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ABSTRACT

The design of convertible bonds involves the choice of relative debt and equity components. In this paper we examine the empirical validity of the theories on convertible design using a sample of convertible bonds issued between 1968 and 1990. The four theories tested are the agency theory, the variance signalling hypothesis, the delayed equity hypothesis and the tax-bankruptcy cost hypothesis. We find evidence consistent with the delayed equity rationale. We also find some evidence consistent with the implications of agency theory to convertible design when convertibles are issued for new investment purposes. We do not find any evidence consistent with the other hypotheses.

ON THE DESIGN OF CONVERTIBLE BONDS

When a firm uses straight debt or seasoned equity to raise capital, the design of the security (i.e., the choice of the parameters of the security) is relatively simple. If the required capital is known, the firm needs to choose the yield in the case of straight debt and the offering price in the case of equity.[1] The firm typically sets the yield and stock price at or very close to prevailing market values.

A convertible, on the other hand, offers the firm additional design choices. Since a convertible is a hybrid security with features of both debt and equity, the firm needs to choose the relative debt and equity components. This is primarily accomplished through a trade off between the yield and the conversion ratio; the higher the yield the higher the debt component, and the higher the conversion ratio the higher the equity component. Additionally, the call features of a convertible differ from that of non-convertible callable debt because a call that forces conversion increases the equity base. Therefore, the choice of the call price and the call-protection period offer additional choices in the design of the convertible. Convertibles with a lower call price and/or shorter call protection have a higher effective equity component.

Several theories have been proposed to explain the rationale behind the issuance of convertibles and their design. In this paper we investigate the empirical support for these theories. In particular, we test explanations based on agency theory, variance signalling, delayed equity argument and tax-bankruptcy cost hypothesis.

Agency rationales for convertible issuance (Jensen and Meckling (1976), Galai and Masulis (1976), Green (1984)) suggest that the conversion feature is used to protect the convertible bondholders from managers who, acting in the stockholders' interest, have the

[1]The firm's problem is not as simple, especially for debt instruments. In practice, when designing a debt instrument, the firm needs to also choose the maturity, call provisions, sinking fund provisions, and covenants. However, these choices have to be made for convertibles also. We do consider some of these choices in this paper.

incentive to undertake high-risk, negative net present value projects. The variance signalling hypothesis implies that firms use the relative debt and equity components of a convertible to signal future variance of cash flows which is private information. The delayed equity rationale suggests that the call feature combined with the conversion feature allows average firms to separate themselves from below-average firms by using convertibles as delayed equity. The signalling cost in the delayed equity argument of Stein (1992) is the expected cost of financial distress due to debt. The tax-bankruptcy cost hypothesis uses the traditional trade off between tax advantages of debt and the cost of financial distress in designing a convertible.

We find evidence consistent with the delayed equity rationale. We find that when firms use conversion premium to set the delay, the equity component is related to both prior stock price run up and to the probability of financial distress, as implied by the delayed equity hypothesis. When the call-protection period is the primary determinant of the delay, there is no such relationship. This dependence of the relationship to the call-protection feature is implied only by the delayed equity hypothesis. We also find evidence consistent with the agency rationale, but only when convertibles are issued to finance new investment. We do not find evidence consistent with the other two hypothesis.

The only related work that we are aware of is Essig (1992). Essig tests two theories of convertible issuance: the agency theory and the estimation risk hypothesis of Brennan and Schwartz (1982), which is the basis for our variance signalling hypothesis. However, his focus is not the design of the convertible but the factors affecting choice of convertible financing and the proportion of convertible debt in a firm's capital structure. He derives testable implications from the two competing hypotheses relating certain firm characteristics such as assets in place, capital investment, etc., to the probability of issuing convertibles and the proportion of convertible in the firm's capital structure.

The paper is organized as follows. Section 1 describes the various rationales for issuing convertibles and their implications for convertible design. Section 2 describes the variables and Section 3 analyzes the data. Section 4 provides the results and Section 5 concludes.

1. Rationales for issuance of convertibles

In order to obtain some insight into the design of convertible bonds, we need to understand why firms issue them. This section provides a brief review of the various rationales that have been suggested for the issuance of convertibles and describes their respective implications to convertible design.

a. The agency rationale

Jensen and Meckling (1976) and Galai and Masulis (1976) show that stockholders of a leveraged firm have the incentive to take negative net present value projects that have highly variable cash flows since they effectively hold a call option on the firm's assets (i.e., the risk-shifting problem). Jensen and Meckling (1976) argue that convertible bonds mitigate this incentive. Since the value of the warrant component of the convertible increases with variance, holders of appropriately-designed convertibles may benefit from risk-shifting at the expense of stockholders. Green (1984), using a rigorous framework in which the value of the firm is endogenously determined, proves that a convertible can be designed to control the risk-shifting problem.

Jensen and Meckling (1976) argue that the severity of the agency problem depends on two factors: the ease with which resources can be shifted from one project to another and the incentive to shift resources to high variance negative net present value projects. The ease of reallocating resources depends on the type of assets the firm holds. Firms with large tangible investments in fixed assets may find it relatively difficult to substitute assets. In a similar vein, Titman and Wessels (1988) argue that the cost of risk-shifting is likely to be lower for firms whose value is derived more from growth options than from assets-in-place. Hence the dilution ratio of convertibles issued by such firms is likely to be lower.

The incentive to shift resources depends on (i) how well the firm is performing, and (ii) the variance of the cash flows of the firm's potential projects. When the firm is performing poorly, the risk of financial distress increases and the stockholders' incentive to appropriate bondholders' wealth by risk-shifting increases. Similarly, the greater the increase in variance of the firm's future cash flows due to an investment, the greater the incentive to take negative net present value projects. Since the value of the option held by stockholders increases with the variance of the cash flows, the incentive to undertake negative net present value projects increases with the variance. To protect against such perverse incentives of stockholders, convertible holders must be offered a higher equity component. Therefore, the higher the risk of financial distress and/or the higher the expected change in the variance of the firm's cash flows, the higher the equity component.

b. Variance signalling rationale

Most of the rationales based on asymmetric information assume that there is asymmetric information between the firm and the market regarding the variance of the firm's cash flows.[2] In contrast to straight debt or equity, the value of the convertible is not a monotonic function of the variance of the firm's cash flows since the convertible is a combination of straight debt and warrants. The value of the debt component is a decreasing function of the variance of the firm's cash flows while the value of the warrant component is an increasing function of the variance. Using this non-monotonicity property, Brennan and Schwartz (1982) showed that, if the firm and the market have different estimates of the variance, a convertible can be designed so that both parties value it the same. Berkovitch and Narayanan (1990) extend the Brennan and Schwartz idea by considering the signalling effects of the firm's actions and show how the variance of the firm's cash flow affects the design of the convertible parameters.

[2]The only exception to our knowledge is Stein (1992), which is discussed separately as the delayed equity rationale.

Suppose there are two firm types, one with high variance of cash flows and another with low variance. The variance of the firm's cash flows is private information, known only to the managers of the firm. Issuing risky straight debt is disadvantageous for the low-variance type since the debt will be undervalued. The low-variance type, however, can separate itself from the high-variance type by issuing convertible debt with a low debt component and a high warrant component. If the effect of the warrant component dominates that of the debt component, the value of the convertible increases with the variance. Therefore, if the high-variance type tries to mimic the low-variance type by issuing a convertible with the same parameters (i.e., the same conversion ratio and coupon rate), it will be issuing too valuable a security. In other words, the undervaluation of the warrant component for the high-variance type overwhelms the overvaluation of the debt component.[3]

The implication of the asymmetric information theories is that firms that have private information that the variance of their cash flows will increase will issue convertibles with low equity component and those that have private information that the variance will decrease will issue convertibles with high equity component. In contrast to the agency rationale, in these theories the change in the variance may be due to changes in the pattern of cash flows from the firms' existing assets or due to the introduction of new projects. Irrespective of the source of the change in variance, one would expect a negative correlation between the equity component and the change in variance.

c. Delayed equity rationale

Stein (1992) presents a model in which there is asymmetric information regarding the *mean* of the future cash flows. "Medium" firms issue convertibles to distinguish

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[3]Brennan and Kraus (1987) arrive at the same result by showing that firms can signal their variance by issuing securities with a payoff that is neither a convex nor a concave function of the cash flows of the firm. The terminal payoff of a subordinated convertible fits this description. Most convertibles are subordinated securities. In our COMPUSTAT sample of 123 issues, all were subordinated.

themselves from firms whose mean future cash flows are lower. They intend to use convertibles as "delayed equity", planning to call them for conversion as soon as uncertainty regarding future cash flows is resolved favorably.[4] The "bad" firms cannot mimic this strategy because of higher probability of a bleak future resulting in costly financial distress: in the event of financial distress, the convertible is essentially debt as investors will not convert them.[5] "Medium" firms cannot use straight debt to distinguish themselves from "bad" firms because the expected cost of financial distress is too high. This is the only rationale that exploits the call feature of the convertible which is incorporated in all the convertibles in our sample.[6]

Stein's model of delayed equity can be extended to a continuum of types in a straightforward manner. In this case, one would see a spectrum of convertibles with varying equity components being issued. The highest type firm will issue a convertible with zero equity component (that is, straight debt), the lowest type firm will issue a convertible with zero debt component (that is, equity) and all the intermediate types will issue convertibles with positive debt and equity components where the debt component will be directly related (or equivalently, equity component will be inversely related) to the

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[4]Contrary to the currently accepted thesis that convertibles are called late, Asquith (1995) provides evidence that convertibles of firms whose dividends are less than after-tax interest payments are called immediately (to force conversion) after the conversion value reaches 120% of the call price.

[5]Firms that issue convertibles are unwilling to issue straight debt to pool with even better firms because the expected cost of financial distress is higher with debt.

[6]The delayed equity rationale is also consistent with the reason that is often stated by corporate managers and investment analysts for the use of convertibles. In surveys conducted by Brigham (1965) and Hoffmeister (1977), the most common reason given by corporate financial managers for issuing convertibles is that convertibles provide a way of selling common stock in the future at a price above the existing market price because of positive conversion premiums. In the Brigham (1965) survey, 86% of the responding firms said that they issued convertibles to sell equity at a premium. In the Hoffmeister (1977) survey, on the other hand, while 70% of the firms said that the above rationale was one of the motivating factors for issuing convertibles, 58% said the interest cost reduction was another motivating factor. These rationales for convertibles have remained in vogue (see Calamos (1988), Knecht and McCowin (1989), and McGuire (1991)) despite arguments to the contrary in academic journals and textbooks.

type of the firm. One implication of this model is that the higher the probability of financial distress, the higher the equity component.

The delayed equity argument rests on the ability of the firm to call the convertible at an opportune time to force conversion. This provides additional interesting implications for convertible design. The expected length of the delay before the convertible is converted (that is, the duration between the issue date and the date of expected conversion) is a function of several convertible parameters such as the conversion premium, the call price and the call-protection period. The expected delay is positively related to each of these three parameters. In addition, the delay also depends on the expected increase in the firm's stock price. As we show later, the call price is apparently not used as a decision variable and is set on a standard basis. Therefore, the expected delay is essentially controlled by the conversion premium and the call-protection period.

Firms that have good growth prospects will have higher expectations of stock price growth (recall that this information is private in Stein's model). Such firms signal their higher quality by designing a convertible that is closer to debt than equity. This is achieved either by issuing a convertible with higher conversion premium or by incorporating a longer call-protection period. Both these measures ensure that the convertible will remain unconverted (that is, as debt) for a longer period; equivalently, the convertible will have a lower equity component. This line of reasoning implies that, in cases where the conversion premium is the primary determinant of the delay (because the call-protection period is low or zero), there must be a negative relation between the equity component and the expected stock price growth.

Stein (1992) also argues that a low level of tangible assets might make liquidation, and hence financial distress, costly. As the cost of financial distress increases, firms can separate themselves from inferior firms by issuing convertibles with a smaller debt component. Therefore, the delayed equity hypothesis would predict an inverse relation between proportion of fixed assets and the equity component of a convertible.

d. Tax-Bankruptcy cost hypothesis

This hypothesis suggests that convertibles are designed to optimize the capital structure by trading off the interest tax shields from the debt component against the costs of financial distress. Thus, following DeAngelo and Masulis (1980), firms that have low non-debt tax shields can use the corporate tax reduction from interest payments to more than offset the increased personal tax from holding debt. Such firms will gain from issuing convertibles with higher debt component. Furthermore, firms with low expected costs of financial distress will also benefit from issuing convertibles with higher debt component.[7] Thus under this rationale, one should see a positive relation between the equity component of a convertible and both non-debt tax shields and the expected costs of financial distress.

e. Summary of factors affecting convertible design

Table 1 lists the factors affecting convertible design as predicted by the theories and the relation of each factor to the equity component as implied by one or more theories. A positive sign indicates that the factor is directly related to the equity component and a negative sign implies the opposite. Zeros indicate that the rationale does not have any implications for that particular parameter.

2. Methodology and variables

Given the predicted relationships between the equity component of convertibles and factors posited by the various theories, we employ regression techniques to estimate

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[7]Convertible design is unlikely to be driven only by the trade off between taxes and cost of financial distress. Value maximizing behavior by firms implies that if security issuance or design moves a firm along a given leverage-value function, the abnormal stock returns upon announcement of the issue must be nonnegative. However, there is strong evidence (see Dann and Mikkelson (1984), Eckbo (1986), and Mikkelson and Partch (1986), in addition to the results reported in this paper) that there are negative abnormal returns upon announcement of convertibles and that the magnitude of the stock price reaction is less severe than that for equity issues but more severe than that for debt issues. This evidence is consistent with an optimal capital structure model that incorporates adverse selection.

the partial effect of each of the factors on the equity component. This section describes how the equity component and the factors affecting it are measured.

a. The dependent variable

All our hypotheses are stated in terms of the equity component of the convertible. There are several ways of measuring the equity component. In practice, the parameters often used are the conversion ratio (or, equivalently, the conversion price), the dilution ratio, and the initial conversion premium. These parameters are inappropriate for our purpose because none of them measures what proportion of the convertible is equity.

To calculate the equity component of a convertible, we define a measure called the Relative Dilution Ratio (RDR). The RDR is the ratio of the dilution ratio of the convertible (that is, the percentage of equity held by convertible holders on conversion) to the dilution ratio that would have resulted if common stock had been issued instead to raise the same amount of capital. Let

I = dollar amount raised through convertible financing.

p = Conversion price = Face value of convertible / conversion ratio

S = share price at the time of issue of convertible

N = number of common shares outstanding at the time of issue of convertible

It is assumed that, if common stock is used instead of convertibles, shares will be issued at the current share price S. Then, the dilution ratio under equity financing, i.e., the fraction of the firm's equity owned by the new stockholders, equals $I/(I + NS)$. Under convertible financing, the number of shares owned by convertible-holders upon conversion is I/p (assuming convertibles are issued at par) and the dilution ratio is therefore[8]

$$\frac{I/p}{N+I/p}=\frac{I}{I+Np}$$

[8]All convertibles in our sample are issued at or very close to par.

Hence, the relative dilution ratio is given by

$$RDR = \frac{I + NS}{I + Np}$$

Note that the RDR is closely related to the initial conversion premium, which equals (p/S - 1). If we denote initial conversion premium by CP, RDR can be written as

$$RDR = \frac{I/NS + 1}{I/NS + 1 + CP} \tag{1}$$

Therefore, RDR is inversely related to the initial conversion premium. The main difference between the two is that RDR accounts for the relative size of the issue (i.e., I/NS) while the initial conversion premium does not.

For convertibles issued at par, the no-arbitrage condition implies that the initial conversion price must be greater than the stock price at the time of issue. In other words, the lowest conversion premium must be zero. It can be seen from Equation (1) that, if the conversion premium is zero, RDR is one. A conversion premium of zero (or an RDR of one) implies that the convertible is equivalent to equity. The theoretical upper bound for the conversion premium is infinity which implies a lower bound of zero for RDR. At this value, the convertible is equivalent to straight debt.[9] Therefore, the higher the RDR the higher the equity component of the convertible. From now on, we use the terms RDR and "equity component" interchangeably.

For I we used the gross dollar amount raised through convertible financing before underwriting fees and transaction costs. For S we used the closing stock price on the date of convertible issue if it was available on CRSP. When not available, we used the bid-ask spread reported on CRSP for the issue date. For N we used the number of shares outstanding as reported by CRSP on the date of convertible issue.

[9]~~King (1984) attempts to evaluate~~ debt and equity components of a convertible by a contingent claims approach, assuming that markets are perfect. Under perfect markets, however, there is no reason to prefer convertibles over other securities. Moreover, his approach ignores signalling aspects of convertibles.

b. Independent variables

1. Proportion of fixed assets (FA)

The agency hypothesis implies that the higher the proportion of fixed assets the less feasible it is to shift resources to high-variance, negative net present value projects. Moreover, the higher this proportion, the higher the probability that the debt is secured, reducing the incentive to shift risk. Since the proportion of fixed assets is inversely related to the cost of financial distress, the delayed equity hypothesis suggests that the proportion of fixed assets is inversely related to the equity component of the convertible. The proportion of fixed assets (FA) is defined as the ratio of property, plant and equipment (net) to total book value of assets, both as reported in COMPUSTAT. The figures used are for the fiscal year-end prior to the announcement date of the convertible. Since both the feasibility and the incentive to shift risk are inversely related to the proportion of fixed assets and directly related to RDR, FA should be inversely related to RDR.[10]

2. The probability of financial distress (IC)

The agency theory, the delayed equity rationale, and the tax-bankruptcy cost hypothesis imply that firms will increase the equity component of the convertible as the probability of financial distress increases. We use the interest coverage ratio (IC) to proxy the probability of financial distress. Since firms in different industries have different capital structures and hence different optimal coverage ratios, it is not appropriate to compare the

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[10]We used other variables which capture the spirit of the FA variable. For example, a growth variable will have exactly the opposite predictions to the FA variable. Firms with high growth opportunities have more flexibility in allocating resources to high variance projects and hence the agency hypothesis will imply that growth is directly related to the equity component. As Stein (1992) argues, firms with high growth options have higher costs of financial distress and hence both the delayed equity and the tax-financial distress hypotheses imply that growth is directly related to the equity component of the convertible. We used market-to-book ratio to proxy growth opportunities and the results are qualitatively similar to tests with FA.

coverage ratios across firms in different industries. Therefore, we standardize the interest coverage ratio of each firm by its own ratio in the past. Specifically, we define[11]

$$IC = \frac{\text{Interest coverage ratio 5 years before issue of convertible}}{\text{Interest coverage ratio 1 year before issue of convertible}}$$

where interest coverage ratio is defined as[12]

$$\frac{\text{Earnings before interest and taxes}}{\text{Interest + Debt due in 1 year}}$$

Thus, a higher value of IC implies that the interest coverage ratio has worsened over time and that the probability of financial distress has increased. Therefore, according to agency, delayed equity, and tax-bankruptcy cost hypotheses, there should be a positive relation between IC and RDR.

3. Standard Deviation Ratio (SDR)

The variance signalling rationale implies that firms whose future cash flow variance is lower signal this fact by issuing convertibles with high RDR while firms whose variance is higher will issue convertibles with low RDR. We assume that the firm (that is, the management) knows the future variance which is different from the current variance either because the firm is undertaking a new project or because it has new information regarding the variance of the cash flows generated by the assets in place. We use the Standard Deviation Ratio (SDR) to measure the change in variance that is being signalled by the firm. SDR is the ratio of the post-issue standard deviation of cash flows to the pre-issue standard deviation, i.e.,

[11] In some cases COMPUSTAT data on interest coverage five years before issue of convertible was missing. In such cases, we used the interest coverage four years before issue of convertible.

[12] We used different definitions of interest coverage ratios but the results are similar.

$$SDR = \frac{\text{post - issue standard deviation of cash flows}}{\text{pre - issue standard deviation of cash flows}}$$

The standard deviation of pre-issue cash flows is measured as the standard deviation of the operating income before depreciation (before extraordinary items) over a five years preceding the issue of the convertible, normalized by asset value.[13] Similarly, the standard deviation of post-issue cash flows is measured as the standard deviation of the operating income before depreciation over a five-year period starting with the fiscal year end following the issue of the convertible. According to the variance signalling hypothesis, this ratio of post-issue to pre-issue variance of cash flows should be negatively related to RDR. Since SDR is the ratio of a firm's post- and pre-issue standard deviation of cash flows, it is not affected by differences in the variance of cash flows across firms or industries.

The agency rationale implies that the higher the expected future variance of cash flows the higher the equity component of the convertible. According to this rationale, then, the ratio of post-issue to pre-issue variance of cash flows should be negatively correlated to RDR.[14]

4. Tax advantage of debt (TL)

Under the tax-bankruptcy cost hypothesis, firms with higher tax advantage of debt will issue convertibles with a lower RDR. DeAngelo and Masulis (1980) argue that firms with greater non-debt tax shields, such as tax loss carry forwards and investment tax credits, gain less from debt tax shields and are likely to use less debt. Since a significant

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[13]We also normalized the operating income by sales. The results are qualitatively similar.

[14] It is tempting to hypothesize that tax-bankruptcy cost hypothesis implies that increase in variance results in increase in the equity component of the convertible. There is no theoretical basis for this argument as shown by Castanias (1983) in the context of debt-equity choice. The empirical evidence on this issue is also mixed. While Kim and Sorensen (1986) find a positive relation between volatility and leverage, Kester (1986) and Titman and Wessels (1988) find no significant relation between the two.

portion of our sample is from the mid to late eighties when investment tax credit was abolished we use the tax loss carry forwards (TL) as the (inverse) indicator of the tax advantage to debt. Our use of this method is also influenced by the success of Mackie-Mason (1990), who finds that tax loss carry forward is a significant explanatory variable in the firm's debt-equity choice and that firms with high tax loss carry forwards are less likely to issue debt. Following Mackie-Mason, we express the tax loss carry forward as a percentage of sales:

$$TL = \frac{\text{Tax loss carry forwards}}{\text{Net sales}}$$

where both the tax loss carry forward and the net sales are from the fiscal year preceding the issue of the convertible. TL should be positively related to RDR under the tax-bankruptcy cost hypothesis.

5. Run up in stock prices (RUNUP)

One implication of the delayed equity rationale is that firms with higher expected stock price growth will issue convertibles with low equity component to offer a given delay in forcing conversion.[15] To proxy the near-term future stock price growth, we use the cumulated raw return on the firm's stock over the 249 days between day -250 and day -2, where day 0 is the announcement day of the convertible issue.[16] RUNUP is expected to be negatively related to RDR.

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[15]Berkovitch and Narayanan (1993) suggest that more equity issues are made when the economy and the stock market are booming. This is because an expanding economy makes lower quality projects profitable and such projects are financed with equity. This suggests that convertibles issued during a stock market run up will a have higher equity component.

[16]In practice, the stock price run up appears to be an important determinant of the conversion premium, which is inversely related to RDR. To quote from Calamos (1988):

> *"Conversion premium levels have always ebbed and flowed depending on market sentiment. In a bullish environment, the enthusiasm of the market boosts premium levels. When market sentiment changes, premium levels can change very rapidly."*

3. Data description

The initial sample consists of U.S. convertible issues registered with the SEC during the period 1968-1990, as reported in the S & P Bond Guide. It excludes zero-coupon convertibles (also known as LYONS) and exchangeable bonds (bonds convertible to another firm's stock).[17] The final sample includes issues that met the following criteria:

a) The relevant convertible parameters (conversion premium, coupon rate, and issue size) required to calculate RDR are reported either in the S & P Bond Guide or in the Moody's Manuals.

b) The announcement of the issues is reported in the Wall Street Journal Index so that we can identify the announcement date.

c) The firms have return data available in the CRSP files on NYSE, AMEX, or NASDAQ firms to calculate RUNUP.

d) The firms have valid data in the COMPUSTAT files for 10 years surrounding the issue date. This criterion is necessary to estimate the SDR, the ratio of post-issue to pre-issue standard deviation, and IC, the relative interest coverage ratio.

The number of convertible issues that met criteria (a), (b), and (c) was 288 and the number that met all four criteria was 123. For convenience, we call the former sample the CRSP sample and the latter one the COMPUSTAT sample. The distribution of convertible issues during the period between 1968 and 1990 is given in Table 2, both for the CRSP sample of 288 issues and the COMPUSTAT sample of 123 issues. It can be seen from the table that the distribution of convertible announcements across time has been very uneven. However, convertible issues have been relatively more uniform during the eighties than during the seventies. From the COMPUSTAT sample in Table 2 it can be seen that about 82% of our final sample is from the eighties.

[17] ~~Zero-coupon convertibles are exc~~luded because their characteristics are different from those of coupon-bearing convertibles. In particular, since they have a constant conversion ratio, the conversion price changes over time as the interest accumulates.

a. Issue size

Table 3 provides the characteristics of the convertible issues in the COMPUSTAT sample. The table also shows the characteristics of issues before and after 1980. The year 1980 was chosen as the dividing line for two reasons. First, most convertibles issued prior to 1980 have no call-protection period while the reverse is true for those issued after 1980. Second, such a division facilitates comparison with Dann and Mikkelson (1984) which covers convertibles issued up to 1979. It can be seen from the table that the nominal median size of a convertible issue has increased by 50% after 1980. However, when adjusted for inflation (the Personal Consumption Expenditures Index (base year = 1987) was used to calculate real values), the median size after 1980 is only 18% larger. In fact, the mean issue size, measured in real terms, has actually decreased since 1980. Similarly, while the nominal market value of equity of firms issuing convertibles in the post-1980 sample is 2.75 times that of the pre-1980 sample, there is no significant change in real terms. The relative issue size, i.e., the issue size as a proportion of the market value of the firm's equity, has declined slightly over time. The mean dilution ratio has remained stable, around 0.17.

b. Conversion premium and call protection

The major differences between the pre- and post-1980 samples are in the initial conversion premium and the call-protection period. The median initial conversion premium is 40 percent higher in the post-1980 period. In the pre-1980 sample, the median initial conversion premium was only 15% while in the post-1980 sample it is 21%. The Mann-Whitney test confirms that the two samples come from different populations and the Median test confirms that the difference in medians is significant at the 1% level. This is consistent with the delayed equity rationale which implies that conversion premiums increase in a bull market. Another explanation for the increase in conversion premium is that it is higher to offset the increase in the call-protection period. Since call protection delays forced conversion and is a valuable option given up by the firm, it is able to charge a higher conversion premium.

The mean call-protection period has increased from 0.33 years in the pre-1980 sample to 2.53 years in the post-1980 sample. This is significant at the 1% level (t = 8.55). In fact, in the pre-1980 sample, only 6 of the 39 issues had any call protection at all. In contrast, in the post-1980 sample only 6 of the 84 issues had no call protection. Of the issues that had call protection, the protection period varied from 1 year to 5 years.[18]

c. Call price

All convertibles in our sample are callable. If there is no call protection, it is common practice to set the initial call premium as the coupon payment and then to reduce it to zero over a period of time. A cursory inspection revealed that a similar rule is followed even when there is call protection. If the convertible is call-protected, the first call price (at the expiry of call protection) is usually the call price that would have prevailed on that date using the rule for convertibles with no call protection. To examine if firms use the call price as a design variable, we set the standard call price as the face value plus one year's coupon payment. We then calculate the adjusted call price as follows:

Adjusted call price = Call price on first permitted date of call + (annual rate of change of call price) × call-protection period.

The adjusted call price is, therefore, a measure of the call price that would have prevailed at the time of issue if there were no call protection. By dividing the adjusted call price by

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[18]If we look at the conversion premiums before and after 1979, instead of before and after 1980, the difference is dramatic. Before (and including) 1979, the mean conversion premium is 13.6% while after 1979, it jumps to 24%. There appears to be a temporal pattern in the design of convertibles. Prior to 1980, call premiums were low and there was generally no call protection. In 1980, the call premiums almost doubled (to 27.8%) but still very few issues had no call protection. Since 1980, call premiums have stayed at their high level, but convertibles are almost always protected from call for two to three years.

the standard call price we obtain the relative call price. A relative call price of 1.00 indicates that the adjusted call price at the time of issue is the standard call price, which is the face value plus one year's coupon payment.

It can be seen from Table 3 that the average relative call price is 1.00 (rounded to two decimal places) in both the sample periods. In fact, there are only 19 issues where the relative call price differs from 1.00, and only 5 issues where it differs by more than 5%. Thus, it appears that firms set the call price in a standard fashion.

d. Purpose of issue

The stated purpose for convertibles issues was collected from various Moody's Manuals. About two-thirds of the convertibles are issued exclusively to refinance existing debt and this proportion is the same in both sample periods. The debt replaced by convertibles is always short-term debt; in most cases, the debt replaced is bank debt. About 25% of the convertibles are issued exclusively to finance new investments while the remaining are used for both refinancing and new investments.

e. Stock returns at the announcement of the issue

Table 4 provides the market adjusted returns on common stock around the announcement of convertibles issues in our CRSP sample. For comparison, Table 4 also provides market adjusted returns on common stock around the announcement of common stock issues from Korajczyk, Lucas, and McDonald (1990). The t-statistic for each period in Table 4 is calculated by using the cross-sectional variance of abnormal returns as in Korajczyk, Lucas, and McDonald (1990). The price rise prior to announcement is significant while the abnormal return over the 100 days after the issue is insignificantly different from zero. The two-day abnormal return around the announcement is -1.07% and is significant, which is generally consistent with the results of Dann and Mikkelson (1984), Eckbo (1986) and Mikkelson and Partch (1986). Figure 1 provides a graphical representation of the cumulative market adjusted return and the cumulative market return around the announcement of the convertible. As can be seen from Figure 1, the pattern of positive abnormal returns prior to announcement and negative abnormal return at announcement is identical to that surrounding the announcement of common stock issues.[19] The pattern is completely different from that surrounding straight debt issues. Both Chaplinsky and Hansen (1993) and Mikkelson and Partch (1986) report that there are negative abnormal returns prior to straight debt announcements and zero abnormal returns at announcement.[20] The pattern of abnormal returns surrounding convertible issues is consistent with the theory of Lucas and McDonald (1990) which argues that managers with positive net present value projects wait till their assets-in-place are overvalued before issuing securities.[21]

f. Summary statistics of regression variables

Table 5a provides the summary statistics of all regression variables in the COMPUSTAT sample. While the median of IC is 0.93 suggesting that for about half the firms in the sample the probability of financial distress increased during the years leading to the convertible issue. The mean SDR being greater than one suggests that the variance of the firm's cash flows increased after the issue on average. There are only 18 firms with TL and hence the median is zero. The mean run up in stock prices (raw return) in the year preceding the issue is 43.6%.

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[19]This has also been noted by Mikkelson and Partch (1986).

[20]The abnormal returns reported in this paper and in Korajczyk, Lucas, and McDonald (1990) are market adjusted returns while Chaplinsky and Hansen (1990) and Mikkelson and Partch (1986) calculate abnormal returns using a market model.

[21]To check the robustness of these results, we also calculated abnormal returns as

$$r_{it} - [r_{ft} + \beta_i(r_{mt} - r_{ft})]$$

where r_{ft} is the one-month Treasury bill rate assumed to be constant over the month, r_{mt} is the return on the S & P 500, and $\beta_i = cov(r_i, r_m)/var(r_m)$. β_i was measured over periods both prior to the announcement of the issue and after the announcement. The pattern of price rise prior to announcement and price drop upon announcement still holds though the magnitudes are somewhat different.

Table 5b provides the distribution of RDR and conversion premium in the COMPUSTAT sample. It can be seen that about 80% of the RDRs fall between 0.80 and 0.95, with a mean of 0.857. The distribution of the initial conversion premium is slightly less concentrated, with 76% falling between 10% and 30%.

4. Results

a. Tests on the entire sample

In order to examine the factors that affect convertible design, the relative dilution ratio (RDR) is regressed on the independent variables discussed above. The regression run is:

$$RDR = \alpha_0 + \alpha_1 FA + \alpha_2 IC + \alpha_3 SDR + \alpha_4 TL + \alpha_5 RUNUP$$

The results of the regression is given in Table 6. In the regression with the entire sample of 123 observations, α_1, the coefficient of the fixed asset variable FA has the sign predicted by the agency and delayed equity hypotheses, but is insignificant. The coefficient of the RUNUP variable, α_5, has the sign predicted by the delayed equity hypothesis, but is also insignificant. The coefficient of the SDR variable, α_3, is positive as predicted by the agency rationale, but is insignificant. The sign of the TL coefficient, α_4, is opposite that predicted by the delayed equity and tax-bankruptcy cost hypotheses. The only variable that is significant in the regression with the entire sample is the relative interest coverage ratio IC. It is significant at the 1% level and the sign is as predicted by the agency, delayed equity, and tax-bankruptcy cost hypotheses. Thus the regression with the entire sample provides some support for these three hypotheses but not for the variance signalling rationale.

b. Further tests to examine support for alternative theories

The only result that emerges from the regression with the entire sample is that there is no support for the variance signalling rationale. The significance of IC is consistent with the agency, delayed equity, and tax-bankruptcy cost explanations of convertible issuance. To further examine the support for these rationales, we suggest and carry out the following tests.

Among the theories, the only one that depends on the call feature of the convertible is the delayed equity hypothesis. Therefore, if convertible design is not based on the delayed equity hypothesis, regression results should be independent of the call feature. On the other hand, the call feature can play a significant role only under the delayed equity hypothesis. Similarly, we argue below that only the agency theory is restricted to convertible issuance for new investment and the possibility of risk-shifting. Therefore, if convertible design is not based on agency theory considerations, regression results should be independent of the purpose of issuance of convertibles. By the same token, the purpose of issuance can play a significant role only under the agency hypothesis.

Therefore, we carry out regressions on two different sets of subsamples - the first one split on the basis of the call feature and the second one split on the basis of the purpose of issuance. Since the regressions on the whole sample are not consistent with the variance signalling hypothesis and there is no suggestion under that theory to meaningfully split the sample, our conclusion remains that variance signalling is not a factor in convertible design considerations.

b.1. Further examination of the support for delayed equity hypothesis

As discussed before, the expected length of delay is affected by three parameters of the convertible, namely, the conversion premium, the call price, and the call-protection period. Since we have shown that the call price is set in a standard fashion, it appears that firms try to control the expected length of delay by appropriately designing the conversion premium and/or the call-protection period.

While the average call-protection period is 1.83 years (Table 3), it ranges from zero to slightly over five years. If the call-protection period is long enough, it may be the primary determinant of the expected delay. If this is the case, then conversion premium, and hence RDR, need not be designed to provide the expected delay and need not have the posited relation to the factors implied by the delayed equity hypothesis. Therefore, under the delayed equity hypothesis, we expect to find that the relationship between RDR and the factors posited by the hypothesis, namely, FA, IC, and RUNUP, to be stronger when the call-protection period is not the primary determinant of the delay. While the above factors are common to agency and tax-bankruptcy cost hypotheses also, neither hypothesis has similar implications since they are not based on the call delay. Therefore, we can conclude that there is support for the delayed equity hypothesis if the relationship between RDR and the common factors to be stronger when the call-protection period is not the primary determinant of the delay.

The issue then is how to determine when the call-protection period is likely to be the primary determinant of the expected delay. To do this, we first estimate the number of years it would take the conversion value to exceed 120% of the call price. Asquith (1995) has found that firms generally call their convertible for conversion, if there is no call protection, when the conversion value exceeds 120% of the call price. We use the past year's rate of return on equity as the predictor of expected future rate of return to calculate the expected conversion value. The details of the calculation are shown in the Appendix. We find that the median number of years it takes the conversion value to exceed 120% of the call price is 1.45. If the call protection period significantly exceeded this number, we can assume that the call-protection period was the primary determinant of the expected delay.

Specifically, we assumed that if the call-protection period is greater than or equal to 2 years, the call-protection period is the primary determinant of expected delay. One reason for using 2 years as the cutoff is that the median number 1.45 is calculated using the previous year's (the year previous to issue) return on equity as the future expected return which may overestimate the true expected return. This is because the post-issue rate of return on equity in our sample is on average lower than the pre-issue return. In addition, by dividing the sample on the basis of whether the call-protection period is greater or less than 2 years gives us reasonable-sized subsamples.[22]

The regression results on the two subsamples (less than 2 years call-protection or greater than or equal to 2 years call-protection) are given in Table 6. In the subsample with call-protection less than 2 years, we find that IC and TL are of the sign predicted by the delayed equity hypothesis and are significant at the 1% and 5% levels, respectively. However, these variables are not significant in the subsample with call-protection greater than or equal to 2 years. These results are consistent with the delayed equity rationale if the primary determinant of delay in the second subsample is the call-protection period. These results, however, are not consistent with the agency or the tax-bankruptcy cost hypothesis since under these hypotheses, the IC and TL should be significant irrespective of the length of the call protection period.

b.2. Further examination of the support for agency hypothesis

All models of convertible issuance implicitly assume that convertibles are issued to finance new projects. However, some of these theories are equally applicable when convertibles are issued for refinancing. Firms can signal that the variance of their assets in place has changed by refinancing. Or, as suggested by the delayed equity rationale, they could signal the change in their expected future cash flows. The agency rationale, however, has implications only for new project financing. The firm can shift risk either by reallocating existing resources or by allocating new capital to riskier projects. However, mere refinancing cannot achieve this. Therefore, one might reasonably expect that the agency rationale to be the more dominant factor in the design of convertibles when they are issued for new investment. If this was the case one would find SDR to be positively

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[22]We also divided the sample on the basis of whether they had call-protection or not. The results are very similar.

related to RDR in the when convertibles are issued for investment purposes, but not so if convertibles are issued for refinancing purposes.

To test this, we divided the sample on the basis of the purpose of the convertible issuance. Funds from issuing convertibles are stated to be used for three purposes: for refinancing only (72 cases), for new investment (32 cases) and those for both refinancing and new investment (19 cases). Because of the limited number of issues that falls into the last two categories, we combined the last two into one category, and label it as the investment category.

Results from Table 7 show that, in the refinancing subsample, IC is significant (at the 1% level). The SDR variable is insignificant and the sign of its coefficient is inconsistent with the variance signalling rationale.. The results of the refinancing subsample are similar to those with the entire sample reported in Table 6. In the investment subsample, two variables are significant: SDR is significant at the 10% level and IC is significant at the 5% level. Both variables are suggested by the agency rationale and the signs of their coefficients are as posited by that rationale. In particular, it must be noted that the sign of the SDR coefficient is positive as suggested by the agency rationale and inconsistent with the prediction of the variance signalling rationale. The fact that the SDR coefficient is significant only if the purpose of issue is investment is supportive of the agency hypothesis.

In summary, these results suggest that convertible design is consistent with delayed equity hypothesis. There seems to some support for the agency rationale when convertibles are issued for investment purposes. We find no evidence to support the variance signalling hypothesis.

5. Conclusions

This paper examines the implications of different theories to the design of convertible debt. The theories considered are the agency rationale, the variance signalling rationale, the delayed equity rationale, and the tax-bankruptcy cost rationale. When we ran the regression using the entire sample, only the interest coverage ratio variable was significant. This was consistent with all but the variance signalling hypothesis.

To distinguish between the other three hypotheses (agency, delayed equity, and tax-bankruptcy cost), we ran the regression on two subsamples: one with call-protection period less than 2 years and another with call-protection period greater than or equal to 2 years. For all theories except the delayed equity rationale, there should be no difference in results between these two subsamples since these theories are not based on the call feature of the convertible. However, if the call-protection period is the primary determinant of the expected delay in forcing conversion, the delayed equity hypothesis would imply that the relation between the equity component and the independent variables should be stronger in the subsample with less or no call protection. If the call-protection period is the primary determinant of the delay, then the equity component of the convertible need not be designed to provide the delay and hence will not necessarily have the predicted relation to the independent variables. We find that, in the subsample with less than 2 years' call protection, the equity component is related to the interest coverage and tax loss variables. Moreover, no such relationships exist in the subsample with greater than 2 years' call protection, supporting the delayed equity hypothesis.

The agency rationale suggests that convertibles are designed to minimize stockholders' incentive to undertake high-variance negative net present value projects. When we consider convertible issues whose proceeds (at least partly) are used for new investments, the evidence provides some support for the agency rationale. In this subsample, we find that the greater the increase in the variance of cash flows the higher the equity component; this supports the claim that the higher the expected increase in variance the greater the incentive to take negative net present value projects, requiring convertibles with higher equity component to offset this incentive. We also find that greater the probability of financial distress the greater the equity component of the convertible, reflecting the fact that the incentive to undertake negative net present value projects is greater if the firm is closer to financial distress.

The only rationale for which we do not find supporting evidence is the variance signalling rationale. In none of the regressions do we find the equity component to be positively related to the expected increase in cash flow variance, as suggested by this rationale. While the significance of IC in the regression with the entire sample (Table 6) can be viewed as support for the tax-bankruptcy cost hypothesis, other results do not provide support for this hypothesis. The fact that the significance of IC disappears when the call protection period is greater than 2 years is not consistent with the tax-bankruptcy cost hypothesis. Also, the negative stock price reaction at the announcement of the convertible issue is not predicted by this hypothesis.

In summary, we conclude that the delayed equity rationale plays an important role in the design of convertibles. Agency considerations seem to play a role when convertibles are issued for new investment.

Appendix

Estimation of the expected number of years it takes for conversion value to exceed 120% of the call price.

We make the following assumptions:

1. The call price is fixed and equals face value plus the coupon rate. This will be the call price in the first year if there were no call protection period. We already know that this is how call price is set. In subsequent years, call price usually falls; therefore, our estimate will overstate the expected number of years it takes for conversion value to exceed 120% of the call price.
2. The expected future stock price return equals the previous year's return. This is a weak assumption but gives us an order of magnitude of the expected call delay. When the previous year's return is negative (there are only 7 instances out of 123), we ignore it.

Expected conversion value in year $n = S \times \mathrm{CR} \times (1 + r_e)^n$

where S = current stock price; CR = conversion ratio; and r_e = the expected stock return.

We set this equal to $1.20 \times C$ where C is the call price of the bond and solve for n:

$$S \times \mathrm{CR} \times (1 + r_e)^n = 1.20 \times C$$

The median number of years is 1.45.

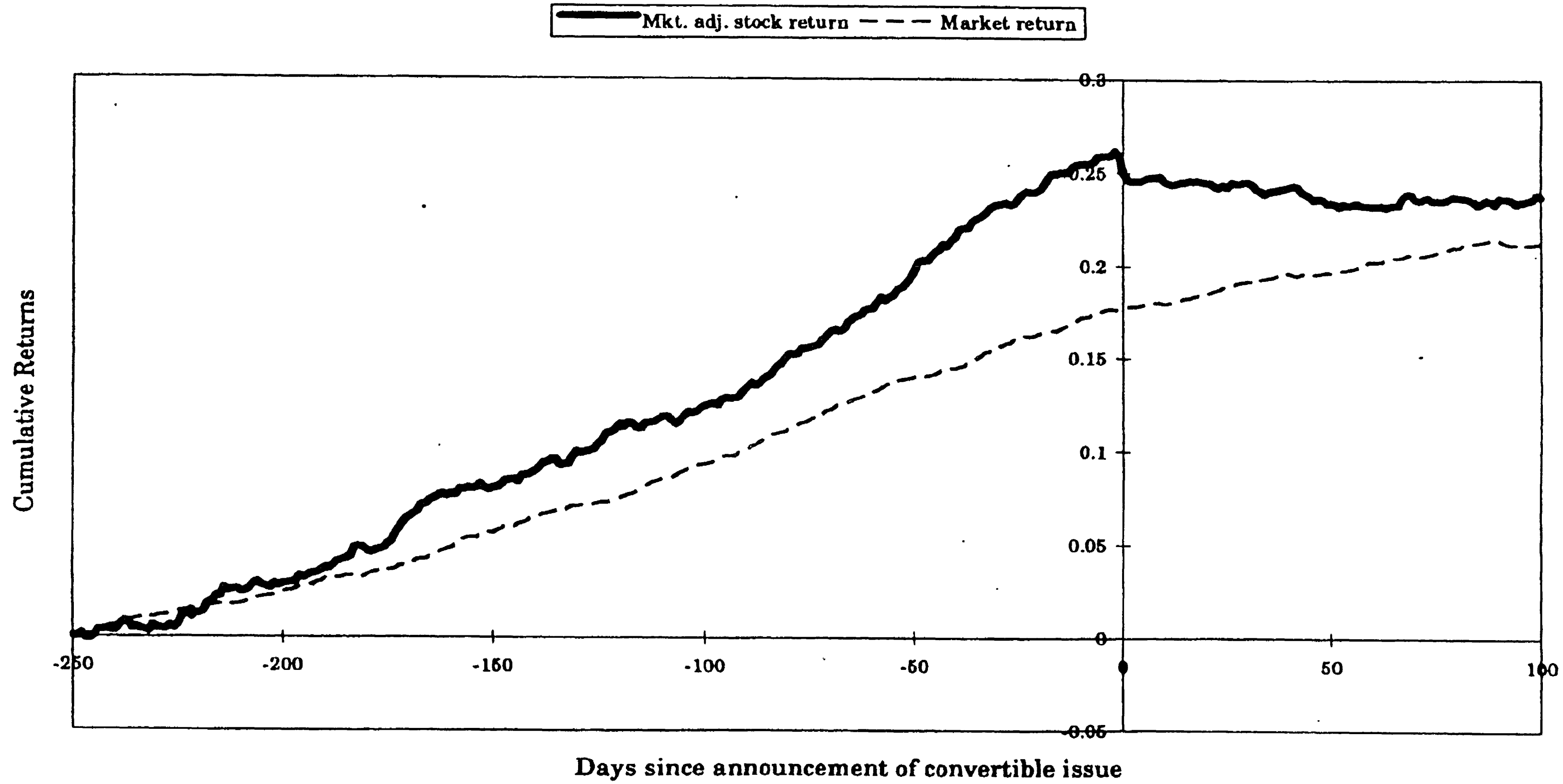

Figure 1. Market and stock returns around announcement of convertible issues

Table 1

Factors affecting the equity component of convertible

Factor	Variables	Hypotheses			
		Agency	Variance Signalling	Delayed Equity	Tax-bankruptcy cost
Proportion of fixed assets	FA (+)	–	0	–	0
Probability of financial distress	IC (+)	+	0	+	+
Change in cash flow variance	SDR (+)	+	–	0	0
Debt tax advantage	TL (–)	0	0	0	+
Expected stock price growth	RUNUP (+)	0	0	–	0

The table lists the five factors predicted by the three theories to affect the design of the convertible and their relation to the equity component of the convertible. The second column lists the variables used to proxy the factors. A plus sign in the variables column indicates that the variable used is directly related to the factor and a negative sign indicates the variable in inversely related to the factor. The variables used are explained in detail in the text. A plus sign in the hypotheses columns indicates a direct relationship between the variable and the equity component, a minus sign indicates an inverse relationship and a zero indicates that the theory does not have any implications for the variable.

Table 2

Time series distribution of convertible issues

(by announcement year)

Year	CRSP sample		COMPUSTAT sample	
	Number of issues	Avg size ($ millions)	Number of issues	Avg size ($ millions)
1968	7	22.5	0	0.0
1969	27	37.8	1	15.0
1970	10	35.4	3	57.7
1971	31	34.9	8	38.8
1972	2	30.0	0	0.0
1973	2	19.0	0	0.0
1974	0	0.0	0	0.0
1975	5	54.0	3	76.7
1976	2	12.5	0	0.0
1977	4	20.9	0	0.0
1978	3	24.7	1	16.0
1979	9	32.4	6	16.3
1980	30	43.0	19	46.8
1981	15	73.9	7	56.3
1982	8	58.4	4	58.0
1983	20	55.0	11	36.7
1984	7	61.6	2	35.0
1985	16	65.9	9	56.4
1986	19	59.7	8	60.6
1987	11	90.9	3	133.3
1988	6	100.3	4	118.8
1989	39	56.9	24	67.9
1990	15	96.8	10	111.0
Total/ Average	288	53.2	123	60.5

Table 3

Summary characteristics of convertible issues[a]

Measure	Mean and Median Values[b]		
	All N=123	1980 and before[c] N=39	1981 and after[c] N=84
Issue size[d] – Nominal	60.48 (50.00)	44.03 (30.00)	68.11 (50.00)
Issue size[d] – Real[e]	72.40 (46.51)	82.55 (41.21)	67.69 (48.51)
Market value of equity[d,f] – Nominal	545.66 (162.92)	249.97 (130.05)	682.94 (214.76)
Market value of equity[d,f] – Real[e]	626.83 (232.41)	475.74 (232.41)	696.98 (217.24)
Issue size/Market value of equity	0.29 (0.20)	0.31 (0.21)	0.27 (0.20)
Dilution ratio[g]	0.17 (0.14)	0.17 (0.15)	0.17 (0.14)
Initial conversion premium[h]	0.22 (0.21)	0.19 (0.15)	0.23 (0.22)
Call-protection period[i]	1.83 (2.00)	0.33 (0.00)	2.53 (2.05)
Relative call price[j]	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)
Purpose[k] – Proportion for refinancing	0.59	0.62	0.57

Table 3 (continued)

[a] The numbers reported are for the COMPUSTAT sample of 123 issues consisting of the issues of those firms for which data was available on CRSP tapes and in COMPUSTAT for 5 years before and after the issue year.

[b] The median values are in parentheses.

[c] Convertibles are classified according to the year in which they were issued.

[d] In $ millions.

[e] To adjust for inflation, the Personal Consumption Expenditure Index (1987 = 100) was used.

[f] The market value of equity is calculated using the stock price and number of shares outstanding on the issue date.

[g] Dilution ratio = Number of shares issued on conversion/(Number of shares issued on conversion + Number of shares outstanding on issue date)

[h] Initial conversion premium = (Conversion price/Stock price on issue date) - 1.

[i] The call-protection period is stated in years.

[j] The call price on issue computed using the annual change in call prices and expressed as a percentage of the face value plus one year's coupon payment. It is the call price that would have prevailed at the time of issue if there was no call protection.

[k] The percentage of issues used to payoff existing liabilities.

Table 4

Mean excess stock returns around announcements

of convertible and equity issues

Period (days)	Mean excess stock returns (%)	
	Convertible issues	Equity issues
-250 to -101	22.25 (t=10.10; N=257)	19.59 (t=21.32; N=1097)
-100 to -2	22.24 (t=14.50; N=277)	18.84 (t=25.54; N=1175)
-1 to 0	-1.07 (t=-4.79; N=288)	-2.89 (t=-20.70; N=1197)
1 to 100	2.27 (t=1.50; N=288)	-0.00 (t=-0.20; N=1223)

Notes:

1. The convertible sample used is the CRSP sample of 288 issues.
2. The excess stock returns are market adjusted returns for the stated event period where event day 0 is the announcement date.
3. The excess return data for equity issues is from Korajczyk, Lucas, and McDonald (1990)
4. The numbers in parentheses are t-statistics and the sample size, respectively.

Table 5a

Summary statistics

Variable	Mean	Median
RDR	0.857	0.857
CP	0.219	0.209
FA	0.394	0.326
IC	2.221	0.927
SDR	1.362	0.968
TL	0.055	0.000
RUNUP	0.436	0.415

Notes: Sample summary statistics for firms that were available on both CRSP and COMPUSTAT tapes. Sample size is 123.

Variable names are as follows:

RDR = Relative Dilution Ratio
CP = Conversion Premium
FA = Ratio of Fixed Assets to Total Assets
IC = Relative interest coverage ratio
SDR = Standard Deviation Ratio (post issue / pre issue)
TL = Tax loss carry forward / Net sales
RUNUP = Cumulative Raw Stock Return (–250, –2)

Table 5b

Distribution of Relative Dilution Ratio (RDR) and

Conversion Premium in the COMPUSTAT sample

RDR		Conversion Premium	
Range	Number	Range	Number
less than 0.65	1	less than 5%	4
0.65 - 0.70	2	5 - 10%	9
0.70 - 0.75	4	10 - 15%	16
0.75 - 0.80	7	15 - 20%	28
0.80 - 0.85	39	20 - 25%	29
0.85 - 0.90	41	25 - 30%	20
0.90 - 0.95	23	30 - 35%	7
greater than 0.95	6	greater than 35%	10
Total	123	Total	123

Table 6

Results of the OLS regression examining convertible design

Model : $RDR = \alpha_0 + \alpha_1 FA + \alpha_2 IC + \alpha_3 SDR + \alpha_4 TL + \alpha_5 RUNUP$

Sample	Size	α_0	α_1	α_2	α_3	α_4	α_5	R^2
All	123	0.841*** (50.95)	-0.010 (-0.48)	0.003*** (3.19)	0.006 (1.37)	-0.001 (-0.12)	0.013 (0.70)	0.057
Call protection: < 2 years	53	0.852*** (33.53)	-0..024 (-0.54)	0.003*** (3.09)	0.005 (0.83)	0.080** (2.00)	-0.003 (-0.12)	0.114
Call protection: ≥ 2 years	70	0.837*** (38.25)	-0.016 (-0.72)	0.001 (0.73)	0.006 (0.94)	-0.010 (-0.86)	0.039 (1.46)	0.068

Notes:

1. The numbers in parentheses are White's heteroskedasticity-consistent t-statistics.

2. ***, **, and * denote significance at 0.01, 0.05 and 0.10 levels respectively.

3. Variable names are as follows:
   - RDR = Relative Dilution Ratio
   - FA = Ratio of Fixed Assets to Total Assets
   - IC = Relative interest coverage ratio
   - SDR = Standard Deviation Ratio (post issue / pre issue)
   - TL = Tax loss carry forward / Net sales
   - RUNUP = Cumulative Raw Stock Return (−250, −2)

Table 7

Results of the OLS regression on subsamples based on purpose of issue

Model : $RDR = \alpha_0 + \alpha_1 FA + \alpha_2 IC + \alpha_3 SDR + \alpha_4 TL + \alpha_5 RUNUP$

Sample	Size	α_0	α_1	α_2	α_3	α_4	α_5	R^2
Purpose: Refinancing	72	0.852^{***} (48.59)	-0.013 (-0.51)	0.003^{***} (3.23)	0.001 (0.39)	0.037 (1.33)	-0.007 (-0.39)	0.102
Purpose: Investment	51	0.812^{***} (24.42)	-0.036 (-0.86)	0.003^{**} (2.38)	0.020^{*} (1.82)	-0.017 (-0.39)	0.066 (1.55)	0.147

Notes:

1. The numbers in parentheses are White's heteroskedasticity-consistent t-statistics.

2. ***, **, and * denote significance at 0.01, 0.05 and 0.10 levels respectively.

3. Variable names are as follows:
   - RDR = Relative Dilution Ratio
   - FA = Ratio of Fixed Assets to Total Assets
   - IC = Relative interest coverage ratio
   - SDR = Standard Deviation Ratio (post issue / pre issue)
   - TL = Tax loss carry forward / Net sales
   - RUNUP = Cumulative Raw Stock Return (–250, –2)

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