



Information Asymmetry and Capital Structure

REVIEW OF AGENCY COSTS AND CAPITAL STRUCTURE

As described in *Agency Costs and Capital Structure*, agency costs can significantly reduce firm value. If investors believe that management is not maximizing shareholder value, stock prices will go lower as a result. The burden is on management to convince shareholders that their objective is to maximize shareholder wealth. Agency cost concerns are exceptionally high at firms with multiple class voting structures for board members. For example, Mark Zuckerberg controls 15% of the economic interest of Meta Platforms (Facebook) and 58% of the voting interest. Given the voting interest, Zuckerberg in effect controls the board.¹

Agency costs are not limited to conflicts between management and shareholders, but also occur between management, acting on behalf of shareholders, and debtholders. For financially stable firms, when management makes decisions which impact the firm's value, shareholders capture all or most of the resulting change in value. For firms with risk-free debt, 100% of the change in firm value, positive or negative, accrues to the equity holders. With risky debt, even for financially stable firms, debtholders will also participate, albeit to a small extent, in the creation or destruction of firm value due to managerial decisions or other outside forces. But when firms are in financial distress and or near bankruptcy, managers, acting on behalf of the shareholders, may optimally make investment decisions which reduce overall firm value, even though it increases shareholder wealth. Specifically, managers have incentives to increase the volatility of the outcomes associated with projects, even if it means investing in projects which are not expected to generate economic value. Thus, firms and investors attempt to create robust corporate governance and credit documents to ensure such value destruction doesn't occur when firms end up later in financial distress.

In corporations, shareholders face only limited liability. That is, shareholders can lose no more than what they invested in the corporation. Thus, debtholders don't have recourse to go after additional assets held

¹ The point is not that Zuckerberg controlling the board is necessarily a problem in the real world. Rather, agency costs tend to be higher at multiple class voting structure firms. But these costs can be outweighed by other benefits associated with these structures.

by the shareholders.² If debtholders did have recourse to go after assets of shareholders and shareholders could lose more money than they invested in the corporation, managers would be less likely to invest in – NPV projects on behalf of shareholders when the corporation is in financial distress. In other words, they would be less likely to invest in projects which would otherwise transfer wealth from debtholders to shareholders.

Limited liability gives shareholders the option to default. Thus, we can think of shareholders as owning a call option on the assets of the corporation. From the debtholder viewpoint, the debtholders own the corporation, while selling a call option on the firm's assets to the shareholders. Alternatively, we can think of debtholders as owning a risk-free bond, on which they have sold a put option to the shareholders, giving the shareholders the right to put back the assets to the debtholders.

Unlike shareholders, debtholders don't have a board of directors to act on their behalf; rather debtholders are protected by a legal contract known as an indenture, and by the courts. Over the years, the courts have recognized the existence of the agency costs of debt and have primarily ruled that when a corporation becomes insolvent, and even falls into the "zone of insolvency," the managers owe a duty to the creditors, and not merely to the shareholders.

One key takeaway of our knowledge of agency costs and capital structure is that firms are reluctant to issue new equity when in financial distress, as the proceeds likely go to the debtholders. In this lecture note, we will consider equity issues for firms *not* in financial distress.

PREVIEW OF CAPITAL STRUCTURE AND INFORMATION ASYMMETRY

In perfect capital markets, outside investors have access to the same information as management and other insiders. Of course, this assumption doesn't hold up well in the real world. Managers know what earnings will be before the earnings release, they have superior information concerning product launches, they know firsthand what is taking place in merger negotiations, all well before outside investors learn of the resulting information. Information asymmetry is simply a given in real-world corporate finance.

Consider bluebird bio, a biopharmaceutical firm based in Cambridge, Massachusetts, which focuses on gene therapy to cure rare diseases. Bluebird bio has had several products in the pipeline, but none of these products provided material revenue before 2020. Since bluebird bio went public in 2013, it has issued equity several times. Below, we discuss one of bluebird bio's equity issues, which occurred in December 2017. After the 4 pm EST close of the stock market on December 11, 2017, bluebird distributed a press release which conveyed the following:

² Note that while shareholders only bear limited liability in corporations, this does not mean shareholders are not precluded from making personal guarantees with respect to the liabilities associated with the corporation. But these personal guarantees tend to be with smaller corporations where there is a single owner or a supra-majority owner who is guaranteeing the debts of the corporation.

“bluebird bio, Inc., a clinical-stage biotechnology company committed to developing potentially transformative gene therapies for severe genetic diseases and cancer, today announced that it has commenced an underwritten public offering of \$600 million of its common stock. Bluebird bio also intends to grant the underwriters a 30-day option to purchase up to an additional 15% of the shares of common stock offered in the public offering. All of the shares in the proposed offering are to be sold by bluebird bio. Goldman Sachs & Co. LLC, BofA Merrill Lynch, J.P. Morgan Securities LLC and Cowen are acting as joint book-running managers of the proposed offering. The offering is subject to market and other conditions, and there can be no assurance as to whether or when the offering may be completed, or as to the actual size or terms of the offering.”

The stock price of bluebird bio closed at \$201.80 on December 11, 2017. It had previously risen over 126% in the four months since August 1, when it closed at \$89.15. For comparison, over the same period, the NASDAQ Biotechnology Index increased only 1%. The underwriters were successful in placing the new shares of bluebird bio to the public the next day, selling the intended 3,243,244 shares for gross proceeds of \$600 million. For their services in placing the shares, the underwriters received commissions of \$30 million, or five percent of the total gross proceeds. In addition to the commissions paid to the underwriters, bluebird bio incurred legal fees associated with the offering.

The underwriters set the offering price at \$185.00, well below the closing price of \$201.80; in other words, the issue was underpriced by 8.3% relative to the December 11 closing price. The stock market responded negatively to the announcement of the offering, declining to \$190.95 on December 12, a 5.38% decline. Even with the decline in price the next day, the stock offering remained underpriced by 3.12% relative to the closing price on December 12.

In perfect capital markets, stock prices should not change in response to the announcement of an equity issue. If the purpose of the equity issue is to finance a specific investment or project, while the stock price response may reflect an unexpected amount of the NPV resulting from the project, it should not move simply because the firm decided to finance the project with equity. As a reminder, in perfect capital markets there are no transactions costs associated with equity issues.

THEORY: INFORMATION ASYMMETRY AND CAPITAL STRUCTURE

While the 1958 seminal paper on capital structure by Modigliani and Miller ushered in the modern era of corporate finance, it was another twenty years before researchers began to formally address the importance of information asymmetry in terms of investment decisions, and the choice of financing those investments with equity or debt. The seminal work on information asymmetry and capital structure started with discussions between Stewart Myers (a professor at MIT) and Nicholas Majluf (a Ph.D. student at the

time in corporate strategy at MIT) in 1978. It was another six years before they were successful in publishing their paper in an academic journal in 1984.³ Their research has generally been viewed as the most influential in terms of equity issues and information asymmetry.

Outside of the initial public offering and an occasional stock merger, large primary equity issues are infrequent.⁴ The goal of Myers and Majluf was to understand the reluctance by public corporations to issue equity. According to Modigliani and Miller, management should be indifferent as to whether it issues equity versus debt to raise money. And according to the trade-off theory of capital structure, there is an optimal level of debt which weighs the benefits of interest tax shields and the costs of financial distress. When the present value of the cost of financial distress exceeds the present value of the tax shields, firms should issue equity to finance projects, assuming of course the firm isn't in financial distress (in which case management is less likely to issue equity due to the debt overhang problem discussed earlier).

Myers and Majluf built a model of a firm with assets in place and a project under consideration. As with most theories, the assumptions matter. In this case, they are:

- (1) No taxes or transactions costs
- (2) Investors are rational
- (3) No market imperfections

In contrast to Modigliani and Miller, Myers and Majluf do not assume that investors have the same information as managers. Instead, they assume that managers often have private information unknown to outside investors. Moreover, it is costly for managers to reveal the information asymmetry for a variety of reasons. The lecture note below illustrates their model, using the fictional firm ASYMMETRY. Rather than demonstrating their theory via a formal mathematical model, I do so via an example (as they also do in their research) which will more than suffice for our purposes in this class and your career.

ASYMMETRY has a +NPV project, PROJECT, that it needs to undertake immediately, before the opportunity is lost. To finance PROJECT, ASYMMETRY must raise shares; it does not have excess cash or access to debt financing. So far in this course, if a firm issues new equity, it does so at zero NPV. That is, managers can't create or destroy value by issuing new equity.

For simplicity, assume the model has three dates, $T = -1, 0,$ and $+1$. In the first date, $T = -1$, there is no information asymmetry; in $T = 0$, managers possess proprietary information about its existing assets-in-place which is unknown to outside investors; and in date $T = +1$, the proprietary information is made public to the outside investors.

The upfront investment required for PROJECT is 45.0 million, and the NPV is +5.0 million. Assume there is no information asymmetry about PROJECT – management conveys all proprietary information about

³ Myers, Stewart, and Nicholas Majluf, "Corporate Financing and Investment Decisions When Firms Have Information that Investors Do Not Have," *Journal of Financial Economics*, 1984.

⁴ By primary equity issues, I refer to the company as issuing new equity as opposed to an insider or an institution selling already-issued shares of a company via a secondary equity issue.

PROJECT to the outside investors. Since PROJECT has a positive NPV of 5.0 million, management will immediately undertake PROJECT and invest the 45.0 million.

For ASYMMETRY's existing operations, labeled as Assets-In-Place, there are two possible outcomes, each with a 50% likelihood of occurring.

ASYMMETRY's Assets-In-Place (T = -1 and T = 0)

	State 1	State 2	Expected Value
Assets-In-Place	80.0	120.0	100.0

As shown above, the value of existing operations, or Assets-in-Place, is 100.0 million in both periods, T = -1 and T = 0. But in T = 0, management has proprietary information about which state of the world will occur, and management will inform the outside investors in T = +1 as to what is likely to take place.

We begin by assuming that management will issue stock to finance PROJECT regardless of which state of the world occurs. Management chooses to take on the project regardless of the value of the Assets-In-Place. Thus, in T = 0, management announces PROJECT, and the value of ASYMMETRY increases from 100.0 million to 105.0 million, reflecting the NPV of +5.0 million associated with PROJECT.

ASYMMETRY will immediately issue new shares worth 45.0 million to the new shareholders, resulting in a new firm value of 150.0 million. That is,

$$V_{\text{ASYMMETRY}} = V_{\text{ORIGINAL SHARES}} + V_{\text{NEW SHARES}}$$

$$150.0 = 105.0 + 45.0$$

or,

$$V_{\text{ASYMMETRY}} = V_{\text{ASSETS-IN-PLACE}} + V_{\text{PROJECT}}$$

$$150.0 = 100.0 + 50.0$$

where the value of PROJECT is the sum of the investment and the NPV in the project:

$$V_{\text{PROJECT}} = I_{\text{PROJECT}} + \text{NPV}_{\text{PROJECT}}$$

$$50.0 = 45.0 + 5.0$$

At T = 0, with the announcement of PROJECT and the simultaneous issue of new shares, the original shareholders will own 70% (105.0/150.0) of ASYMMETRY, and the new shareholders will own 30% (45.0/150.0) of ASYMMETRY. From the viewpoint of the new investors, the shares are priced correctly. Since ASYMMETRY chooses to issue stock in both state of the world, the issuance in and of itself doesn't convey any information to the new shareholders.

The payoffs to the original shareholders, as made public in T + 1, and new shareholders, are displayed below. These payoffs are a function of the value of ASYMMETRY and the percentage ownership stakes. For

example, if the firm ends up in the bad state (State 1), the resulting firm value is 130.0 million. The original shareholders own 91.0 million (70%) of ASYMMETRY, and the new shareholders own 39.0 million (30%) of ASYMMETRY.

Payoffs to Original and New Investors Investing in PROJECT

	State 1	State 2	Expected Value
V_{ORIGINAL}	91.0	119.0	105.0
V_{NEW}	39.0	51.0	45.0
$V_{\text{ASYMMETRY}}$	130.0	170.0	150.0

As noted above, new shareholders are willing to invest 45.0 million in ASYMMETRY and own 30% of the firm. They assume management will issue shares regardless of which state of the world occurs. Recall that management, however, in $T = 0$, knows which state of the world the firm is in, although it will not reveal that information until $T + 1$. If management acts on behalf of the current shareholders, they will compare the wealth of the original shareholders under both outcomes based on issuing new stock versus not issuing new stock to finance PROJECT. The table below displays the payoffs to the original investors from investing versus not investing in PROJECT.

Payoffs to Original Investor from Investing or Not Investing in PROJECT

	Issue New Shares and Invest	Pass Up PROJECT
V_{ORIGINAL} in State 1	91.0	80.0
V_{ORIGINAL} in State 2	119.0	120.0

When management contemplates a decision to accept or reject PROJECT, the original shareholders are better off if management bypasses the +NPV investment when management knows ASYMMETRY will be undertaken in the good state of the world (State 2). In period $T + 1$, the ownership stake held by the original shareholders is worth 120.0 million if management bypasses PROJECT, versus 119.0 million if management accepts PROJECT and raises 45.0 million from new shareholders. Given that, management will only issue new shares if they know ASYMMETRY is being undertaken in the bad state of the world (State 1). New shareholders, who are rational, as per the assumptions of the model, recognize management will issue and invest in PROJECT only in State 1. Consequently, new shareholders will thus assign a value of 80.0 million to the Assets-In-Place.

In this model, management will optimally bypass a +NPV if the firm is substantially undervalued in the market, to avoid issuing stock at too low a price. Of course, there are times where the project has such a large +NPV that it still makes sense for management to invest in the project as it more than compensates for selling the stock at too low a price.

THE VALUE OF FINANCIAL SLACK AND THE PECKING ORDER THEORY

We can think of financial slack in a corporation as the excess cash on hand, and an available line of credit or immediate debt capacity. Given information asymmetry, financial slack has option value, as it allows a firm to invest in a +NPV project where the firm might otherwise reject the investment if it were forced to issue undervalued stock. In the real world, many large companies maintain financial slack to solve this problem of information asymmetry.

If management can convey its proprietary information to investors, the problem of underinvestment in +NPV projects will immediately disappear. But due to agency costs, not all investors necessarily believe managers, as some managers are inclined to cheat and over promise on the positive end of the spectrum. Moreover, revealing the information immediately can be costly to the firm for several reasons, ranging from disclosing proprietary information to competitors, and the time and resources it takes to convey the information to the shareholders.

The pecking order theory is the result of information asymmetry. Firms finance projects primarily with retained earnings and access to lines of credit, as well as by issuing new debt. When the firm runs out of debt capacity, e.g., when bankruptcy and agency costs of debt become large, firms are forced to resort to financing via new equity issues. But when firms end up in financial distress, the cost of debt overhang makes it problematic to issue new equity, since the benefit often goes only to the debtholders, rather than to the shareholders. In aggregate, firms rely on retained earnings for about 75% of its financings to grow; the rest is handled through issuing new debt issues (with no financing from new equity issues outside of stock mergers, by and large).

As illustrated at the beginning of the lecture note, bluebird bio issued new equity after its stock price had risen sharply, and its stock sharply declined in response to the new equity issue announcement. This finding generalizes to larger samples across thousands of firms and through time. On average, the issuer's stock price increases during the several months prior to a new equity issue and then declines roughly 3% at the announcement of it. In many respects, the 3% decline does not seem substantial relative to the volatility of stock prices, etc. But it fails to capture the underpricing aspect of issuing new equity, as illustrated in the bluebird bio example.⁵ More important, there is severe sample selection bias with respect to new equity issuers. That is, for most firms which issue new equity, they are somewhat able to mitigate the information asymmetry problem by being able to release the relevant information to new investors at a relatively low cost. Otherwise, they simply bypass investing in the project and the new equity issue. Thus, we do not have empirical evidence on what the stock price reaction would have been to non-equity issuers if they had chosen to announce and issue the stock. Firms which are hit with sudden needs for cash to survive and can only do so via raising new equity are forced to realize enormous discounts of often 20% or more.

⁵ Moreover, as mentioned earlier, the direct costs of equity issues tend to be high.

ISSUING NEW EQUITY: CONCLUDING COMMENTS

The pecking order theory is straightforward. Due to information asymmetry, corporations first use retained earnings to finance new projects, then lines of credit, followed by new debt issues, and lastly, equity. The pecking order theory comes from a strong area of economic research known as signaling, or adverse selection theory. Most of us are familiar with the lemons principle as formulated by George Akerlof in 1970, winner of the 2001 Nobel Prize in Economics.⁶ Akerlof proved how markets can partially fail when potential buyers are unable to verify the quality of the product they are buying. Akerlof applied the adverse selection theory to the used car market. Car owners tend to sell cars which they do not like versus cars which they like. Buyers recognize this adverse selection on the part of sellers and thus will only pay low prices. The result is that lower-quality cars are sold in the used car market and at low discounted prices. The Myers and Majluf theory, which extends the work of Akerlof, is more interesting and complex, as the information asymmetry does not necessarily involve the project for which financing is required. Rather the asymmetry is about the existing assets-in-place which are not being sold and need no financing.

Despite all of the focus on the stock market and the creation of shareholder wealth, corporations are hesitant to issue new equity. This lecture note focuses on the information asymmetry problem, which severely constrains new equity issues. Managers are not inclined to issue equity if they believe the company's stock is undervalued. And if stock is issued, investors expect the worse. In *Agency Costs and Capital Structure*, we saw that shareholders are generally unwilling to provide additional equity financing when the firm is in financial distress, as the funds benefit the bondholders, rather than the stockholders.

This is not to say that equity issues don't occur. For instance, a stock merger includes the issuance of new equity. And new equity is issued with respect to the exercise of employee stock-option plans. Notably, for these types of equity issues, the information asymmetry is mitigated by the fact that the recipients are more likely to possess the same information as management. That is, as part of their initial due diligence in reaching a definitive agreement to merge, target management will gain a far better understanding about the value of the acquiring firm relative to other outside shareholders. And in the case of employee stock options, at least the higher-ranking employees will also benefit from the information available to them.⁷ By far, the highest profile new equity issue is the initial public offering (IPO) for companies. The direct underwriting fees on large IPOs, those greater than \$1 billion in valuation, are generally around 4% in today's market.

In some infrequent cases, companies go public via a direct listing rather than through the traditional IPO process where an underwriter is employed. A high-profile case involved that of Spotify which listed directly on the NYSE in 2018. With the Spotify direct listing, there was no accompanying designated raise

⁶ Akerlof, George, "The Market for Lemons: Quality, Uncertainty, and the Market Mechanism," *Quarterly Journal of Economics*, 1970.

⁷ Corporations bear a higher reputational cost of issuing overvalued equity to employees via stock option programs than if issuing overvalued equity to external investors. Whereas the employees may respond after the fact via a reduction in work effort and productivity, external investors have no such recourse.

of capital by either the company itself or its investors. Rather, Spotify simply became listed, thereby allowing its existing shareholders to freely sell their shares on the stock exchange.

This lecture note has not yet mentioned the ugly word which comes to mind with respect to issuing new equity, that is, "dilution." Corporate managers, business reporters, pundits of all types, and even many students who excel in economics and finance, misunderstand dilution terribly. In essence, the big concern is that if a company issues new shares of stock, it can reduce the value of the existing shareholders' wealth, simply due to a reduction in their proportional holdings in the company. But this concern is baseless, assuming investors prefer more wealth to less wealth.

Consider two paths which management could take. The first path is to issue new shares to finance a +NPV project. Granted, this path reduces the proportional ownership of shareholders who choose not to participate in the equity offering, but their wealth is higher assuming that the benefits from the project exceed any issuing costs with the new equity. The alternative path is to reduce CAPX, which just happens to generate +NPV, and repurchase shares with the cash. This path is accretive in terms of the share ownership for investors not choosing to tender their shares. However, it is wealth destructive. **ECONOMIC DILUTION IS DUE TO SELLING UNDERVALUED STOCK.**

CONVERTIBLE DEBENTURES

Most external financing of large corporations is either straight debt (or bank loans), and the issuing of common equity (for stock mergers, IPOs, etc., as noted above). Other corporate financings include convertible securities (debentures and preferred), preferred equity, and warrants. Historically, convertible debentures have been an important source of financing for firms with negative or volatile cash flows, and with expected high future growth. Although convertibles having been around for decades, many market participants do not have a solid understanding of how convertible debentures are valued.

An often-used explanation given for the issuance of a convertible security is that they provide the best of both worlds -- that is, convertibles pay a lower interest rate than straight debt, on one hand, and they provide an opportunity to issue new equity at a premium to the current stock price on the other hand. A survey of corporate executives reveals that in nearly 60% of the cases, management viewed a convertible security as an inexpensive way to issue delayed stock, and in over 40% of the cases viewed convertibles as cheaper than straight debt. This explanation is intuitive and appealing at first glance. But the logic implies corporations can issue convertible debentures at prices that are rich relative to straight debt or common equity. Indeed, this line of thinking violates Proposition I of Modigliani and Miller. The explanation accounts for only one side of the equation. While it is true that a convertible debenture pays a lower interest rate than straight debt, it also pays a higher interest rate than that on straight equity (zero) and thus is worse than issuing equity in the downside scenario, as it still contains an indenture which gives the convertible holder priority over the equity holders. And if the company does exceedingly well after the issuance of the convertible, it is true that it is better to have issued the convertible at a higher price due to the conversion than if issuing straight equity. But it would have been even better to have issued straight debt.

We will view a convertible debenture not only in the context of a Modigliani and Miller world but will also relax the assumptions underlying perfect capital markets to show why convertible debentures exist, even if they are not mispriced, as suggested by popular understanding. In addition, we consider when there are instances where convertibles can become mispriced, largely due to issues involving liquidity, a concept not frequently studied in corporate finance (which is often studied in a vacuum isolated from capital markets).

CONVERTIBLE DEBENTURES AND MODERN FINANCE THEORY

In the lecture note, *Introduction to Capital Structure*, the focus was on the choice of debt versus equity and did not consider hybrid securities such as convertible debentures. But by understanding the Modigliani and Miller propositions, we know that in a perfect world without market frictions and imperfections, the issuance of a convertible debenture to either replace a corresponding amount of debt or equity, or even both, will have no impact on the overall value of the corporation. An investor can create a mimicking portfolio of a straight corporate debenture and equity options (or shares). And with respect to Proposition II, if the convertible debenture is issued to replace straight corporate debt, it will decrease the expected return on equity, though not as much as an equity issue would. And if the convertible debenture is used to replace straight equity, it will increase the riskiness of equity, though not as much as if straight corporate debt was issued.

As shown in the follow-up lectures to the Modigliani and Miller propositions, the assumptions are key. For example, as discussed previously, the tax treatment of interest favors debt financing, all else being held constant. Likewise, we can show that convertible debentures often play an important role in the capital structure of many corporations, specifically to mitigate agency costs and information asymmetry. As discussed below, there are cases in which a convertible debenture can be a more efficient form of financing than straight corporate debt, and other cases where a convertible debenture is a preferable form of financing to straight equity. We will discuss the case of a convertible debenture as an alternative to straight debt.

Consider a firm such as Krystal Biotechnology, Inc., a biotechnology company which is developing a proprietary gene therapy platform for patients suffering from rare debilitating disorders. Due to a high degree of uncertainty about its ability to generate positive cash flows, the stock price of Krystal Biotechnology is highly volatile, with annualized volatility of about 80%. If Krystal Biotechnology were to issue straight debt, it would likely have to pay an abnormally high interest rate due to its high risk. Indeed, even if Krystal Biotechnology ever becomes profitable, it could still be close to financial distress given the volatility of its cash flows. As we saw in the *Agency Costs and Capital Structure* lecture note, firms in financial distress find it difficult to raise debt financing, due to the possibility of asset substitution and risk shifting on behalf of the shareholders. The same difficulty in raising debt can be true of firms that are not in financial distress. With a stock return volatility of 80%, there is a moderate probability that Krystal Biotechnology would encounter financial distress, thus likely restricting the firm from even raising debt capital in the first place.

To add further realism to the above example, suppose there is considerable uncertainty about the overall risk level of the corporation. Indeed, there may be strong disagreements about the level of risk between management and potential debt holders. Whereas Krystal Biotechnology management might think that the overall asset volatility is only 50%, potential bond holders might think it is much higher. Thus, it can be relatively difficult to agree on the appropriate coupon, or interest, rate for the debt, not simply because there might be disagreement over the current level of volatility, but also because management might alter the overall level of business risk down the road. As theorized by Brennan and Schwartz in 1988, if the firm were instead to issue a convertible debenture, the holders of the convertible would be somewhat immune to the uncertainty regarding the overall risk of the corporation.⁸ That is, the negative impact of the risk on the cost of the debt component of the convertible is offset by the positive impact on the equity option component of the convertible. Put differently, volatility reduces the value of debt, but increases the value of options. Indeed, this logic implies that two firms with different levels of risk might end up issuing convertible debentures with nearly identical terms, including the coupon payments.

Stein in 1992 developed a complementary theory to the previous work of Brennan and Schwartz.⁹ According to Stein, small growth firms are often unable to raise debt efficiently due to high financial distress costs. Many of these firms prefer to issue equity. But they do not wish to do so at the current stock price if management believes the stock is undervalued. Moreover, as we discussed earlier, an equity issue will typically cause investors to anticipate that the current stock price is overvalued, thereby driving the stock price down. In Stein's model, management of the convertible issuer is confident that the cost of financial distress is low -- that is, management is optimistic that investors will not redeem the convertible for cash at maturity. In fact, Stein's model posits that management believes they will be able to call the convertible at a future date and thereby force the holders to convert to equity at the higher conversion price relative to the stock price at issue. In this case, the issuance of a convertible debenture doesn't communicate a negative signal about the current stock price the way a regular equity issue would.

⁸ Brennan, Michael, and Eduardo Schwartz, "The Case for Convertibles," *Journal of Applied Corporate Finance* 1988.

⁹ Stein, Jeremy, "Convertible Bonds as Backdoor Equity Financing," *Journal of Financial Economics* 1992.