Convertible bonds as backdoor equity financing

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This paper argues that corporations may use convertible bonds as an indirect way to get equity into their capital structures when adverse-selection problems make a conventional stock issue unattractive. Unlike other theories of convertible bond issuance, the model here highlights: 1) the importance of call provisions on convertibles and 2) the significance of costs of financial distress to the information content of a convertible issue.

1. Introduction

Convertible bonds are an important source of financing for many corporations. According to data presented in Essig (1991), more than 10% of all COMPUSTAT companies had ratios of convertible debt to total debt exceeding 33% during the period 1963–1984. A good deal of research effort has been devoted to developing pricing models for convertibles,[1] as well as to the issues surrounding corporations' policies for calling them.[2] Somewhat less work has addressed the fundamental question of why companies issue convertibles in the first place.

This paper develops a rationale for the use of convertible debt. I argue that companies may use convertible bonds to get equity into their capital structures

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[1]See, e.g., Ingersoll (1977a) and Brennan and Schwartz (1977, 1980).

[2]See Ingersoll (1977b), Mikkelson (1981), Harris and Raviv (1985), Jaffee and Shleifer (1990), and Asquith and Mullins (1991), among others.

2.2. Financing instruments

In the first part of the analysis, I focus on three financing options open to firms at time 0: equity, straight long-term debt that matures at time 2, and callable convertible debt that also matures at time 2. For the time being, short-term debt due at time 1 is not considered. The possibility of short-term debt is addressed in section 2.4 below.

A policy of equity financing can be summarized by the fraction of the firm's time 2 gross cash flows apportioned to outside claimants. A policy of long-term debt financing can be described by the face value of the debt – i.e., the promised repayment at time 2. It is assumed that long-term debt financing carries with it the potential for costly financial distress. If the firm's cash flow at time 2 falls short of the face value of the debt, a deadweight cost of c is imposed on the owner-manager. For the sake of simplicity, this cost c is taken to be exogenous, and might be thought of as representing time and resources devoted to litigation, etc.[5] A more general approach, and one more suitable for non-owner-managed firms, might involve endogenizing the extent to which financial distress imposes costs on shareholders, perhaps by appealing to Myers's (1977) idea of underinvestment in the face of a debt overhang, or a related concept.

A convertible bond has both a face value and a conversion ratio. It is also callable at time 1, so that the issuer may attempt to force conversion at this time. If investors convert, they get the specified number of common shares. If the bond is not called, they retain a debt contract with the original face value. Clearly, the issuer will not always be able to successfully force conversion. Investors will rationally convert only if the stock price at time 1 is high enough, so that the conversion value exceeds the call price.

2.3. A separating equilibrium with convertible financing

To illustrate the benefits of convertible financing, I first demonstrate that the availability of convertible bonds makes it possible to sustain a separating equilibrium in which all types of firms issue fairly priced claims and invest efficiently. This outcome is not generally possible when long-term debt and equity are the only financing options. I then argue in section 2.4 (using a slightly expanded version of the model) that even when we enrich the range of financing choices to include short-term debt, it is still not generally possible to achieve an efficient separating equilibrium without the use of convertibles.

The nature of the efficient separating equilibrium is summarized in the following proposition:

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[5]A similar formulation – nonpecuniary bankruptcy costs for the owner-manager – is adopted by Diamond (1984).

Proposition. *If costs of financial distress are high enough, so that $c > (I - X_L)$, then the following is a separating equilibrium:*

(i) *good firms issue debt with a face value of I and invest;*
(ii) *bad firms issue a fraction $I/(qX_H + (1 - q)X_L)$ of equity and invest;*
(iii) *medium firms issue a convertible bond and invest.*

The convertible has a face value of $F > X_L$; has a call price K that is given by $X_L < K < I$; and is convertible into a fraction $I/(pX_H + (1 - p)X_L)$ of the firm's equity.

To prove the proposition, we need to check three pairs of incentive conditions. Given the market beliefs associated with the equilibrium, we require that: 1) a bad firm does not wish to mimic either a medium or a good firm; 2) a medium firm does not wish to mimic either a bad or a good firm; and 3) a good firm does not wish to mimic either a bad or a medium firm.

2.3.1. The perspective of a bad firm

Much of the insight for the proposition is revealed by showing that a bad firm will not mimic a medium firm by issuing a convertible bond. Given the convertible structure outlined above, a bad firm issuing a convertible would face a probability z of being unable to force conversion at time 1 – when a bad firm deteriorates (which happens with probability z), the conversion value of the bond falls to $IX_L/(pX_H + (1 - p)X_L)$, which is below the call price K. In this circumstance, the call provision cannot be used to force conversion.

Consequently, if a bad firm issues a convertible, there is a probability z that it will be left with a debt burden of F.[6] This 'convertible overhang' in turn leads to certain financial distress, since a deteriorated bad firm's cash flow of X_L always falls short of F. So, the expected costs of financial distress to a bad firm associated with a convertible issue are given by zc.

On the other hand, there is some gain to a bad firm in mimicking a medium firm, in that it sells an overpriced security. It sells a convertible that it knows will remain a debt claim worth X_L with probability z and that will convert into equity worth I with probability $(1 - z)$. The true value of this convertible is thus $(1 - z)I + zX_L$, but a bad firm is able to raise an amount I with it. Thus the bad firm has issued a security that is overpriced by an amount $z(I - X_L)$.

Taking both factors into consideration, a bad firm will choose to issue the convertible only if the overpricing amount exceeds the expected distress costs of

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[6] A deteriorated bad firm is not only unable to use the call provision to force conversion, but is also unable to use the call provision to buy back the convertible for cash. This is because the call price exceeds the entire market value of a deteriorated bad firm, so that no method of financing will allow it to raise enough cash at time 1 to pay the call price.

zc. However, given the condition on c stipulated in the proposition, namely, that $c > (I - X_L)$, this can never happen. Therefore a bad firm will not mimic a medium firm. The central role of costs of financial distress is apparent here; if c were smaller, there would indeed be an incentive for a bad firm to mimic a medium firm, and the conjectured separating equilibrium would be destroyed.

The argument that a bad firm will also not mimic a good firm is more direct: if it does so, it issues debt that has a true value of $qI + (1 - q)X_L$. Since the bad firm raises an amount I, the debt issue is overpriced by $(1 - q)(I - X_L)$. But given the stipulated condition that $c > (I - X_L)$, the overpricing is again less than the costs of financial distress $(1 - q)c$. So a bad firm does not mimic a good firm.

2.3.2. The perspective of a medium firm

When a medium firm issues a convertible, it is issuing a security that it views as fairly priced. In addition, a medium firm bears no expected costs of financial distress with a convertible, because it knows that the conversion value of the bond will always be equal to I at time 1. Since this conversion value exceeds the call price K, a medium firm can force conversion with certainty and is never left with any debt burden.[7]

In view of this fact, it is obvious that a medium firm will not wish to mimic a bad firm. Such mimicking would entail the medium firm's issuing an underpriced (from its perspective) equity security and gaining nothing in return. Unlike a bad firm, a medium firm cannot reduce expected distress costs by switching to equity financing, since it already perceives these costs to be zero.

A medium firm will also not wish to mimic a good firm, for the same reasons that a bad firm will not wish to mimic a good firm. As before, the expected distress costs associated with long-term debt outweigh the benefits from selling an overpriced security. Indeed, the logic is identical to that sketched above for a bad firm, with q replaced everywhere by p.

2.3.3. The perspective of a good firm

There is clearly no reason for a good firm to deviate from a policy of long-term debt financing. A good firm bears no expected costs of distress with long-term debt. Thus by mimicking a bad or a medium firm, it can only sell what it sees as an underpriced security, with no compensating benefit.

In summary, the logic for a convertible is this: a medium firm does not want to issue equity because of the negative inference the market would draw. Straight

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[7]It is easily checked that it is always in a medium firm's best interest to use the call provision to force conversion at time 1. This would be true even without costs of financial distress – by forcing conversion a medium firm extinguishes an otherwise valuable option held by investors.

debt is also unattractive, because of the costs of financial distress. A convertible allows a medium firm to get equity into its capital structure, while at the same time conveying a more positive message to the market: a convertible issue cannot be coming from a bad firm, since a bad firm knows that its stock price may not be high enough at time 1 to realize conversion.

In this framework, the use of convertible securities has positive efficiency implications. In the separating equilibrium described above, all firms invest, and no costs of distress are actually borne in equilibrium. If convertibles were not available, this would not generally be the case. Rather, we would be back in a situation very similar to that described in the original Myers and Majluf (1984) paper, and might well have some types of firms failing to invest. With only two modes of financing (equity and long-term debt) available, any equilibrium that had all types of firms investing would have to involve some pooling in terms of financing choices. But if the NPV of the investment is relatively small, such pooling equilibria cannot be sustained – the higher-quality firm in the pool will prefer to pass up the investment instead of issuing what it perceives to be an underpriced security.[8]

2.4. Why don't medium firms simply postpone equity issues until time 1?

We have thus far not explored the possibility that firms might issue short-term debt and then refinance it at time 1 with an equity issue. If this option were introduced into the current set-up, it would also be possible to achieve an efficient separating equilibrium without appealing to convertible bonds. For example, suppose that good and bad firms behaved as before (i.e., financed with long-term debt and equity, respectively), but that medium firms simply used short-term debt to postpone an equity issue until time 1. This also satisfies the conditions for a separating equilibrium.[9]

But this strategy of simply postponing an equity issue works well only because the current version of the model has the unnatural feature that information asymmetries disappear completely after time 0. This feature implies that there are no adverse-selection problems associated with a time 1 equity issue. A more complete model would have the property that there is a steady-state level of

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[8]For example, if costs of financial distress were very high, then medium and bad firms would be unwilling ever to use long-term debt. Thus, in order for both types to invest, they would both have to issue equity. This pooling equilibrium cannot be sustained if N is small in relation to $(p - q)(X_H - X_L)$.

[9]The logic is similar to that above. Since there is symmetric information at time 1, the medium firm knows it will be selling a fairly priced security. The bad firm will not mimic the medium strategy of delaying the equity issue, since if it deteriorates, it will be unable to raise enough equity financing to refinance its short-term debt, and will thus face costs of financial distress. Neither the bad nor the medium firm will mimic the good firm by issuing long-term debt, again because of costs of financial distress.

information asymmetry – when managers' time 0 private information becomes public at time 1, managers learn a *new* piece of private information. In this way, managers are always one step ahead of the rest of the market, and the adverse-selection problems associated with an equity issue cannot be avoided simply by postponing the issue.[10]

It is straightforward to extend the model in this direction. Two new assumptions are needed: 1) At time 1, half of the medium firms (call them the M_G's) get some new private information that suggests they will do better than previously expected – their probability of receiving X_H rises from p to $p_G > p$. The other half of the medium firms (the M_B's) see their probability of receiving X_H fall to $(2p - p_G) < p$. 2) At time 1, some of the firm's existing assets can be liquidated and the initial outlay of I recovered. But the NPV of this liquidation strategy is negative, reducing the net value of the firm by L.

In the appendix, I prove that if $(p_G - p)$ and L are both large enough and the NPV of the time 0 investment, N, is small enough, then there can no longer be *any* separating equilibrium (efficient or otherwise) where the medium firms issue short-term debt at time 0. The logic is as follows. If a medium firm receives optimistic new private information at time 1 (i.e., becomes an M_G) it will then be reluctant to go through with the planned equity issue at that time, perceiving itself to be undervalued. This may result in an M_G instead inefficiently liquidating some assets to repay its short-term debt.[11] Folding back to time 0, there can thus be *ex ante* expected costs to a medium firm of relying on postponed equity financing. We can therefore endogenously rule out the postponed equity strategy, leaving convertible bonds as the only means of achieving an efficient separating equilibrium.[12]

2.5. Discussion

The model is extremely stylized, and some of its specific conclusions are due to oversimplified assumptions. For example, it is unrealistic to assume that a medium firm will be able to achieve conversion *with certainty*. At the expense of a bit more notation, it would be possible to generalize the model so that a medium firm is more likely to achieve conversion than a bad firm, but still

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[10]Lucas and McDonald (1990) present an infinite-horizon steady-state model of equity issues, wherein managers always have one-step-ahead knowledge of firm value.

[11]Such inefficient liquidation at time 1 would be an exact analog to the Myers–Majluf (1984) result that 'good' types may pass up positive-NPV investments rather than issue underpriced equity.

[12]Central to this result is the fact that an equity issue at time 1 is discretionary – a firm can decide to scrap a planned issue if its private information is optimistic. If it were possible to contractually precommit to equity issues sufficiently far in advance, such precommitted issues might represent a viable means for overcoming information problems and restoring efficient investment.

faces some uncertainty. In this case, convertibles would not wholly eliminate expected costs of financial distress. Nonetheless, the qualitative conclusion – that convertibles offer an attractive middle ground between the high expected costs of distress associated with a debt issue and the large negative announcement impact associated with an equity issue – would remain unchanged.

In a richer model of this sort, however, it might be difficult to argue that a convertible bond represents an *optimally* designed security. Although convertibles will continue to represent an improvement over debt and equity for some firms, one might imagine other financing contracts that now do even better – contracts that completely eliminate costs of distress while at the same time avoiding some of the informational problems associated with a common equity issue.

One example of such a contract can be given in the context of the model presented above. Suppose that at time 0 the company issues a security that can be redeemed at time 1 for k shares of stock, where the redemption ratio k depends on the stock price that prevails at time 1 – in particular, k is given by $1/P_1$. By construction, this security is 'adverse-selection-proof'. No matter what management's information advantage at time 0, everybody can agree that the security is worth $1. Furthermore, since the security converts into equity with certainty at time 1, there is no potential for costly financial distress.[13]

This line of reasoning suggests that the theory of convertible bond issuance presented here is only part of the story. Although the theory can explain why some corporations prefer convertibles to straight debt or equity, it implicitly limits the menu of financing options to these three instruments. It would clearly be desirable to have a model that endogenously explains why the alternative (and apparently more efficient) kinds of securities described above are rarely seen in practice.[14]

3. Empirical implications

The theory of convertible bond issuance presented above has a number of empirical implications. In this section, I discuss four categories of evidence that are relevant for assessing the theory: 1) managers' stated motivations for using

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[13]Brennan (1986) discusses exactly such a security.

[14]Interestingly, there have been several recent issues of an instrument that resembles that sketched above. For example, in May 1991, GM announced plans to raise $600 million by issuing a type of 'preference' shares (dubbed PERCS). One key feature of the PERCS is that they would automatically convert into shares of GM common in July 1994, with the number of shares being a decreasing function of the stock price prevailing at that time. Thus, as with the example given here, the PERCS represent a form of financing that: 1) has a true value that is relatively insensitive to any inside information managers might have, yet 2) does not seem to involve any potential for costly financial distress.

convertibles, 2) characteristics of firms that rely heavily on convertibles, 3) convertible call provisions and firm's call policies, and 4) stock-price reactions to announcements of convertible issues.

3.1. Managers' motivations for using convertibles

Several researchers have used surveys to gather direct evidence on why managers opt for convertible financing. An early such study is Pilcher (1955). Pilcher's survey asked (p. 60):

> Which played the most important role in the decision by your company to utilize the convertible privilege: the desire to 'sweeten' the senior leverage, thereby making it more attractive to buyers, or the desire to raise common equity on a sort of delayed action basis?

In this survey, 82% of the respondents chose the 'delayed equity' answer and 18% chose the 'sweetened debt' answer. Brigham (1966) asked an almost identical question, and the pattern of responses was very similar – 73% indicated that their primary intent in issuing a convertible was to obtain equity financing, whereas 27% indicated that they wished to sweeten a debt issue. Brigham also asked those in the 73% majority why they used a convertible to obtain equity financing. The overwhelming majority – 68% – said they believed their stock price would rise over time, so that a convertible provided a way of selling common stock at a price above the existing market.

Finally, Hoffmeister's (1977) survey allowed respondents to choose from among five other possible rationales besides delayed equity and sweetened debt. The respondents were also asked to pick a first, second, and third choice. Again, the delayed equity motive emerged as the single most important, ranking as first choice for 34% of the firms and as one of the top three choices for 70%.[15] In sum, the overriding message from the surveys seems to be that many (if not most) managers issue convertibles in the hopes of increasing the amount of equity in their capital structures. Thus the survey data support the basic premise of the model developed here.

In addition, the survey data help to underscore the important differences between this model and that of Constantinides and Grundy (1989). In their model, as in this one, the use of a convertible helps to overcome problems due to asymmetric information – it allows for a separating equilibrium and efficient investment. In the Constantinides–Grundy model, however, the issue of a

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[15]Hoffmeister also split his sample between industrial and financial firms, and found that the delayed equity motive was disproportionately important for the industrial firms, 47% of whom ranked it as their first choice. In contrast, sweetened debt was the most important motive for financial firms, with 41% picking it as their first choice.

convertible must be combined with a publicly observed *stock repurchase* to have the desired effect. 'Bad' firms are deterred from issuing convertibles not because of costs of financial distress, but rather because they find it unattractive to repurchase overpriced stock.[16]

This implication of the Constantinides–Grundy model is difficult to square with the survey data – if managers say they are using convertibles to get more equity into their capital structures, they would certainly not want to use the proceeds of a convertible issue to buy back stock. Other available evidence also casts some doubt on the notion that convertible issues are accompanied by stock repurchases. For example, the papers of Dann and Mikkelson (1984), Eckbo (1986), and Mikkelson and Partch (1986) all contain data (taken from issuer prospectuses) on the planned use of proceeds from convertible issues. None makes any mention of share repurchases: the most significant uses of proceeds are capital expenditures, general corporate spending, and debt re-financing.

In fact, debt refinancing is a very important use of convertible proceeds. For example, Dann and Mikkelson (1984, p. 175) note that 'one-third of the issu-ances were virtually entirely refinancing of existing straight debt'. This is what one might expect if (as the survey data suggest) managers use convertibles in the hopes of attaining a less-levered capital structure. It is, however, essentially the reverse of what is predicted by the Constantinides–Grundy model.

3.2. Characteristics of convertible issuers

The model of this paper suggests that convertibles would be especially valuable for firms that: 1) are characterized by significant informational asym-metries and 2) might incur large costs of financial distress if they added more debt to their capital structures.

Broman (1963) presents some early evidence consistent with the latter predic-tion. He examines 60 industrial firms that issued convertible bonds of $10 million or more in the period 1951–1959, and finds higher leverage ratios for these firms than for those issuing straight debt. Indeed, this finding leads Broman to conclude that 'debt advantages [of convertibles] are not as impor-tant in the minds of issuers as an eventual increase in equity ownership' (p. 71).

More recently, Essig (1991) conducts a detailed study of the characteristics of convertible issuers. Among the variables he examines are: 1) the ratio of R&D to sales, 2) the ratio of tangible assets (property, plant, and equipment plus

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[16]In Constantinides and Grundy (1989), as in the other theories of convertible bond issuance cited above, little importance is assigned to the callability feature. What is distinctive about a convertible in their framework (i.e., what allows the combination of a convertible issue and a stock repurchase to have the desired informational properties) is simply that it is concave in firm value for low values of the firm and convex for higher values.

inventories) to total assets, 3) the ratio of market value of equity to book value, 4) the ratio of long-term debt to equity, and 5) the standard deviation of changes in cash flow. Using both simple stratifications of the data as well as a more sophisticated multivariate regression framework, Essig relates these variables to firms' propensities to employ convertible financing.

A number of significant patterns emerge.[17] First, firms are more apt to rely on convertibles if they have high ratios of R&D to sales. For example, firms that make 'heavy' use of convertibles (i.e., their ratio of convertible debt to all debt exceeds 67%) have R&D to sales ratios almost twice those of other firms. To the extent that a high R&D ratio is indicative of the potential for information asymmetries, this finding supports the prediction of the model.

Alternatively, one might argue that a high R&D ratio indicates that a firm has important growth options, which – in the context of Myers (1977) – would tend to make financial distress more costly. In other words, a high R&D ratio may be an empirical proxy for a high value of the parameter c. Under this interpretation too, the empirical relationship conforms to that predicted by the model.

Essig also finds that convertible use is strongly negatively related to the ratio of tangible assets to total assets and strongly positively related to the market-to-book ratio. In both cases, one can interpret the results much like the results for the R&D-to-sales ratio. For example, a low level of tangible assets might make liquidation (and hence financial distress) costly. Similarly, a high market-to-book ratio would appear to indicate the presence of important growth options, which again would make distress costly.

With regard to the ratio of long-term debt to equity, Essig's results confirm Broman's (1963) earlier findings. Firms that have high debt-to-equity ratios are significantly more likely to use convertibles. Finally, Essig documents that convertible use is also positively linked to the volatility of a firm's operating cash flows. Again, these results are consistent with the model's prediction that convertibles should be particularly attractive to issuers facing potentially large costs of financial distress.

3.3. Call provisions and firms' call policies

The model in this paper differs from other models of convertible bond issuance in that it emphasizes the importance of the call provision. Convertible bonds are typically callable after the expiration of a modest call protection period – in Asquith's (1991) sample of convertibles issued between 1980 and 1983, the median length of this call protection period is 252 days and 21% of all convertibles have no call protection whatsoever.

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[17]The patterns discussed below appear to be quite robust – they show up both in the simple stratifications and in a variety of multivariate regression specifications.

Moreover, Asquith documents that, contrary to widespread belief, firms actually do use the call feature to force prompt conversion after the expiration of the call protection period, provided that this is feasible (i.e., the conversion value exceeds the call price) and that there are no negative cash flow consequences associated with the call. For example, Asquith finds that for firms where dividends are less than after-tax interest payments, conversion is forced almost immediately after the conversion value reaches 120% of the call price – the median delay from this point is only 18 days.

The result is that a large fraction of convertibles wind up being converted into equity a relatively short time after the initial issue date. In Asquith's sample, approximately two-thirds of all convertible bonds issued (and not subsequently removed from the sample because of merger) are eventually converted. Asquith's empirical findings are thus consistent with both the spirit of the story offered here and with the expectations of the managers in the surveys. They suggest that firms issuing convertibles have a good chance of seeing them turn into equity financing within a reasonable time.

3.4. Stock-price reactions to announcements of convertible issues

The model developed above also has implications for the magnitudes of stock-price reactions to financing announcements. First and most directly, it suggests that the announcement of a convertible bond issue should not be interpreted as negatively by the market as the announcement of an equity issue of comparable size. A convertible issue reveals a firm to be of medium quality, whereas an equity issue reveals a firm to be of bad quality.[18]

Table 1 summarizes some relevant evidence, taken from several papers that have studied these announcement effects. The first column of the table demonstrates that the absolute magnitude of the effect is indeed larger for equity issues than for convertible issues, by a factor of about two. And this simple comparison may understate the true differences, because convertible issues tend to be larger (as a fraction of firm value) than equity issues.

The second column of the table therefore divides the average announcement impact (in percentage terms) reported in each study by the average issue size (scaled by the market value of outstanding equity). Now the impact of an equity issue looks to be about three times as large as the impact of a convertible issue of the same size – an equity issue has a negative impact on the order of 28%

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[18]In the context of the model, the exact magnitude of the stock-price reaction to a convertible issue depends on the prior distribution of good, medium, and bad firms in the population. For example, if there are many good firms, a convertible issue that reveals a firm to be of medium quality will be bad news, and will lead to a negative stock price reaction. Conversely, if there are few good firms, a convertible issue can have a positive impact on the stock price.

Table 1

Average two-day announcement impact for common stock and convertible bond offerings.

Study	Average announcement impact	Average impact/issue size
(A) *Common stock offerings*		
Asquith–Mullins (1986)[a]	− 3.0%	− 31.0%
Masulis–Korwar (1986)[b]	− 3.25%	− 22.0%
Mikkelson–Partch (1986)[c]	− 4.46%	− 29.5%
Unweighted average	− 3.57%	− 27.5%
(B) *Convertible bond offerings*		
Dann–Mikkelson (1984)[d]	− 2.31%	− 10.5%
Eckbo (1986)[e]	− 1.25%	− 9.6%
Mikkelson–Partch (1986)[c]	− 1.39%	− 6.2%
Unweighted average	− 1.65%	− 8.8%

[a]*Source*: Tables 2 and 3 (primary offerings only).

[b]*Source*: Average impact comes from table 5 (industrial firms); average issue size comes from table 3, column 2.

[c]*Source*: Average impact comes from table 4 (events with no contemporaneous announcement); average issue size comes from table 3, row 2.

[d]*Source*: Average impact comes from table 3; average issue size comes from table 2, column 2.

[e]*Source*: Average impact comes from table 4; average impact/issue size is calculated on p. 149.

of issue size, while a convertible issue has a negative impact of roughly 9% of issue size.

Of course, these comparisons need to be interpreted with caution, as they completely overlook issues of sample selection. It would seem, however, that controlling for issuer characteristics might well *strengthen* the contrast between equity and convertible issues. Both the theory and much of the evidence reviewed in section 3.2 above suggest that convertible issuers are exactly the kinds of firms that would otherwise be expected to suffer from particularly *large* announcement effects, as they are the ones for whom asymmetries of information are most pronounced. Thus our observation of smaller announcement effects with convertibles than with straight equity is all the more striking.

The model may also shed light on certain cross-sectional aspects of stock-price reactions to convertible issues. For example, Mikkelson and Partch (1986) document that convertibles with high bond ratings (A and above) have very negative announcement effects, whereas convertibles with low ratings (B and below) have essentially no announcement effects. (See their table 7.) Mikkelson and Partch, as well as other authors [e.g., Brennan and Kraus (1987)], have

argued that this finding is difficult to reconcile with existing theory. But the current model provides a simple explanation: the greater the potential for costly distress (i.e., the lower the bond rating) the more credible is the convertible as a signal of optimism. Firms with low bond ratings have the most to lose if they are unable to force conversion, and hence will only issue convertibles if they are quite optimistic about the prospects for their stock price.[19]

4. MCI's use of convertibles, 1978–1983[20]

The case of MCI Communications Corporation provides a particularly sharp illustration of many of the ideas developed above. MCI was organized in response to a change in FCC policy that allowed new companies to enter the market for specialized long-distance services. MCI went public in June 1972, with an issue of $30 million of common stock. The company experienced large operating losses in its first few years.

By 1978, however, the outlook had improved considerably, in large part because of the success of MCI's Execunet service. Execunet, which was introduced in 1974, enabled MCI to attract small-business subscribers who could not afford dedicated private lines between particular cities. Unfortunately, the growth of Execunet was constrained in its early years by a 1976 court order that restricted it to existing customers.

The court order was lifted in May 1978. At that point MCI embarked on a period of dramatic growth. Total assets went from $161 million in March 1978 to $2,071 million in March 1983. This growth implied a need for repeated large infusions of external financing.

At the time this rapid growth began, MCI was highly leveraged. In March 1978, total debt stood at $173 million. Thus in book-value terms, the company had a ratio of debt to total capital in excess of 100%. Even in market-value terms, the picture was not much better – the market value of common stock at this time was only in the neighborhood of $40 million. An application of Myers's

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[19]One should probably not place too much inferential weight on this particular empirical finding, however. First, the sample is quite small. Second, an apparently contradictory result is reported by Eckbo (1986). Finally, there are again issues of sample selection – for example, low-rated issuers are probably subject to greater information asymmetries, and hence one might expect a larger price impact, all else being equal.

[20]Most of the factual material in this section is drawn from the Harvard Business School case study 'MCI Communications Corp., 1983' by Bruce Greenwald (1984). Moreover, in a teaching note for the MCI case, Greenwald (1986, p. 8) makes a verbal argument for convertibles that closely parallels the formal one offered here: '(Convertibles) offer a promise of ultimately escaping the business-risk burdens of debt, while showing management's confidence in the future of the company. If the price of the stock does not rise above the price at which conversion can be forced, management must live with the burden of unconverted debt.' My debt to Greenwald's analysis of the MCI case should be apparent from this passage.

(1977) logic suggests that, given the obvious importance of future investment in its growth options at this point, excessive debt could have been particularly damaging to a company like MCI.

MCI's high debt level and the accompanying potential for costly financial distress would seem to have dictated that the external funds be raised primarily through some sort of equity instrument. But MCI management expressed an aversion to the issuance of straight equity. Chief financial officer Wayne English was quoted as saying: 'It was always our conviction that issuing more common would knock the props out from under our stock.'

MCI decided to finance much of its growth with the use of convertible securities. At first, convertible preferred stock was used. Convertible preferred was apparently chosen over convertible debt because of tax considerations – MCI was initially unable to take advantage of the deductibility of interest expense because of a large accumulation of tax losses. A first issue of convertible preferred in December 1978 raised a gross amount (before issue expenses) of $28 million. This was followed by a second offering in September 1979 that raised $67.5 million, and a third offering in October 1980 that raised $49.5 million.[21]

The call provision on these securities allowed MCI to call them any time the market price of MCI common exceeded the conversion price by a stated margin (e.g., 25%) for 30 consecutive trading days. As its stock price rose, MCI was therefore able to force prompt conversion of all three convertible preferred issues, with the last conversion being effected in November 1981.

With its debt ratio improving, MCI undertook a $52.5 million sale of public subordinated debentures in July 1980. Another bond issue in April 1981 raised $105.9 million. The company then returned to the use of convertible securities, although it switched from using convertible preferred to convertible subordinated debentures. An August 1981 convertible debt issue raised $100 million and a May 1982 issue raised another $250 million. Again, the use of early call provisions combined with a rising stock price enabled MCI to force prompt conversion of these two issues: they were both converted by February 1983.

Thus, in a little over four years MCI was able to force conversion on five consecutive convertible issues, representing total financing of almost $500 million. A sixth convertible issue – another convertible debenture – in March 1983 produced an additional $400 million. Finally, in July 1983, MCI raised a record $1 billion with a 'synthetic' convertible, consisting of a package of bonds and detachable callable warrants.

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[21]The theoretical arguments made above apply to convertible preferred to the extent that an excess of preferred in a company's capital structure can lead to costs of financial distress. Although preferred may not have exactly the same properties as debt in this regard, its seniority relative to common equity implies that it can nonetheless create the kinds of 'debt overhang' costs identified by Myers (1977).

Unfortunately for MCI, it was unable to force the conversion of these last two issues. Its stock price, which was in the low $40s at the time of both issues, began a sharp decline as MCI fared poorly in product market competition with AT&T. This left MCI with a large debt burden, which it had difficulty servicing. In apparently desperate circumstances, MCI sold an 18% equity stake to IBM in June of 1986, at a price of approximately $14 per share. In December 1986, it announced major layoffs and large reductions in capital expenditures.

Although the successful conversions of the first five issues illustrate how convertibles can be used as an indirect method of obtaining equity financing, the failures of the last two underscore that this method is not without its risks. As seen in the model of section 2, it is exactly the presence of these risks – the potential for costly distress when stock prices fall and conversion cannot be forced – that enable convertibles to be issued with less adverse informational consequences than straight equity.

5. Summary

This paper has argued that companies may find convertible bonds an attractive middle ground between the negative informational consequences associated with an equity issue and the potential for costly financial distress associated with a debt issue. When used with a call provision that enables early forced conversion, a convertible can serve as an indirect (albeit somewhat risky) mechanism for implementing equity financing that entails less of an adverse price impact than an offering of common stock.

The theory developed here has a number of empirical implications that appear to be supported by existing evidence. In particular, the theory fits well with the following facts: 1) a convertible issue typically leads to a less negative announcement effect than does an equity issue of comparable size; 2) convertibles tend to be used predominantly by highly-leveraged, highly-volatile firms with large R&D portfolios and above-average levels of intangible assets; 3) a majority of managers assert that their primary motive in using convertibles is to raise equity on a 'delayed action' basis; and 4) most convertible issues are forcibly converted promptly after the expiration of their call protection periods, provided such forced conversion is possible and does not have negative cash flow consequences.

Appendix

It remains to be shown that, for $(p_G - p)$ and L sufficiently large and N sufficiently small, there cannot be any separating equilibrium in which medium firms issue short-term debt at time 0.

Suppose that a medium firm did issue short-term debt at time 0. Let us first ask whether we can have a pooling equilibrium in the time 1 subgame, so that both M_G and M_B types issue equity at that time – in other words, can we support the delayed equity strategy? The pooling outcome requires that an M_G prefer issuing equity at the pooling price to not issuing and liquidating some of its assets instead. This implies that there can be no pooling if $I(p_G - p)(X_H - X_L)/(pX_H + (1 - p)X_L) > L$. Thus if $(p_G - p)$ is sufficiently large, there will be no pooling at time 1.

This means that one of two things must happen at time 1 – either the M_G types will liquidate at cost L or they will refinance with debt and incur expected bankruptcy costs of $(1 - p_G)c$. So, working backward, the *ex ante* expected profits to a medium firm in the posited separating equilibrium cannot exceed the maximum of $(N - L/2)$ and $(N - (1 - p_G)c/2)$. Thus, if N is small enough in relation to L and c, *ex ante* expected profits will be negative. This destroys the posited separating equilibrium, as a medium firm would be made better off simply by doing nothing – not issuing and not investing – at time 0.

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