. But unlike with debt, the company can choose not to pay the dividends without being considered in default of the contract.⁴ Preferred stock is called preferred because the company cannot pay dividends on its common stock unless it has paid them to preferred stockholders. Debt holders, however, must be paid before any preferred stockholder gets paid. Unlike preferred stockholders in many other settings, venture capitalists who hold preferred stock usually have voting rights. In addition, venture capitalists usually have a right of redemption, which means that they can cash out their shares at some predetermined price whenever they want to.

Convertible preferred stocks are preferred stocks that give the holder

⁴ In addition, dividends received from preferred stock have different tax implications from interest collected on debt.

the right (or option) to convert his or her shares into a pre-specified number of shares of common stock. Venture capitalists who hold convertible stock will exercise this option only if they expect to receive more money by doing so, for example, if the stock price is very high relative to the conversion price. Thus, convertible preferred stock provides venture capitalists with some protection if the business does not

use “effort” to describe actions or decisions that involve time and work but that increase the probability of higher profits. For example, in a biotechnology start-up, the entrepreneur, who has scientific skills, puts effort into developing a new drug by reading scientific material and conducting laboratory experiments, while the venture capitalist, who has managerial skills, puts effort into

Preferred stock has some features that resemble debt, but legally, it is an equity security.

do well (in this case, the fact that it is preferred allows venture capitalists to take priority over common stockholders in payments) while the conversion feature allows them to share the upside.

A convertible bond is another example of a convertible security. This is a bond that can be converted into shares of common stock. While convertible bonds are sometimes used by other firms, they are not very common in venture capital finance.⁵ (See *Who Issues Convertible Securities?*)

CONVERTIBLE SECURITIES CAN ALIGN INCENTIVES

Venture capitalists are usually very active in managing and providing advice to the firms they finance. The firm’s success depends on the venture capitalist’s effort as well as on the entrepreneur’s. Economists

marketing the drug by conducting market research to find out who is likely to use it. Clearly, earnings and profits depend not only on effort but also on some other factors that are beyond the firm’s control, such as overall economic conditions or what a competitor does. Nevertheless, the underlying assumption is that when one exerts more effort, the firm is more likely to generate more profits. The firm may still end up with low profits, but the chances for low profits are reduced when more effort is exerted.

Since exerting effort is costly, the entrepreneur and venture capitalist will do so only if they are provided with the right incentives. Ideally, this could be done via a contract that specifies the level of effort that each one should make and the punishment for shirking. For example, someone who does not exert the appropriate amount of effort should be paid less (or not be paid at all).

The problem with such a contract is that it is often impossible to observe or measure precisely how much effort someone exerts. For example, it may be hard to determine whether the scientist has used intelligence and creativity in developing the drug or

⁵ Convertible debt was used in only one out of the 213 cases that Kaplan and Strömberg analyzed. Convertible zero-coupon debt was used in eight cases. A zero-coupon debt is a bond that does not make periodic interest payments. It pays only the principal at the expiration date. A convertible zero-coupon debt is a zero-coupon debt that can be converted into shares of common stock.

conducted the “right” experiments. Thus, a court may not be able to enforce the ideal contract described above. However, a court may be able to enforce a contract that depends on some observable outcomes, such as earnings before interest and tax (EBIT). A contract between an entrepreneur and venture capitalist can therefore depend on EBIT, but it cannot depend on effort directly.

The issue then is how to share the project’s earnings between the entrepreneur and the venture capitalist so that each one will have the incentive to put the appropriate amount of effort into the project. Intuitively, one will exert more effort when one has more at stake. If you are the sole owner of the firm and do not need to share the profits with anyone, you will exert as much effort as you can, up to the point at which the extra effort no longer increases profits (net of the cost of exerting effort). However, if you need to share the profits with someone else, you will be less willing to exert effort, and you will do so only up to the point at which the extra effort increases *your* share of the profits.

The optimal split of profits between the entrepreneur and the venture capitalist is the one that induces efforts that generate the highest total profits (net of the cost of putting forth effort). Suppose, for example, that the optimal split is 50-50; that is, the entrepreneur and the venture capitalist each have 50 percent of common stock, giving each a claim on 50 percent of the firm’s profits. This is how the entrepreneur and venture capitalist would split the profits if there were no other issues involved. In other words, if providing incentives to exert effort is the only concern, we can induce the optimal level of effort by giving the entrepreneur and the venture capitalist shares of common stock according to the optimal split.

Who Issues Convertible Securities?

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homas Noddings, Susan Christoph, and John Noddings analyzed U.S. convertible bonds and U.S. convertible preferred stocks trading in January 2000.^a Their data do not include firms that rely on venture capital financing, since those firms are not publicly traded.

They found that companies that issue convertible bonds span a broad market spectrum from very small-cap to very large-cap firms, but the majority of issues represented micro-sized to small-sized growth companies with ratings below investment grade. A total of 311 companies had actively traded convertible bonds. Of these companies, 26 percent were in what the authors defined as the micro-cap category (market capitalization below \$225 million), 32 percent were in the small-cap category (market capitalization between \$225 million and \$1.25 billion), 27 percent were in the medium-cap category (market capitalization ranging from \$1.25 billion to \$10.5 billion), and the remaining 15 percent were large-cap companies (market capitalization above \$10.5 billion).^b Only 21 percent of the firms had a Standard & Poor’s bond rating of BBB and above. Noddings, Christoph, and Noddings note that the 230 small-cap and larger companies (i.e., the small, medium, and large) were among the 3,000 largest U.S. firms, and that while there was a slight overlap with the largest 3,000 firms, most of the 81 micro-cap companies came from the 1,000 firms just below the top 3,000. This gives us some idea of the fraction of public firms with actively traded convertible bonds (roughly 8 percent).

Like convertible bonds, most convertible preferred stocks were issued by small to mid-sized companies. Out of the 117 companies with actively traded convertible preferred stocks, 15 percent were in the micro-cap category (defined above), 32 percent were small cap, 39 percent were medium cap, and 14 percent were large cap. Only 13 percent had a Standard & Poor’s preferred stock rating of BBB and above.

^a The first edition of their book covers January 1998. Even though the numbers are not identical in both editions, the results are essentially the same.

^b There are no precise definitions for small, medium, and large market cap. In addition, these definitions can change over time. I use the definitions in Noddings, Christoph, and Noddings’ study.

Another issue, however, is that venture capitalists need to be compensated not only for the effort they exert but also for the money they invest in the venture. Venture capitalists will agree to invest in the firm only if they expect to make a profit; more precisely, the expected

return on the investment, adjusted for risk, needs to be at least as high as what the venture capitalists could obtain by investing their money elsewhere. If the investment is very large relative to the size of the company, a venture capitalist may insist on a split of, say, 60-40, where he

or she gets 60 percent of equity instead of only 50 percent. However, compared with the optimal split of 50-50 assumed above, a 60-40 split distorts incentives, inducing the entrepreneur to exert too little effort. The use of convertible securities can help ensure that a venture capitalist gets enough cash to cover the initial investment while at the same time maintaining incentives.

The idea is as follows: Suppose that profits can be either \$100 million (good state) or \$40 million (bad state), and the entrepreneur can either exert effort or not. The entrepreneur's effort increases the likelihood of the good state and reduces the likelihood of the bad state. The entrepreneur will exert effort only if the payoff he receives in the good state is large enough compared to what he gets in the bad state. With a 50-50 split, the entrepreneur obtains \$50 million in the good state and \$20 million in the bad state, and as assumed here, this induces him to exert effort. However, we can also induce effort by giving the entrepreneur less in *both* states; for example, we can give the entrepreneur \$30 million in the good state and nothing in the bad state. In this case, more is left to the venture capitalist, and the venture capitalist can cover his investment. This profit allocation can be implemented by giving the entrepreneur shares of common stock and by giving the venture capitalist shares of convertible preferred stock. The preferred stock ensures that the venture capitalist has priority in payment in the bad state (in our example, he receives everything), and the convertibility option allows the venture capitalist to share the upside. For more details, see *An Example of Venture Capital Financing* on pages 22 and 23, as well as the table on page 24.

The detailed numerical example illustrates two more things: First,

the need for convertible preferred stock arises only when the required investment from the venture capitalist is large. Otherwise, the two objectives (inducing effort and allowing the venture capitalist to cover his investment) can be achieved by simply giving the venture capitalist shares of common stock, which is equivalent to simply sharing the profits of the firm. This seems consistent with the observation that "angel investors," who invest smaller amounts than venture

A striking feature of venture capital finance is that the venture capitalist typically infuses capital in stages, which are usually related to significant milestones in the development process.

capitalists, are more likely to obtain common stock. See, for example, the paper by Andrew Wong.⁶ Second, in some cases (for example, when the required investment is very large and the entrepreneur has no funds of his own), we may not achieve the two objectives above even with convertible preferred stock. In this case, it might not be possible to finance the venture at all, or the entrepreneur might need to wait until he has amassed enough capital of his own.⁷

⁶ An angel investor is a high-net-worth individual who typically invests in small private firms, on his own account. (In contrast, venture capitalists invest funds received from other individuals.) Formally, angel investors are "accredited investors," according to the SEC. The SEC rule 501 of Regulation D states that an accredited investor is an individual who has a net worth that exceeds \$1 million or an expected yearly income of more than \$200,000 (\$300,000 including spouse).

⁷ For more detailed models, read the paper by Catherine Casamatta and the paper by Rafael Repullo and Javier Suarez.

CONVERTIBLE PREFERRED STOCK CAN PREVENT WINDOW DRESSING

A striking feature of venture capital finance is that the venture capitalist typically infuses capital in stages, which are usually related to significant milestones in the development process. Such stages, for example, might be completion of the design, the pilot production, the first date the firm makes a profit, or the introduction of a second product. At each stage,

the firm is given just enough cash to reach the next stage, and the venture capitalist retains the option to abandon the venture if performance is not satisfactory.

The threat to abandon the venture may induce the entrepreneur to put more effort into making the venture a success. This is good, of course, but it also introduces the potential for "window dressing." The entrepreneur might manipulate short-term performance signals upward to fool the venture capitalist into continuing to finance the project. For example, the entrepreneur might engage in activities that boost short-term earnings but reduce long-term earnings. Or the entrepreneur might produce a prototype that looks functional (and so meets the requirements of the current stage) but is in fact too costly to put into mass production. Window dressing reduces the benefit of stage financing because the venture capitalist bases decisions on "noisy" or incorrect information

An Example of Venture Capital Financing

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exter, a young genius, has finally decided to have his own start-up. He has an idea about how to develop a drug that allows cartoon characters to become humans and vice versa. Dexter

has no cash of his own, and he hopes to raise the required investment of \$45 million from his old neighbor, Mandark, who now has his own venture capital firm.

Assume that there are two states: A good state, where profits are \$100 million, and a bad state, where profits are \$40 million. Dexter and Mandark can either exert effort or not. Exerting effort raises the probability of the good state and lowers the probability of the bad state: If both Dexter and Mandark exert effort, the probability of each state is 50 percent. If either of them does not exert effort, the probability of the good state falls to 25 percent, and the probability of the bad state rises to 75 percent.

But Dexter and Mandark bear a cost for exerting effort. Think of this as profits each forgoes by putting effort into the venture rather than into other projects. Assume that the cost of exerting effort (per individual) is \$7.5 million.

Let's suppose that Dexter and Mandark share profits between them. The question is how to design a contract between Dexter (the entrepreneur) and Mandark (the venture capitalist) so that (i) each will have the incentive to exert effort (more precisely, we want to make sure that if one exerts effort, the other one cannot gain by not exerting effort);^a and (ii) Mandark (who

supplies the funds) will at least break even.

Consider first an even split; that is, Dexter and Mandark write a contract according to which they split the profits equally, so that each one gets \$20 million in the bad state and \$50 million in the good state. Is this enough to induce effort? Yes. If Dexter exerts effort, Mandark cannot gain by not exerting effort. To see this, note that Mandark's expected return from exerting effort equals $(0.50 \times 20) + (0.50 \times 50) - 7.5 = 27.5$, and his return from not exerting effort is the same $((0.75 \times 20) + (0.25 \times 50) = 27.5)$. Similarly, if Mandark exerts effort, Dexter cannot gain by not exerting effort.

The problem with this split is that Mandark does not receive enough to cover his initial investment of \$45 million. Knowing this, Mandark will not invest to begin with.

We might think that the solution is to give Mandark a larger share of the project's profits, so that he can cover his initial investment. The problem is that by reducing Dexter's share, we eliminate his incentives to exert effort. For example, if Mandark gets 75 percent of the profits and Dexter gets 25 percent, Dexter ends up with \$10 million in the bad state and \$25 million in the good state, so he has no incentive to exert effort. (If he exerts effort, he obtains $(0.50 \times 10) + (0.50 \times 25) - 7.5 = 10$; if he does not exert effort, he obtains $(0.75 \times 10) + (0.25 \times 25) = 13.75$.)

Instead, one solution is a contract that gives Dexter nothing in the bad state and \$30 million in the good state, while giving Mandark \$40 million in the

^aThis is what economists refer to as a Nash equilibrium.

rather than on correct information. In extreme cases, the possibility of window dressing may cause the venture capitalist to decide not to finance the venture to begin with.

In their article, Francesca Cornelli and Oved Yosha show that properly designed convertible preferred equity can overcome window dressing. How can such a security resolve the problem? Cornelli and Yosha show that the

convertibility option is the answer.

Cornelli and Yosha assume that the venture capitalist must choose whether to convert his preferred stock to common stock after he sees the results of the first financing stage but before he sees final profits. This means that the decision to convert must be based on the venture's interim performance. The venture capitalist will choose to exercise the conversion

options only if profits are likely to be high, based on the venture's interim performance. Window dressing, because it makes interim performance look better, increases the likelihood that the venture capitalist will convert his or her preferred stock to common stock. But conversion is a very undesirable outcome for the entrepreneur. In particular, if the conversion price is set low, the venture capitalist obtains

An Example of Venture Capital Financing...continued

bad state and \$70 million in the good state.^b This is feasible because Mandark expects to get \$55 million, on average, which is more than his initial investment plus his effort cost.^c It also induces both Dexter and Mandark to exert effort (as shown in possibility 3 in the table).

This last contract is more than pure profit sharing, since Dexter receives a positive share of the profits in the good state, but nothing in the bad state, even though the project generates \$40 million. Such a contract can be implemented by giving Dexter shares of common stock and by giving Mandark shares of convertible preferred stock. Specifically, Dexter gets 30 shares of common stock, and Mandark gets 70 shares of convertible preferred stock that has a total promised payment of \$40 million (if not converted) and that can be converted into 70 shares of common stock. If the bad state happens, Mandark will not exercise the option to convert and will obtain the promised payment

of \$40 million, which is everything the firm has. If instead Mandark chose to convert the preferred shares, he would obtain only 70 percent of the profits (because he has 70 shares and Dexter has 30), which is less than \$40 million. In contrast, if the good state happens, Mandark will exercise the conversion option and, by doing so, obtain \$70 million (since he will then own 70 percent of the firm's shares, and the firm is worth \$100 million as a whole). This is clearly better than not converting and receiving \$40 million instead. (The table provides a summary.)

Finally, note that if Mandark needs to invest \$27.5 million or less, the two objectives (inducing effort and allowing Mandark to cover his investment) can be achieved even with an equal share (first possibility in the table). In contrast, if Mandark needs to invest more than \$47.5 million, even the use of convertible preferred stock (third possibility in the table) does not achieve the two goals.

^b This is not the only possibility. For example, giving Dexter \$1 million in the low state and \$31 million in the high state, while giving Mandark \$39 million and \$69 million, can also work.

^c To simplify, I assumed here that the discount rate (i.e., the expected return Mandark can obtain by investing his money in other ventures with similar risk) is 0 percent. With a positive discount rate, Mandark would need to get more. For example, if the discount rate is 5 percent, Mandark would require an expected payoff of \$54.75 million ($= (45 \times 1.05) + 7.5$). The solution presented in this example still works in this case.

many shares of stock by choosing to convert preferred stock to common stock, and the entrepreneur ends up owning a substantially smaller portion of the venture. To prevent this from happening, the entrepreneur will not engage in window dressing in the first place.

Putting it differently, the entrepreneur faces a tradeoff: Window dressing increases the probability that the venture will continue to be financed but also increases the probability that the venture capitalist will use the conversion option to acquire a substantial portion of the firm's equity. Setting the conversion price low makes the second scenario,

in which the venture capitalist uses the conversion option, very undesirable for the entrepreneur, and this induces the entrepreneur to refrain from window dressing in the first place.⁸

⁸ The assumption that the venture capitalist must decide whether to exercise the conversion option *after* seeing the results of the first stage but *before* seeing the final results (i.e., before learning about the long-term performance of the venture) is crucial. Otherwise, the venture capitalist will not convert upon seeing a good interim signal and instead will wait to obtain more precise information. This is a drawback of the model because in reality convertible preferred stock typically does not have such a pre-specified deadline for conversion. The venture capitalist usually converts only upon exiting the investment, i.e., when the venture is sold to an acquirer or when the venture goes public in an initial public offering.

CONVERTIBLE SECURITIES AND EXIT DECISIONS

Now let's consider the exit decision and the contract between the venture capitalist and the entrepreneur. The exit decision refers to the terms on which the venture capitalist can cash out his or her investment, pay the investors, and move on to the next prospect. A moderately successful investment usually leads to a sale to another firm, while an exceptionally successful investment leads to an initial public offering (IPO), in which the firm issues common stock to the general public. For example, Apple, Google, Intel, Microsoft, and Yahoo, which are

TABLE

An Example of Venture Capital Financing

	Possibility 1			Possibility 2			Possibility 3		
	Good state	Bad state	On average*	Good state	Bad state	On average*	Good state	Bad state	On average*
Total profits	100	40	70	100	40	70	100	40	70
Dexter's payoff	50	20	35	25	10	17.5	30	0	15
Mandark's payoff	50	20	35	75	30	52.5	70	40	55
On average, does Mandark cover his initial investment plus the cost of effort?*	No ($35 < 45 + 7.5$)			Yes ($52.5 = 45 + 7.5$)			Yes ($55 > 45 + 7.5$)		
If Mandark exerts effort, can Dexter gain by not exerting effort?	No If Dexter exerts effort, he receives $35 - 7.5 = 27.5$. Otherwise, he receives $(0.25 \times 50) + (0.75 \times 20) = 27.5$.			Yes If Dexter exerts effort, he receives $17.5 - 7.5 = 10$. Otherwise, he receives $(0.25 \times 25) + (0.75 \times 10) = 13.75$.			No If Dexter exerts effort, he receives $15 - 7.5 = 7.5$. Otherwise, he receives $(0.25 \times 30) + (0.75 \times 0) = 7.5$.		
If Dexter exerts effort, can Mandark gain by not exerting effort?	No If Mandark exerts effort, he receives $35 - 7.5 = 27.5$. Otherwise, he receives $(0.25 \times 50) + (0.75 \times 20) = 27.5$.			No If Mandark exerts effort, he receives $52.5 - 7.5 = 45$. Otherwise, he receives $(0.25 \times 75) + (0.75 \times 30) = 41.25$.			No If Mandark exerts effort, he receives $55 - 7.5 = 47.5$. Otherwise, he receives $(0.25 \times 70) + (0.75 \times 40) = 47.5$.		
Implementation	Dexter and Mandark each get 50 shares of common stock.			Dexter gets 25 shares of common stock, and Mandark gets 75 shares of common stock.			Dexter gets 30 shares of common stock, and Mandark gets 70 shares of convertible preferred stock, which can be converted into 70 shares of common stock, and which have a total promised payment of \$40 million.		

*If both Dexter and Mandark exert effort

The table illustrates three ways to split profits between Dexter (the entrepreneur) and Mandark (the venture capitalist). Total profits are either \$100 million (good state) or \$40 million (bad state). If both Dexter and Mandark exert effort, the probability of each state is 50 percent. If either of them does not exert effort, the probability of the good state falls to 25 percent and the probability of the bad state rises to 75 percent. The cost of effort is \$7.5 million per individual. Mandark needs to cover his initial investment of \$45 million plus the cost of effort. In addition, both Mandark and Dexter must be induced to exert effort. For simplicity, the discount rate is assumed to be 0 percent. The table shows that possibility 3 achieves the two goals, but possibilities 1 and 2 violate one of them. All numbers represent millions of dollars.

now publicly traded, initially received venture capital.

The two types of exit decisions create new contracting opportunities for the venture capitalist and the entrepreneur: They can now allocate profits differently, depending on whether the firm is sold to another firm or goes public. This additional flexibility can make it easier to achieve the two objectives: providing incentives to exert effort and making sure that the venture capitalist breaks even. Indeed, real world contracts often incorporate the exit decision. In many cases, the convertible preferred stock automatically converts to common stock in an IPO, but it does not automatically convert when the firm is purchased by another firm; Kaplan and Strömberg show that an automatic conversion provision was present in 95 percent of the financing rounds they studied. In almost all cases, automatic conversion was related to an IPO.⁹

Thomas Hellmann provides a model that explains this automatic conversion clause. In his model, the entrepreneur and the venture capitalist learn about the potential profitability of the venture. Then they need to make an exit decision. They can either sell the venture to an acquirer or remain independent, hoping to go public (in an IPO) later. Remaining independent is risky: The venture can succeed and obtain a high IPO price (the IPO value for existing shareholders could be \$1 billion), but it can also fail and yield no profits.¹⁰ In contrast,

⁹ The convertible preferred shares currently being used to recapitalize banks also have a mandatory conversion feature.

¹⁰ In the survey by William Sahlman, 34.5 percent of the capital invested resulted in a loss (11.5 percent resulted in total loss, and 23.0 percent resulted in partial loss). The data he used covered investments by 13 venture-capital partnerships in 383 companies from 1969 to 1985.

if the venture is sold, say, at \$600 million, the venture capitalist and the entrepreneur end up with a guaranteed payoff that is high but not as high as what they would get if they remained independent and the venture turned out to be a huge success.

The two types of exit decisions have very different implications for continuing effort by the venture capitalist and the entrepreneur (i.e., the effort they need to exert after learning about the potential profitability of the venture and making an exit decision). If the venture

A moderately successful investment usually leads to a sale to another firm, while an exceptionally successful investment leads to an initial public offering (IPO), in which the firm issues common stock to the general public.

remains independent, the entrepreneur and the venture capitalist need to exert effort in order to increase the probability of a success before going public. However, if the venture is sold, their efforts are no longer needed. Thus, a contract must provide the entrepreneur and venture capitalist with incentives to exert effort only if the venture remains independent but not if it is acquired by another firm.¹¹

Remember that the contract also needs to make sure that the venture capitalist is compensated for his or her initial investment. In the example above, we showed that this can be done by giving the venture capitalist convertible preferred stock. But we

¹¹ Note that we are dealing here only with the efforts that must be exerted after the exit decision has been made. In his article, Hellmann also deals with the effort that must be made in the first stage before the exit decision is made.

also showed that when the required investment by the venture capitalist is very large, we could not achieve the two objectives simultaneously. (The problem was that if we gave the venture capitalist a big enough share of the profits to cover his investment, we hurt the entrepreneur's incentives to exert effort.) Contracting on the exit decision can help us achieve the two objectives. In particular, we can give the venture capitalist a higher share of profits only if the firm is sold to another firm (in which case the entrepreneur's effort is not important),

while maintaining the optimal split of profits (inducing both to exert effort) if the venture remains independent. For example, if the firm is sold to another firm, the venture capitalist can obtain everything (\$600 million), whereas if the firm remains independent, the venture capitalist and the entrepreneur can split profits equally to induce optimal effort levels.¹²

Note that in the profit allocation above, the venture capitalist receives more if the value is realized through an acquisition rather than an IPO.

¹² In the first numerical example in this article, there was more than one way to induce optimal levels of efforts because we could decide how to split profits in the high state as well as in the low state. Here if the venture remains independent there are also two states (failure, success), but because there are no profits if the venture fails, we can only split profits if the venture has an IPO. The only way to do it and maintain the optimal level of effort is equal shares.

He or she obtains \$600 million in the first case but only \$500 million (which is half of the IPO value) in the second case. This is done to increase the amount of money that the venture capitalist obtains as much as possible (so that he or she is willing to put out more money upfront) while at the same time inducing the entrepreneur and venture capitalist to exert the optimal level of effort needed for a successful IPO.¹³ This allocation of profits can be achieved by giving the entrepreneur 50 shares of stock and giving the venture capitalist 50 shares of convertible preferred stock that have a total promised payment of \$600 million and that can be converted into 50 shares of common stock. For this to work the convertible preferred stock must have an automatic conversion clause. Otherwise, the venture capitalist will not convert the preferred stock voluntarily when the firm makes an IPO.¹⁴

CONTROL RIGHTS

The discussion so far has been about cash flow rights: i.e., who has the right to obtain the venture's profits? Hellmann's model provides insights not only about cash flow rights but also about control rights; i.e., who

¹³ The fact that the venture capitalist receives more in an acquisition compared to an IPO is counterfactual. However, it is not necessary for the main idea to hold. To see why, consider the case in which we don't know exactly at what price the firm will be sold, and we want the venture capitalist to obtain \$300 million plus 50 percent of the remaining sale profits (so the entrepreneur gets the other half of the remaining profits). For example, if the firm is sold for \$600 million, the venture capitalist gets \$450 million, and the entrepreneur gets \$150 million. This can be implemented by giving participating preferred stock to the venture capitalist (as explained in the next footnote) that automatically converts to common stock in an IPO. Automatic conversion is necessary because without it, the venture capitalist would get \$300 million plus 50 percent of the remaining \$700 million, which is more than \$500 million, so he will not want to convert.

gets to make the venture's decisions? In particular, Hellmann focuses on the exit decision, showing that the firm's performance determines who gets to make the exit decision. According to his model, the entrepreneur should obtain control when the potential

Control rights are important because the entrepreneur and the venture capitalist, who hold different securities, may have different preferences regarding the exit decision to be made.

profitability of the venture is high, and the venture capitalist should obtain control otherwise. This is consistent with the empirical evidence presented in the article by Kaplan

¹⁴ If the venture capitalist converts preferred stock to common stock, he or she ends up with \$500 million because the venture capitalist and the entrepreneur each have 50 shares of stock. If the venture capitalist does not convert preferred stock to common stock, he or she ends up with \$600 million, but this does not implement the profit allocation wanted. In the real world, there is an extensive use of a variant of convertible preferred stock called *participating preferred*. This type of security was used in 38.5 percent of the cases in the sample of Kaplan and Strömberg. Participating preferred stock can be thought of as a position of two securities: preferred stock and straight common stock. Upon exit, the holder of the participating preferred stock (the venture capitalist) obtains the promised dividend (just like preferred equity) but also obtains dividends as if the security had been converted to common stock. The venture capitalist will never want to convert his or her security to common stock; a venture capitalist who does so gives up the preferred stock and ends up with only common stock. Automatic conversion is therefore necessary.

and Strömberg. For example, they show that the venture capitalist may contractually obtain control from the entrepreneur when EBIT falls below a mutually agreed upon amount.¹⁵

Control rights are important because the entrepreneur and the venture capitalist, who hold different securities, may have different preferences regarding the exit decision to be made. We have already seen that given the profit allocation in the previous section, the venture capitalist always prefers to sell the firm rather than have an IPO. However, this may not be the right decision from the firm's point of view (it may not be the decision that maximizes total profits). For example, if the probability of a successful IPO is 70 percent, it is better to remain independent and attempt a successful IPO because $0.7 \times \$1$ billion is greater than \$600 million. The entrepreneur will be happy with this decision (as he or she receives nothing if the firm is sold, but \$500 million if the IPO is successful), but the venture capitalist will not.

But this does not mean that we should give the entrepreneur full control. In particular, suppose the entrepreneur and the venture capitalist learn that the probability of a successful IPO is only 50 percent. The right decision in this case is to sell the firm because $\$600$ million $>$ $0.5 \times \$1$ billion. The venture capitalist gets paid \$600 million and so will be happy with this decision. However, the entrepreneur will prefer to take

¹⁵ They also showed that a state-contingent board provision (i.e., the venture capitalist gets control of the board in the bad state) was present in 18 percent of the cases in their sample and that state-contingent voting rights (i.e., the percentage of votes that investors and management have to affect corporate decisions) were present in 18 percent of all financing rounds and 25 percent of first financing rounds.

the risk of remaining independent. If they sell the firm, the entrepreneur gets nothing, whereas if they remain independent and the venture succeeds, he or she can get \$500 million.

So how can we make sure that the right decision is made? In the example above, the entrepreneur should obtain control if the probability of a successful IPO is high (70 percent), and the venture capitalist should obtain control if the probability of a successful IPO is low (50 percent). More generally, the entrepreneur should obtain control if the expected proceeds from an IPO are high (either because of a high probability of success or because of a high IPO price), and the venture capitalist should obtain

control if the expected proceeds from an IPO are low. In the real world, such contingent control rights can be implemented, for example, by stating in the contract that the venture capitalist obtains control if EBIT falls below some pre-specified level, which might indicate a low probability of a successful IPO.

SUMMARY

Convertible securities (in particular, convertible preferred stock) are widely used in venture capital financing. Convertible securities can help align incentives so that both the entrepreneur and the venture capitalist exert the appropriate levels of effort to ensure the business's success.

Convertible securities can also prevent window dressing, so that the venture capitalist can provide financing in stages based on performance without worrying that the entrepreneur will try to make things look better than they really are.

The convertible securities used in venture capital financing have many unique features. For example, an automatic conversion when the firm makes an IPO can increase the amount of money the entrepreneur can raise from the venture capitalist without compromising the incentives necessary to put effort into the venture. We also saw that appropriately designed control rights can ensure optimal exit decisions. 

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