

Is Convertible Debt a Substitute for Straight Debt or for Common Equity?

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Abstract

This paper examines the ability of the risk-shifting hypothesis and the backdoor equity hypothesis to explain firms' decisions to issue convertible debt. Using a security choice model that incorporates pre-offer issue, issuer, and macroeconomic information, we document significant variation in the market reaction to new convertible debt issues depending on whether investors expect the motivation for issuance to be asset substitution or asymmetric information. Our results suggest that both motives explain the use and design of convertible debt. Some firms issue convertible debt instead of straight debt to mitigate the costs of bondholder/stockholder agency conflicts. Other issuers use convertible debt instead of common equity to reduce the costs of adverse selection. Thus, in contrast to standard securities like straight debt or common equity, which solve some financing problems but exacerbate others, hybrid securities such as convertible debt are seen as providing a more flexible funding choice that can solve conflicting financing problems.

Financial economists study the security issue decision to understand more fully why firms choose to issue a particular security and how investors in financial markets react to that choice. The research documents several results about investor reaction to the announcement of convertible debt security offers. First, price reactions to convertible debt security offer announcements are negative and statistically significant. Second, the average price reaction to convertible debt security offer announcements lies between the average price reactions to common equity and straight debt security offer announcements. Since existing research has been unsuccessful in identifying factors that explain these announcement period results, there is little definitive empirical evidence that explains either the convertible debt issuance decision or investor reactions to the issuance decision.

The purpose of this paper is twofold. The first is an examination of the decision to raise capital using a hybrid security like convertible debt rather than a standard security like straight debt or common equity. Existing research suggests that the choice between straight debt and common equity is partially predictable. We extend this literature by proposing and implementing a security choice model that includes non-standard security choices like convertible debt. Our results indicate that pre-offer issue, issuer, and macroeconomic information can reliably explain issue choices.

Our second objective is to re-examine the information content of convertible debt security offer announcements. This is important because, even though existing studies have demonstrated a significantly negative stock price reaction to convertible debt offerings (Dann and Mikkelson, (1984) and Eckbo, (1986)), they fail to document a significant cross-sectional relation between excess returns and firm specific explanatory variables. Recent research suggests that investor reaction to straight debt announcements can be explained by the partial anticipation of the offer (see, e.g., Chaplinsky and Hansen, (1993), and Jung, Kim and Stulz, (1996)). We show that the pre-offer information that conditions investor expectations of a convertible debt offer also enhances the explanatory power of the cross-sectional analysis of announcement period excess returns.

Several theoretical explanations have been proposed to explain the use of convertible debt and investor reaction to that security offer choice. Green (1984) demonstrates that the substitution of convertible debt for straight debt reduces the agency costs that are caused by bondholder/stockholder conflicts of interest. This theory is known as the “risk-shifting” hypothesis.¹ Stein (1992) argues instead that corporations use convertible debt as a substitute for common equity because it provides indirect equity financing that mitigates the adverse selection

costs associated with direct equity offerings. This theory is known as the “backdoor equity” hypothesis.²

These two theories make different empirical predictions about issuer motives that are based on the relative levels, and the specific sources, of debt- and equity-related financing costs. According to the risk-shifting hypothesis, issuers would prefer convertible debt issues to straight debt because they face high bondholder/stockholder agency costs. The theory does not identify an explicit source of equity-related financing costs. Therefore, after controlling for investors’ expectations regarding the likelihood that an issuer will offer a debt-like security, the risk-shifting hypothesis predicts that convertible debt issuers will have significantly higher agency costs than straight debt issuers.³

The backdoor equity hypothesis by contrast suggests that issuers prefer convertible debt issues to common equity because they face high adverse selection and financial distress costs. After controlling for investors’ expectations regarding the likelihood that an issuer will offer an equity-like security, the backdoor equity hypothesis predicts that convertible debt issuers will have significantly higher adverse selection and financial distress costs than issuers of equity.

Prior research demonstrates that security offer choice decision models can explain an issuer’s choice between standard securities like straight debt and common equity. To directly test the hypothesis that convertible debt can be viewed as either a straight debt substitute (as predicted by the risk-shifting hypothesis) or as a common equity substitute (as predicted by the backdoor equity hypothesis), we build on the security choice model reported in Jung, Kim and Stulz (1996). They estimate several logistic regression models that predict the type of security a firm is likely to issue (straight debt or common equity). The model assigns a probability that a particular firm issues straight debt or common equity.⁴

We extend this approach to determine whether convertible debt issuers during 1977-1984 (the time period Jung, Kim and Stulz examine) would be characterized as debt or equity issuers. In essence, we view convertible debt offers as the outcome of a management decision *not* to issue straight debt or common equity. Therefore, the likelihood of a convertible debt issue increases when the costs of either a straight debt issue or a common stock issue are high.

Our results demonstrate that security offer choice models have explanatory power for classes of securities like convertible debt. We find that the issue, issuer, and macroeconomic factors that explain the choice of convertible debt also explain a significant proportion of the

cross-sectional variation in announcement period excess returns for convertible debt security offers.

Earlier studies have been generally unsuccessful in explaining cross-sectional differences in investor reactions to convertible debt security offer announcements. One explanation for the difference between their results and ours is that earlier studies do not attempt to formally incorporate the determinants of an issuer's security choice decision into the analysis of investor reactions. This is an important limitation, because theoretical explanations of convertible debt offerings argue that the motivations for issuing convertible debt are different from those for issuing standard securities. Therefore, empirical studies that treat convertible debt issuers as a single homogeneous group may fail to find support for either the risk-shifting explanation or the backdoor equity explanations.⁵

Modeling convertible debt financing decisions as a security choice problem produces a number of new insights regarding the use of convertible debt. First, we find that firms issuing convertible debt are of two types: (1) firms with debt capacity, valuable investment opportunities and high firm risk that substitute convertible debt for straight debt; and (2) firms with valuable investment opportunities, high financial distress costs and high costs of asymmetric information that substitute convertible debt for common equity.

The former is consistent with the risk-shifting hypothesis, which predicts that convertible debt issues by firms with debt capacity are attributable to the riskiness of the firm's investment opportunities. Firms with high levels of diversifiable risk choose convertible debt over straight debt to reduce agency costs due to bondholder/stockholder conflicts of interest.

The latter is consistent with the backdoor equity hypothesis, which predicts that convertible debt issues by firms expected to issue common equity are better news for shareholders, since they signal management's confidence in the future performance of the issuer. For this subset of issuers, convertible debt economizes on two sources of financing-related costs: adverse selection and financial distress.

Therefore, our results suggest that agency conflicts between bondholders and stockholders and information asymmetries between incumbent stockholders and new investors *both* play a prominent role in a firm's decision to issue convertible debt but not for the same set of firms. Moreover, since the issue choice is based upon variables that are observable on the issue announcement date, our results are consistent with the hypothesis that the issuance of non-standard securities is a partially anticipated corporate event.

We also find that the market reaction to convertible debt security offers is influenced by investors' expectations regarding the anticipated security choice decision and the perceived motive for issue. Many of the same factors that influence investor expectations of security offer type also explain investor reactions to issue announcements. We document significant differences in the explanatory power of cross-sectional excess return regression models when convertible debt issuers are sorted on the basis of their similarity to straight debt or common equity issuers. The factors that explain the cross-sectional variation in announcement period excess returns for straight debt and debt-like convertible debt issuers are not the same as the factors that explain the cross-sectional variation between common equity and equity-like convertible debt issuers. This result is consistent with the joint hypothesis that issuers substitute convertible debt for straight debt or common equity, and that our security choice model successfully identifies convertible debt issuers on the basis of their issue motivation.

The remainder of the paper is organized as follows. Section 1 reviews the theoretical arguments suggesting that convertible debt can be viewed as a substitute for straight debt and common equity. Section 2 describes our sample selection procedure and summary statistics. Section 3 provides logistic regression models that quantify the security issue choice decision of corporate managers. Section 4 provides our empirical analysis of convertible debt as a substitute for straight debt and common equity. In Section 5, we examine whether the security choice model can explain stock price reactions to convertible debt offer announcements. Section 6 concludes the paper.

1. Theoretical Motivations for the Use of Convertible Debt

We can distinguish a variety of motivations underlying the issue of convertible debt. Some relate to firms that would prefer to issue straight debt, while others relate to firms that would prefer to issue common equity.

1.1. Convertible bonds as a substitute for straight debt

When a firm has risky debt outstanding, maximizing the value of the equity claim and maximizing the value of the firm can lead management to choose different investment policies. Building on the observations of Jensen and Meckling (1976) and Smith and Warner (1979), Green (1984) models shareholders' incentives to overinvest in high-risk investment projects. The substitution of high-risk for low-risk operating and investment policies transfers wealth to shareholders from creditors. If the wealth transfer is large enough, shareholders may even support

the adoption of negative net present value projects. The presence of risky straight debt can thus create investment incentive problems.⁶

One solution to this bondholder/stockholder agency conflict is to issue common equity. While an all-equity capital structure would eliminate these agency costs, it gives rise to other inefficiencies. For example, forgone interest tax shields or excessive managerial discretion costs may outweigh the benefits of reducing the risk-shifting problem. Therefore, while the issuance of common equity can mitigate the agency costs associated with risky straight debt financing, it may exacerbate other equity-related costs of external finance.

Green (1984) demonstrates that the inclusion of conversion privileges can mitigate the distortionary investment incentives created by risky straight debt. That is, conversion features impose a payoff structure on the equityholders' residual claim that alters the incentive to overinvest in risky projects. Different designs of the convertible debt contract can control the shape of the equity's payoff structure, and hence the firm's investment incentives. Thus, the risk-shifting hypothesis predicts that convertible bonds are a substitute for straight debt, and that the substitution of convertible debt is most likely to occur in firms facing significant risk incentive problems. Consequently, convertible debt issuers that appear to be similar to straight debt issuers are expected to differ from these firms primarily in their ability to increase the risk of their investment opportunities.

Green (1984) also suggests that idiosyncratic risk rather than systematic risk motivates the use of convertible debt. Therefore, measures of total risk, rather than nondiversifiable risk, are most likely to explain the issuance of convertible debt instead of straight debt under the risk-shifting hypothesis.

Hence, the asset substitution hypothesis predicts that convertible bonds are a substitute for straight debt, and that this substitution is most likely to occur in firms facing significant risk in their investment opportunity set.

1.2. Convertible bonds as a substitute for common equity

Survey evidence reported by Pilcher (1955), Brigham (1966) and Hoffmeister (1977) suggests that issuers often view convertible debt as a delayed equity offer. In other words, the primary motivation for the issuance of convertible debt is to obtain common equity financing at a better price than the issue date stock market price.

Stein (1992) provides a formal model of this motivation for the use of convertible debt. He suggests that firms may use convertible debt as an indirect method for implementing equity financing when they face significant information asymmetries. Convertible debt provides a financing alternative that mitigates the adverse selection costs of an immediate sale of common equity. Therefore, according to this theory, convertible debt issuers are expected to have announcement period characteristics that are similar to those of common equity issuers.

After controlling for these similarities, the model predicts that leveraged firms subject to significant information asymmetries but optimistic about their future investment opportunities would issue convertible debt. For these firms, common equity is an unattractive financing source because its value is very sensitive to the subsequent disclosure of the firm's private information.

An alternative financing solution for the firm is to issue straight debt, and thereby avoid the sale of an information-sensitive security to outside investors. Such a security would allow the firm to raise new investment capital without incurring adverse selection costs. Stein (1992) notes, however, that the sale of straight debt may cause some firms to incur other value-reducing costs. If financial distress is costly, firms that are highly leveraged and have relatively poor future prospects will forgo long-term debt issues. For these firms, significant financial distress costs would outweigh the adverse selection costs.

Stein (1992) also argues that short-term debt issues followed by a common equity issue at maturity would not adequately solve the firm's financing problem if issuers face a steady-state level of asymmetric information. Convertible debt is uniquely structured to allow managers to obtain financing immediately through a delayed equity offer.

Hence, the backdoor equity hypothesis predicts that convertible bonds are a substitute for common equity, and that this substitution is most likely to occur in firms facing significant information asymmetries and high financial distress costs.

1.3. A security choice model approach to understanding convertible debt issue decisions

The risk-shifting and backdoor equity hypotheses are not mutually exclusive explanations of convertible debt issuance motives. It is important to consider the possibility that firms offer convertible debt for different reasons. This suggests that convertible debt offer decisions should be analyzed in two steps. First, if security choice decisions are predictable, we need to determine why firms issue convertible debt instead of more standard securities like straight debt or common

equity. Second, we must develop a method to sort the universe of convertible debt issuers on the basis of observable variables according to their perceived issuance motivations.

Our approach builds on the security choice models of Bayless and Chaplinsky (1991) and Jung, Kim and Stulz (1996). Both papers suggest that investors have prior beliefs about a firm's security issue choice. Consequently, observed investor reactions around security offer announcement dates reflect investors' expectations of security type as well as the economic impact of the new security offering.

Both Bayless and Chaplinsky (1991) and Jung, Kim and Stulz (1996) estimate a logit model to predict whether an issuer will raise capital through a straight debt or a common equity offer. Although the authors differ somewhat in their choice of explanatory variables, both models successfully classify issuers according to their actual security choice decision. These classifications are then used to examine linkages between investor reactions and theoretical explanations of capital structure, after controlling for investors' expectations of security type.

Bayless and Chaplinsky (1991) and Jung, Kim and Stulz (1996) do not consider why firms often choose to issue more complex financial securities than straight debt or common equity. We propose and implement a new methodology that enlarges the issuer's financing choice set to include convertible debt. By construction, the methodology allows us to simultaneously determine why firms issue convertible debt instead of straight debt or common equity and to sort issuers on the basis of whether convertible debt is offered as a substitute for straight debt or for common equity.

This approach yields new insights into issuer motivations for the use of convertible debt. In particular, it allows us to test the predictions of the risk-shifting and the backdoor equity hypotheses. Consequently, our approach yields more powerful conclusions regarding convertible debt financing motives than other empirical studies.

2. Sample Selection and Descriptive Statistics

The data for our study are obtained from several sources. Jung, Kim and Stulz (1996) provide the sample of straight debt and common equity issuers from 1977 through 1984.⁷ We identify all domestic convertible debt issuers during the same time period in the *Investment Dealers' Digest Domestic and International New Issues* database. For each convertible debt issuer, we use the *Dow Jones News Retrieval* and the *Wall Street Journal Index* to identify the security offer announcement date.

The initial sample consists of 337 convertible bond issues. We require that the issuer firms have stock return information available on the Center for Research in Security Prices (CRSP) tape for the entire calendar year prior to the announcement date, and that the issuer appear on the COMPUSTAT Annual Research Tapes in the period immediately before and after the announcement date. This requirement eliminated 73 observations. Security issues for which we could not identify an announcement date are dropped from the sample, which eliminated another 22 observations. Utilities and banking firms are also eliminated, as are issuers whose announcement dates include other confounding corporate event announcements. This final requirement eliminated 39 observations. Our final sample consists of 203 convertible debt issues, 259 straight debt issues and 182 common equity issues.

Sample characteristics are reported in Table 1. Panel A provides a summary of announcement period excess returns, issue and issuer characteristics, and macroeconomic variables for convertible debt, straight debt and common stock issuers over the 1977-1984 period.⁸ Pairwise significance tests of differences between mean issuer characteristics are reported in Panel B.

Convertible debt issuers experience significant negative announcement period share price reactions. The level of the price reaction falls between investors' responses to straight debt and to common stock offers, perhaps to be expected for a hybrid security.⁹

The amount of capital raised in a typical convertible debt offer is more comparable to the amount raised in common stock offers, although it represents a significantly higher proportion of the issuer's stock market capitalization than a typical common equity offer does. Thus, on an absolute basis there is no significant difference between the size of convertible debt and common equity issues, but there are significant differences in the relative size of the security issue.

The typical firm that issues convertible debt is smaller in terms of capitalization than either equity-issuing or debt-issuing firms. Convertible debt issuers also are smaller, on average, than either straight debt or common equity issuers in terms of total assets. Only the market and book value size differences between convertible debt issuers and straight debt issuers are significant, however. Firm size is often seen as a proxy for the degree of information asymmetry. This suggests that convertible debt issuers are potentially vulnerable to adverse selection problems.

Surprisingly, issuer leverage is fairly similar for all security offer types, measured in either market value or book value terms. Convertible debt issuers have leverage ratios that are insignificantly different from those of straight debt or common equity issuers on a market value

basis, but are marginally higher than those of straight debt issuers on a book value basis. To the extent that book value measures of financial leverage proxy for a firm's debt capacity, both convertible debt and common equity issuers have less debt capacity than straight debt issuers.

The risk-shifting hypothesis predicts that firms are more likely to issue convertible debt when issuers face high levels of idiosyncratic, or diversifiable, risk. Table 1 indicates that convertible debt issuers are riskier than either straight debt or common stock issuers in terms of stock return volatility (total risk), but have equity betas that lie between the betas for straight debt and common stock issuers (systematic risk). Therefore, high levels of idiosyncratic risk characterize convertible debt issuers.

Note, however, that while convertible debt issuers are significantly riskier than straight debt issuers, they are not significantly riskier than common equity issuers. This implies that risk considerations may influence the choice between convertible debt and straight debt, but not between convertible debt and common equity.

The leverage and volatility measures together suggest that convertible debt issuers have higher business risk than either straight debt or common stock issuers during this time period, as well as that much of this incremental risk may be idiosyncratic (i.e., diversifiable). This result is consistent with the risk-shifting hypothesis.

Table 1 also indicates that convertible debt issuers experience significant positive excess returns for the eleven months prior to the security offering. In fact, their pre-issue stock price performance is markedly better than that of straight debt issuers and almost as high as common stock issuers. The use of an equity-linked financing instrument subsequent to a period of positive excess stock price returns is consistent with Myers and Majluf's (1984) pecking-order model. In this model, firms are more likely to issue common equity (or an equity-linked security) when their stock prices reach high levels pre-issue.¹⁰

The pecking-order model also predicts that an increase in financial slack reduces the likelihood of an equity offer because it increases the costs of adverse selection. Convertible debt issuers have more financial slack, as measured by pre-issue cash and liquid assets (normalized by total assets), than either straight debt or common stock issuers. Since investors will be skeptical when firms raise new equity capital when significant amounts of financial slack are already available for new projects, these results are consistent with the notion that convertible debt issuers face high adverse selection costs relative to other security offer choices, especially straight debt.

General economic conditions may also play a role in the security choice decision. For convertible debt issuers, future economic conditions might be expected to be favorable at the announcement date, but somewhat less so than when common stock is issued. This inference is supported by issue volume data reported in Choe, Masulis and Nanda (1993). Therefore, convertible debt may be issued when offering firms are performing well, but general economic conditions are not particularly robust. Moreover, if information asymmetries vary with time across the business cycle, as suggested by Choe, Masulis and Nanda (1993), convertible debt may be offered when adverse selection problems are more pronounced and aggregate future investment opportunities are expected to be marginally less profitable.

The firm's dividend yield and market-to-book ratio are often used as proxies for the expected profitability of future growth opportunities. Table 1 indicates that firms with highly profitable growth opportunities issue convertible debt. Indeed, the dividend yield is lower and the market-to-book ratio is higher for convertible debt issuers than is the case for either straight debt or common stock issuers. The differences between convertible debt and straight debt issuers are significant, but the differences between convertible debt and common equity issuers are not.

Jung, Kim and Stulz (1996) hypothesize that an increase in the profitability of investment opportunities has two effects: (1) it increases the marginal agency costs of debt because the firm has more to lose from financial distress; and (2) it decreases the marginal agency costs of managerial discretion because better investment opportunities serve to align the objectives of management and shareholders. High market-to-book firms are also often characterized as especially vulnerable to asymmetric information problems. This might suggest that convertible debt issuers are good candidates for common equity financing. To the extent that convertible debt issuers face other types of external equity-related costs, a common equity issue could be costly as well.

Table 1 also provides evidence on long-term post-issuance stock price performance. Raw returns are significantly positive for convertible debt issuers over three-year and five-year horizons, but their performance lags that of both straight debt and common stock issuers. In contrast to the positive raw returns, excess returns for convertible debt issuers are negative in the three-year and five-year post-issue periods. This poor excess return performance is similar to that documented by Jung, Kim and Stulz (1996) for equity issuers. These results suggest that convertible debt issuers do not appear to have superior private information regarding post-issue risk-adjusted share price performance.

Overall, the univariate results are consistent with the hypothesis that convertible debt issuers face both debt-related and equity-related costs of external finance that are relatively high. This suggests that multidimensional financing problems are an important motivation for the use of convertible debt, although the analysis thus far does not allow us to distinguish between the two types of financing costs. The risk-shifting and backdoor equity hypotheses provide a basis for analyzing these specific financing problems.

3. A Model of the Convertible Debt Issue Choice

We estimate several logistic regression models that predict the type of security a firm is expected to issue. Although we are interested primarily in the use of convertible debt as a financing choice, our model of the security issue decision includes convertible debt, straight debt and common stock issues. We include standard financing instruments such as straight debt and common equity in our security choice model estimation because managers *choose* to issue convertible debt over these more basic securities. That is, investors' expectations of a convertible debt offer are related to the issuers' decision not to issue straight debt or common equity.

The dependent variable in the logistic model is continuous on the interval [0, 1]. The dependent variable is equal to zero if a firm issues straight debt and equal to one if a firm issues common equity. Convertible debt issues are assigned a value equal to the risk-neutralized probability that the bond will be converted into equity at maturity. A logistic regression model estimates the cumulative probability that an event will occur provided it has certain characteristics that are observable at the time of issue. By estimating the probability that a convertible debt issue is converted into equity at maturity, we implicitly estimate the number of times out of 100 that an issue is converted into equity. Using an estimate of the cumulative probability as the dependent variable is a natural extension of the security choice literature, which only considers straight debt and common equity offers.

This probability value is estimated using the standard Black-Scholes assumptions. That is, we assume that the underlying common stock follows a diffusion process described by geometric Brownian motion. This probability is then estimated as $N(d_2)$ where $N(\bullet)$ is the cumulative probability under a standard normal distribution function, and

$$d_2 = \frac{\ln(S/X) + (r - \text{div} - \sigma^2/2)T}{\sigma\sqrt{T}}$$

where S is the current price of the underlying common stock; X is the conversion price; r is the continuously compounded yield estimated from a 10-year U.S. Treasury bond on the issue date;

div is the issuing firm's continuously compounded dividend yield for the fiscal year-end immediately preceding the offer date;¹¹ σ is the standard deviation of the continuously compounded common equity return estimated over the period 240 to 40 trading days prior to the issue date; and T is the number of years until maturity for the convertible bond. Note that, for convertible debt issuers, the dependent variable can take a continuous value between zero and one. Thus, as the dependent variable approaches one, the more likely the issuer is to issue common stock (or an equity-linked security with a larger equity component). Figure 1 shows the empirical distribution of the probability of conversion for all convertible issuers in our sample. The median probability of conversion is 50.3% and has a standard deviation of 21.8%.

We believe this characterization of convertible debt issuers offers several advantages over other possible approaches. First, it treats the security issue choice decision as a financing problem in which managers endogenously determine the amount of debt and equity to include in their incremental capital sourcing decisions. Instead of limiting managers to dichotomous debt-only or equity-only financing choices, our approach allows the choice of a convertible debt security that consists of both debt and equity components. This, in turn, allows us to conduct empirical tests that recognize the possibility that distinct subsets of the convertible debt issuer universe offer convertible debt for different reasons.¹²

Second, since traditional security choice models consider only standard securities (i.e., straight debt and common equity), they cannot provide insights into the managerial motivations for the use of more complex financing instruments. Our model preserves straight debt and common equity as feasible, extreme forms of financing (i.e., all debt or all equity instead of a hybrid security), and treats convertible debt as a substitute for these standard security choices.

Finally, modeling convertible debt as a continuous variable, based upon the probability that the security will be converted into equity, allows us to use actual security designs to distinguish between different types of convertible debt security offers. To the extent that managers issue convertible debt for multiple reasons, our approach allows us to model the cross-sectional variation in issuer motivations because it assigns distinct classification scores to convertible debt offers that are structured differently.

Thus, in principle, our approach creates a way to examine and understand issuer differences within the universe of convertible debt offers. As a result, we can investigate issue and issuer differences as well as differences between convertible debt offers and offers of straight debt or common equity.

3.1. Discussion of explanatory variables

The security choice model explanatory variables may influence investor expectations about the firm's security choice decision and are observable prior to a security offer. The model includes many of the same predictive variables in Bayless and Chaplinsky (1991) and Jung, Kim and Stulz (1996). Several factors are key determinants of capital structure.

3.1.1. *Asymmetric information.* The firm's choice of the financial security to issue may depend upon management's information regarding expected future performance. Since asymmetric information increases the cost of external financing, Korajczyk, Lucas and McDonald (1991) argue that firms should issue equity during periods when information asymmetries are small. Lucas and McDonald (1990) argue that firms are more likely to have better investment projects when pre-issue stock returns are high. We measure pre-issue stock price performance as excess returns over the eleven months prior to issue announcement.

Choe, Masulis and Nanda (1993) suggest that the presence of good investment projects may depend on the business cycle. We use the six-month leading economic indicators as a proxy for future economic conditions.

Firms with large amounts of financial slack may face higher costs of adverse selection, according to Myers and Majluf (1984). Hence, an increase in financial slack is likely to reduce the probability of an equity issue. Financial slack is measured as the sum of cash and marketable securities divided by total assets.

Finally, the costs of adverse selection may be directly related to the size of the security offer (see, e.g., Krasker, (1986)). Larger security offers increase the potential for wealth loss by existing shareholders, so the probability of an equity offer should decrease as security offer size increases. Offer size is measured as gross proceeds normalized by the market value of the firm's common equity. We also include the logarithm of this ratio in a separate regression to control for potential nonlinearities.

3.1.2. *Costs of financial distress.* An increase in either business risk or financial risk increases the expected costs of financial distress or bankruptcy. We use the ratio of long-term debt divided by total assets as a proxy for financial risk. Current profitability also may influence the ability of the firm to service its near-term financial obligations. We measure current profitability as cash flow divided by total assets. Finally, to measure overall firm risk, we use the stock return volatility over a 200-day period that begins 240 trading days prior to issue announcement.

3.1.3 Tax considerations. Interest payments are tax-deductible to the issuing corporation. Thus, a firm's tax status may affect its security choice decision. We use the ratio of taxes payable to total assets for the year preceding security issue to proxy for the tax benefit of debt.

3.1.4. Other variables. The market-to-book ratio is often used as a proxy for the value of a firm's future investment opportunities. We include this variable as a proxy for the profitability of the issuing firm's future investment opportunities. As argued by Myers (1977), firms with a large fraction of their value in the form of opportunities would be less likely to finance with debt because of potential underinvestment problems.

We also include total assets as an independent variable in our regressions. If information asymmetries are correlated with firm size, the size of total assets serves as an additional proxy for potential adverse selection costs. Total assets may also proxy for the magnitude of financial distress and bankruptcy costs.

3.2. Security offer choice model results

We examine two questions here. First, do security choice models continue to perform well when convertible debt is included? Second, how well does the risk-neutralized probability measure work in explaining the cross-sectional variation in convertible debt security designs?

Table 2 provides the logit model results for the security issue decision. Since the dependent variable is equal to one for common equity offers, positive regression coefficients indicate that the explanatory variable increases the likelihood of an "equity-type" security offer. The converse occurs for straight debt offers (where the dependent variable is equal to zero); negative coefficients indicate the explanatory variable increases the likelihood of a "debt-type" security offer.¹³

Regression (1) in Table 2 indicates that equity-type security offers are more likely when the firm has high financial leverage and profitable future investment opportunities. General economic conditions seem to play an important role in the security choice decision. Equity-type issues are also more likely when future macroeconomic conditions are expected to be favorable and following periods of abnormally high share price performance. Debt-type issues are more likely when the firm has high levels of taxable income. The measures of issuer profitability (cash flow), firm risk (stock return volatility), and financial slack (normalized cash and liquid assets) are insignificant determinants of security issue choice in this model specification.

Finally, the percentage of concordant observations is 76%. This percentage is determined by forming the set of all possible pairs that have different dependent variables. A pair of dependent

variables is said to be concordant if the dependent variable with the larger value has a higher predicted value. For example, suppose two convertible debt offers have conversion probabilities of 35% and 85%. If the predicted values are 40% and 80%, the pair is considered concordant. Conversely, if the respective fitted values are 80% and 40%, the observation pair is considered to be discordant.

A comparison of these results with the debt/equity choice model in Jung, Kim and Stulz (1996) provides useful insights into the effect of adding convertible debt to the set of financing choices. Their tax payment variable, market-to-book ratio, six-month leading indicators and issuer's pre-offer stock price run-up variable also are significant, and have the same sign as in our Regression (1) results. This suggests that these four variables are particularly robust indicators of security choice even when managers can choose hybrid instruments such as convertible debt.

Our results also identify several variables whose marginal significance changes in the security offer choice decision when the financing choice includes non-standard securities like convertible debt. Jung, Kim and Stulz find that issuer stock return volatility and financial slack are statistically significant. These variables are not statistically significant in our model, which suggests that they may not be influential considerations in the expanded security issue decision.

In addition, financial leverage is significant in our model but not in Jung, Kim and Stulz. One explanation is that leverage becomes a more important consideration in the selection of financing instruments other than straight debt and common equity. The backdoor equity hypothesis offers a theoretical explanation for this conjecture, arguing that a company that is already substantially leveraged will issue convertible debt only if management is optimistic about its future stock price prospects. The risk-shifting hypothesis also suggests that the presence of risky straight debt exacerbates bondholder/stockholder conflicts regarding the selection of new investment projects. In either case, an issuer's financial structure has more of an effect on the security choice decision when convertible debt offers are included in the financing choices.

Overall, many factors that influence the debt/equity decision in security choice models retain significance when the firm has access to other financing instruments. Our results, however, also suggest that the marginal contribution of some issue, issuer, and macroeconomic variables is sensitive to the exogenous specification of the feasible set of security choices. This evidence is consistent with the interpretation that security choices are partially predictable.

A direct comparison of the model results indicates that the performance of our security choice model is comparable to the one examined by Jung, Kim, and Stulz (1996), which analyzes

only straight debt and equity offerings. The percentage of concordant observations is 76% in our model, while theirs is 75%. Moreover, since the issue choice probabilities are based upon variables that are observable on the issue announcement date, our results are consistent with the hypothesis that security choice decisions are partially anticipated events.

Regression (2) in Table 2 includes total assets as an additional explanatory variable. Total assets have been interpreted in some empirical studies as a proxy for the degree of information asymmetry. For example, large firms may have greater coverage by equity analysts. Large firms may be more vulnerable to managerial discretion and free cash flow problems, so total assets also may proxy for stockholder/management agency costs (see, e.g., Jensen, (1986) and Stulz, (1990)).

The regression coefficient is significantly negative, which suggests that large firms are less likely to issue an equity-type security. To the extent that smaller firms are subject to more information asymmetries, and therefore face higher adverse selection costs, this result is unexpected. If larger firms face higher costs of managerial discretion, however, we would expect them to issue common equity less frequently.

The inclusion of total assets modifies two other inferences in our model. First, financial leverage is no longer a significant determinant of security choice. Second, stock return volatility has a significant negative coefficient. Surprisingly, firms with higher risk are less likely to issue an equity-type security. One explanation for this result is that convertible debt issuers are riskier than issuers of either straight debt or common equity. Apparently, the higher volatility of convertible debt issuers is sufficiently large to induce the negative relationship. All other inferences from Regression (1) remain unchanged.

Regressions (3) and (4) include normalized measures of security issue size as explanatory variables. The relative size of the security issue diminishes the likelihood that the issuer will offer an equity-type security. This result is consistent with Krasker's (1986) hypothesis regarding the relationship between adverse selection costs and security offer size. The effects of financial leverage and stock return volatility depend on the issue size variable. Financial leverage is positive and significant when issue size is normalized by the market value of the firm's common equity, but insignificant when a linear approximation of the normalized measure is included. Stock return volatility is insignificant in the Regression (3) specification, but negative and highly significant in Regression (4). Finally, inclusion of the relative issue size variables improves the overall model fit as well as the accuracy of the model predictions.

Overall, the security choice models that we estimate in Table 2 perform well in the sense that they correctly classify a substantial proportion of observed financing decisions. The pseudo R^2 values for each model indicate that the model specifications explain a significant portion of the variation in security choice. Moreover, the high percentage of concordant observations indicates that the risk-neutralized probability measures provide an informative characterization of the convertible debt issuers in these models. This suggests that the security choice models of Bayless and Chaplinsky (1991) and Jung, Kim and Stulz (1996) are robust when the financing opportunity set is expanded to include financing instruments other than straight debt and common equity.

4. Convertible Debt as a Substitute for Straight Debt and for Common Equity

Here we focus on what motivates the actual security choice decision *within* the debt-type and equity-type samples. The debt-type issuer group consists of straight debt offers and debt-like convertible debt offers. The equity-type issuer group consists of common equity offers and equity-like convertible debt offers. The main advantage of this approach is that it considers whether debt-type firms control for investment incentive problems by substituting debt-like convertible debt for straight debt. Likewise, do equity-type issuers control for adverse selection problems by substituting equity-like convertible debt for common stock?

This analysis is based on the view that managers understand the firm's investment opportunity set better than outside investors and choose a security issue that meets the firm's requirements. Investors, however, have information about the firm such as financing history, investment decisions, recent performance and current economic and market conditions, on which they base expectations about the likely form of a security offer. Since investors may react negatively to unanticipated security designs, managers must anticipate these reactions and design their security offerings to minimize any negative impacts.

When we classify issuers by the actual security design, we include issuers that offer securities that are not of the predicted type. The fraction of misclassified offers depends on the accuracy of the logistic regression model used to sort among issuers. The high degree of concordant observations noted in our analysis of the security choice models in Table 2 indicates that investors correctly anticipate the issue decisions of firms. All the same, sometimes managers choose to design a security to be more or less equity-like, regardless of what investors expect. They may unexpectedly offer a particular type of security, or choose to design a security like convertible debt in a way that is unanticipated by investors.¹⁴

4.1. Comparison of straight debt and debt-like convertible debt issuers

The risk-shifting hypothesis asserts that access to high-risk investment opportunities creates conflicts of interest between (1) management and stockholders and (2) bondholders. When there is risky debt outstanding, shareholders have an incentive to substitute risky for less risky operating and investment policies, even if the firm's aggregate market value were to decline. Thus, convertible debt is likely to be especially valuable for firms with high levels of risky growth opportunities because these firms have an incentive to engage in asset substitution whenever the development of these investments fails to produce positive NPV projects. This suggests that firms that substitute convertible debt for straight debt are likely to have high levels of profitable investment opportunities with relatively high risk.

Since the security choice model classifies convertible debt issuers as debt-like if their offer characteristics are similar to firms that issue straight debt, the null hypothesis is that there are no significant differences in the offer characteristics of straight debt and debt-like convertible debt issuers. Significant differences in offer characteristics indicate that, although debt-like convertible debt issuers are designed to be more like debt than equity, there are additional factors that influence the security choice decision. These characteristic differences can be interpreted as the determinants of the choice between straight debt and convertible debt for issuers that are not well-suited to offer common equity.

One caveat is that the risk-shifting hypothesis refers to firms that have the *opportunity* to increase the idiosyncratic risk of the firm. Since this relates to the firm's unobservable investment opportunity set, this hypothesis is not necessarily associated with high levels of current firm risk. For example, a firm with profitable but very risky investment opportunities may not have a risk-shifting moral hazard problem because there is little it can do to make its firm riskier. While this may hold for firms that have well-defined positive but risky NPVs (as in Green's (1984) private action model), issuer motives become more complicated when there is an adverse selection component.

The hypothesis we test recognizes that managers understand the investment opportunity set better than investors and that firms continue to invest and develop growth opportunities. As managers learn about the profitability of these growth opportunities, there is a strong incentive to engage in risk shifting if projects turn out unprofitable. Thus, under asymmetric information, growth opportunities and idiosyncratic risk are proxies for the incentive to risk-shift.

Table 3 provides comparative issue and issuer characteristic information for 259 straight debt issuers and 103 debt-like issuers of convertible debt. We provide a univariate analysis and a multivariate discriminant analysis of differences in issuer characteristics. The univariate difference

tests identify a number of issuer characteristics that distinguish between straight debt and debt-like convertible issuers.

Debt-like convertible issuers are significantly smaller than the straight debt issuers, whether size is measured by market value of the issuer's common stock or total assets (book value).¹⁵ Convertible debt issuers have higher market-to-book ratios, lower cash flow, and a lower dividend payout. Since these firms appear to be investing in growth opportunities, it is not surprising that they pay smaller dividends and have less cash flow than the more mature firms issuing straight debt. Convertible debt issuers also have higher levels of stock return volatility and use more debt prior to issue.

Their smaller size, higher levels of growth opportunities and higher risk should make it more attractive for convertible debt issuers to engage in risk-shifting behavior than it would be for straight debt issuers, since it is easier to expropriate the assets of bondholders. Taken together, these "between types" of firms are consistent with the hypothesis that firms design debt-like convertible bond issues to control for the asset substitution problem.

Differences in systematic risk (or beta) do not appear to influence the choice between straight debt and convertible debt for issuers with excess debt capacity. Since stock return volatility is significantly higher for convertible debt issuers, however, it is high levels of idiosyncratic risk that influence the selection of convertible debt for these firms.

Table 3 also identifies other differences and similarities between straight debt and debt-like convertible debt issuers. Security offer excess returns for straight debt issuers are not significantly different from zero, while excess returns for convertible debt issuers are negative. The mean excess return difference between the two issuer groups is negative and statistically significant at the 0.01 level. The negative share reaction may indicate that there is also an adverse selection component (or other equity-related cost) in the security choice decision, since the inclusion of an equity-like feature in convertible debt exposes the firm to adverse selection effects.

Stock price performance and general economic conditions play a marginally significant role in the choice between straight and convertible debt issues. Convertible debt issues are announced when economic conditions, as measured by the leading economic indicators, are more favorable. Thus, although firms predicted to issue convertible debt do not have significantly better investment opportunities than firms predicted to issue straight debt, expectations of favorable economic conditions and improved investment opportunities appear to influence the security

choice decision. Finally, convertible debt issuers have significantly higher pre-issue cumulative excess returns than straight debt issuers.

There are several additional differences between straight debt and debt-like convertible issuers that are not specifically considered in the risk-shifting hypothesis. Debt-like convertible issuers pay lower taxes as a percent of total assets than the expected straight debt issuers. Since these firms are less profitable, the lower interest rates typically associated with convertibles relative to straight debt issues have tax implications that are likely important to the security choice decision. That is, firms may issue convertible debt to obtain a lower interest rate when earnings are relatively low and the probability of not being able to use the interest deduction is relatively high. The issue proceeds are significantly larger in expected straight debt issues than in expected debt-like convertible issues.

The univariate analysis identifies a number of significant pairwise comparisons, but does not consider the correlation between the explanatory variables. The multivariate discriminant analysis reported in Table 3 creates a linear combination of the explanatory variables that best identify the issue and the issuer characteristics that differentiate the straight debt and debt-like convertible debt security offers. We report standardized function coefficients rather than structure coefficients because the former can be interpreted as the independent contribution of the individual variables to explaining group membership while statistically controlling for the other variables in the model.¹⁶

The relative effect of each explanatory variable on the design of straight debt versus a debt-like convertible bond is determined by the absolute value of the variable's discriminant coefficient. Although there are no formal statistical tests of significance for these standardized coefficients, absolute values of 0.30 or greater are considered high enough to be of practical interest (see, e.g., Comrey and Lee, (1992) or Koutsoyiannis, (1973)). The sign of the discriminant coefficient determines the direction of each variable's effect on the security choice decision. Positive coefficients indicate that higher values on the explanatory variables are associated with straight debt issues. Negative coefficients indicate that higher values on the explanatory variables are associated with debt-like convertible debt issuers.

There are eight important determinants of the difference between expected straight debt issuers and debt-like convertible debt issuers in Table 3: dividend yield, financial leverage, tax payments, market-to-book, stock return volatility, excess return, issue proceeds, and the leading indicators. The first five correspond to debt-related financing costs, and the last three are

associated with equity-related financing costs. The results of the multivariate discriminant analysis confirm our univariate findings.

The debt-related financing costs indicate that debt-like convertible debt issuers have better investment opportunities, higher volatility, and lower debt levels, and pay higher dividends and lower taxes. The significantly greater volatility for expected debt-like convertible debt issuers than straight debt issuers is consistent with the risk-shifting hypothesis, in that risk considerations influence the substitution of convertible debt for straight debt. Moreover, systematic risk is an unimportant discriminator. The significance of the dividend yield, the leverage variable, and the market-to-book variable confirms the importance of the agency costs of debt in the security choice decision for these firms. All else equal, marginal agency costs increase with dividends and leverage, and with more profitable investment opportunities. As before, tax considerations influence security choice decisions for debt-like convertible issuers.

The equity-related financing costs indicate that debt-like convertible offers are issued when future economic conditions are expected to be good. These issuers also tend to float relatively large issues, which confirms investor concerns about adverse selection. The significance of the difference in excess returns is consistent with Myers and Majluf's (1984) argument that private information by managers makes equity issues unattractive. In addition, since the marginal agency costs of managerial discretion decrease with leverage and the profitability of the firm's investment opportunities, our results provide no support for the prediction that this particular equity-related cost influences the expected security offer choice decision between straight debt and debt-like convertible debt.

Overall, we interpret the results in Table 3 as supporting the motives hypothesized to explain the substitution of convertible debt for straight debt in the risk-shifting theory. Debt-related agency costs are significantly different for these two issuer groups. Our results also suggest that firms do not solve the asset substitution problem by issuing common equity because they appear to have relatively high adverse selection problems. Finally, the results indicate that convertible debt issuers face relatively high debt- and equity-related financing costs, so that a standard security choice such as straight debt is unlikely to raise capital on the most advantageous terms.

4.2. Comparison of common equity and equity-like convertible debt issuers

The backdoor equity hypothesis asserts that convertible debt is an especially valuable financing instrument for firms that are characterized by significant information asymmetries and

high expected financial distress costs. The adverse selection problem makes a conventional common stock offer costly for these firms. Consequently, the substitution of convertible debt for a common stock offer mitigates the negative information consequences of an equity issue. Moreover, a financially leveraged firm would issue convertible debt only if management is relatively optimistic about its future share price performance.

Table 4 provides comparative issue and issuer characteristic information for 182 issuers and 100 equity-like issuers of convertible debt. Again there is a univariate and a multivariate discriminate analysis.

Investment opportunities (measured by either the dividend yield or the market-to-book ratio) are significantly more profitable for equity-like convertible debt issuers than for common equity issuers. Both convertible debt and common stock are offered following large pre-issue stock price run-ups. If, as Lucas and McDonald (1990) suggest, information asymmetries are higher following periods of abnormal stock price performance, equity-like convertible debt issuers may issue securities to fund profitable investment projects during periods of higher information asymmetry. This is consistent with the backdoor equity hypothesis.

Convertible debt issuers also have significantly greater financial slack than common equity issuers do. Myers and Majluf (1984) hypothesize that an increase in financial slack increases the costs of adverse selection, which suggests that the substitution of convertible debt for common equity mitigates the information asymmetry. To the extent that the costs of adverse selection are directly related to the size of the issue (see Krasker, (1986)), the substitution of convertible debt for common equity also mitigates the information asymmetries facing equity issuers. Taken together, these results support the argument that convertible debt may be an especially useful financing instrument for firms subject to high adverse selection costs, and hence support the backdoor equity hypothesis.

The results in Table 4 do not support the prediction that the benefits of convertible debt are especially large for firms facing high financial distress costs. Common equity issuers and equity-like convertible debt issuers have significantly different levels of financial leverage, but the variable has the wrong sign. Specifically, higher leverage increases the likelihood of a common equity offer. If a high market-to-book ratio indicates the presence of valuable growth opportunities, our results are consistent with the view that firms vulnerable to high financial distress costs substitute convertible debt for conventional common equity. Our results are less supportive of the hypothesis that firms with high debt-to-equity ratios are significantly more likely to use convertible debt.

Both common equity and convertible debt issue announcements produce a significant negative stock price reaction, but the excess returns are significantly less negative for convertible issuers, which is consistent with the backdoor equity hypothesis.

There are several additional issuer or issue characteristics that distinguish these two groups. The equity-like convertible debt offers are larger and represent a significantly greater proportion of the market value of the issuer's common stock than the common stock offers. In contrast to the results for the straight debt and debt-like convertible debt issuers, the risk characteristics of common equity and equity-like convertible debt issuers (both systematic and total firm risk) are significantly different. Finally, firm size, and profitability measures are not significantly different for the two groups. Convertible debt issuers pay more in taxes as a percentage of total assets.

Table 4 also reports function coefficients for the discriminant function analysis. Positive coefficients indicate that higher values on the explanatory variables are associated with common equity issues. Negative coefficients indicate that higher values on the explanatory variables are associated with equity-like convertible debt issuers. There are four equity-related and five debt-related financing cost variables that distinguish the security choice decision for these firms. The equity-related cost variables are issue proceeds, firm size (measured by the market value of the issuer's common equity), relative offer size and financial slack. Each has an adverse selection interpretation. Their signs are consistent with the interpretation that adverse selection costs are higher for expected equity-like convertible debt issuers than for common equity issuers. This result is consistent with the predictions of the backdoor equity hypothesis.

The debt-related cost variables that influence the choice between a convertible debt offer and a common equity offer are the dividend yield, financial leverage, market-to-book ratio, beta, and stock return volatility. The financial leverage is significantly lower, and the market-to-book ratio is significantly higher for convertible debt issuers. The significance of the dividend yield variable is consistent with the market-to-book result, again suggesting that it is perhaps underinvestment considerations that preclude the use of straight debt by equity-like convertible debt issuers. The sign of the coefficient on long-term debt to total assets ratio is inconsistent with the prediction of the backdoor equity hypothesis that financial distress costs are a significant determinant of the substitution of convertible debt for common equity.

The significantly higher market-to-book ratio and correspondingly lower dividend yield, however, is consistent with the view that debt-related costs are higher on at least one dimension for the convertible debt issuers. We interpret this finding as supporting the hypothesis that high

debt-related costs preclude the use of a straight debt offer as a solution to the adverse selection problem for these issuers. The source of this cost is the potential forgone future profitability from lost investment opportunities. The probability of financial distress (as proxied by the amount of financial leverage) is not a significant determinant for the selection of convertible debt.

Risk considerations (an incremental debt-related financing cost) also are significant in Table 4. Specifically, common equity issuers have higher levels of systematic and total risk than convertible debt issuers. While this indicates that risk-shifting could be a problem, it is interesting that issuers with higher risk here offer common equity, not convertible debt. This suggests that risk-shifting considerations are not an important determinant of the use of convertible debt for equity-like issuers. Interestingly, this indicates that risk-shifting is a significant security choice determinant only for those issuers who substitute convertible debt for straight debt, as predicted by the risk-shifting hypothesis.

Overall, the results here are consistent with the hypothesis that convertible debt issuers face both debt- and equity-related financing costs that are significant. In addition, the sources of these costs are largely consistent with the predictions of the backdoor equity hypothesis. We find strong evidence that adverse selection considerations are an important determinant of the substitution of convertible debt for common equity. We also are able to identify debt-related costs that explain why straight debt cannot be used to solve the adverse selection problem.

5. The Determinants of Investor Reactions to Security Issues

To examine the hypothesis that the characteristics that influence security choice decisions also influence investor reactions to different security offer types, we present two analyses. First, we examine announcement date excess returns for convertible debt security offers only. Prior research has not been successful in identifying economic factors that explain the cross-sectional variation in announcement period excess returns surrounding convertible debt security offers. Therefore, we want to examine whether the variables that explain investor expectation of security type might also explain investor reaction to the actual security offer announcement.

Second, we present announcement period excess returns for our full sample of straight debt, common equity and convertible debt security offers. A well-specified security choice model should explain not only security choice decisions but also investor reactions across all security offer types. We also examine how well the model performs separately for the debt-type and equity-type issuer subgroups. Our overall conclusion is that the model explains a significant

proportion of the cross-sectional variation in announcement period excess returns for all security types considered.

5.1. The determinants of investor reactions to convertible debt issues

As Jung, Kim and Stulz (1996) argue, a theory of corporate security issue choice should explain both issuer motivations and investor reactions to management's security issue decision. If our classification scheme for convertible debt issuers is informative, we expect that the model's explanatory variables can also explain how the market reacts to the use of convertible debt.

Because Brennan and Schwartz (1988), Green (1984) and Stein (1992) all emphasize issuer creditworthiness in their models of convertible debt financing, we include issuer credit quality as a control variable in our regression models. The credit quality variable is a dummy variable that is equal to 0 if the convertible bond has an investment grade rating on the issue date and equal to 1 otherwise.¹⁷

Table 5 provides for the entire sample of 203 issuers cross-sectional regressions of announcement date excess returns on the explanatory variables used to model the security choice decision plus the credit quality variable. The model explains a significant fraction of the cross-sectional variation in investor reactions. Regression (5) demonstrates that market-to-book, financial leverage, stock return volatility and credit quality are statistically significant determinants of investor reactions. Excess returns are higher for investment-grade convertible debt issuers with profitable growth opportunities (high market-to-book ratios), high financial leverage and high stock return volatility, whether or not investors anticipate a debt-like or an equity-like offer.¹⁸

The positive relation between stock return volatility and excess returns is consistent with the hypothesis that convertible debt is especially valuable for firms with high risk. In Jung, Kim and Stulz's (1996) results, stock return volatility has no effect on investor reactions to seasoned equity offers. Thus, issuer risk is an important distinction between the use of, and investor reaction to, common equity and convertible debt security offers.

Table 5 also indicates that, all else equal, investors react more negatively to convertible debt offers by speculative-grade firms. If credit ratings are taken to reflect both business and financial risk, these results indicate that investor reactions are more negative for issuers with higher business risk. Another possible explanation for the negative investor reaction to speculative-grade convertible debt offers is that convertible debt offers are underpriced (Kang and Lee (1996)). To the extent that these underpricings represent wealth transfers from equityholders, a negative investor reaction is expected. If poorer credit quality issuers have fewer financing

alternatives, perhaps because of their weaker financial condition, speculative-grade issuers could be underpriced by a larger amount. Finally, the positive relation between financial leverage and excess returns is consistent with Stein's (1992) hypothesis that convertible debt is especially valuable for firms with higher leverage.

Brennan and Schwartz (1988) suggest that there is no compelling reason for large firms to issue convertible debt. The backdoor equity hypothesis predicts that, to the extent that firm size proxies for adverse selection costs, investors react more favorably to convertible offers by smaller firms. Regression (6), which includes firm size as an explanatory variable, produces an insignificant regression coefficient. Note that none of the findings reported in Regression (5) are affected after we control for firm size.

Regression (7) includes issue proceeds (normalized by the market value of the issuer's common stock) as an explanatory variable. The variable is negative and significant, which indicates that convertible debt issuer excess returns are lower in larger security offers. One possible explanation for this result is Hansen and Crutchley's (1990) finding that security offers (including convertible debt) are often undertaken to finance anticipated earnings shortfalls. If larger security offers indicate an unexpectedly greater earnings shortfall, then a negative share price response is expected.¹⁹

Regression (8) includes a measure of "design surprise" as an explanatory variable. It is calculated as the absolute value of the difference between the actual probability of conversion and the predicted probability from the security choice model. A large "design surprise" indicates that the actual security design was significantly different from the design predicted by the security choice model. Regression (8) indicates that the coefficient estimate for design surprise is not significantly different from zero.

Overall, these results suggest that the profitability of investment opportunities, financial leverage, creditworthiness, stock price volatility and the relative offer size are important determinants of investor reactions. We do not find evidence that investors respond to unanticipated security designs. Note, however, that the factors that provide a significant explanation of the variation in announcement period excess returns are not the same as the factors that explain the security choice decision. Therefore, while there is a relationship between security choice decisions and announcement period excess returns, the explanatory variables have a somewhat different marginal impact on issue choice probability and investor reaction to the security choice decision.

5.2. The determinants of investor reactions to equity-type and debt-type issues

Extending the analysis to the full sample of convertible debt, straight debt and equity offer announcements, we use the security choice model in Regression (1) in Table 2 to classify convertible debt issues as debt-like and equity-like. Cross-sectional regressions are run on excess returns for all security offers using the same explanatory variables that we use to model the security choice decision. The results are reported in Table 6.

Overall, Regressions (9) through (11) confirm that the important determinants of the security choice model have significant explanatory power for investor reactions to the announcement of convertible debt, straight debt and equity offers. We find that investors have different responses to equity-type and debt-type issues, and a number of these differences are striking. The first is that the profitability of growth opportunities is an important determinant of excess returns for equity-type issues but not debt-type issues. Second, excess returns are higher for equity-type issues with high stock price volatility but higher for debt-type issues with low stock price volatility. Finally, investors' reactions to debt-type and equity-type issues are consistent with the existence of adverse selection.

Investors react negatively to equity-type issues immediately following periods of good stock price performance, but they respond favorably when managers issue debt-type securities immediately following periods of poor stock price performance.²⁰ Thus, investors treat the decision to issue an equity-type security as a signal of bad news, since managers issue equity-type securities when equity is overpriced. Similarly, they treat the decision to issue a debt-type security as a signal of good news, since managers avoid issuing equity-type issues when equity is underpriced. Finally, we find that when we expand the security universe to include straight debt and common equity offerings, investor reactions to unanticipated security designs remain insignificantly different from zero.

6. Summary and Conclusions

This paper makes several contributions. First, it extends the security choice model literature. Bayless and Chaplinsky (1991) and Jung, Kim and Stulz (1996) limit their security choice models to a choice between straight debt and common equity. Expansion to include the choice of convertible debt allows us to examine investor reactions to debt-like and equity-like convertibles. We find that investors partially anticipate the security offer choice decision. The pre-offer information available to investors conditions their expectation of security issue choices. This expectation, in turn, affects the announcement period excess returns.

Second, the security choice model allows us to test two distinct but not mutually exclusive theories of convertible debt financing. The risk-shifting hypothesis states that managers substitute convertible debt for straight debt to reduce agency costs associated with asset substitution problems. The backdoor equity hypothesis states that managers substitute convertible debt for common equity to mitigate the adverse selection costs of a seasoned equity offer. We find convincing empirical evidence in support of both of these hypotheses. In addition, we document that investor reaction to convertible debt security offers depends on whether investors perceive the offer to be a substitute for straight debt or for common equity.

Third, we identify a number of different issue and issuer characteristics of debt-like and equity-like convertible debt issuers. Comparisons of straight debt versus debt-like convertible debt issuers and common equity versus equity-like convertible debt issuers allow identification of distinctive characteristics that suggest why firms issue convertible debt in place of more standard security offerings. Interestingly, the factors distinguishing straight debt and debt-like convertible issuers are different from the factors that distinguish common equity and equity-like convertible issuers. Stock price reactions to convertible debt offer announcements are significantly related to many of the security choice model explanatory variables. Thus, the multiple-security choice model is able to provide new insights into both issuer motivations for and investor reactions to the convertible debt issue decision.

Finally, the empirical results reported in this paper examine hypotheses that characterize convertible debt as a solution to multidimensional financing problems that are costly around the issue date. Cornelli and Yosha (1997) and Mayers (1998) suggest that convertible debt is also a useful security choice when issuers face sequential financing problems. Future research should examine the extent to which issuers use convertible debt as a solution to simultaneous, multi-dimensional financing problems versus sequential financing problems. A useful approach would be to examine the issuance of mandatory versus voluntary convertible securities, since neither the risk-shifting hypothesis nor the sequential-financing hypothesis explains the use of mandatory convertible securities.

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Table 1

Excess returns and firm characteristics for 203 convertible debt issues, 259 straight debt issues and 182 equity issues from 1977 through 1984

Excess return is computed for the day of the first public announcement and the previous day. Issue proceeds are the gross proceeds of the issue in millions of dollars. Long-term debt is the book value of the firm's long-term debt. Cash flow is operating income before depreciation minus total taxes adjusted for changes in deferred taxes, minus gross interest expense and minus dividends paid on common and preferred stock, divided by total assets. Market-to-book is the ratio of firm market value (market value of equity plus total assets minus book value of equity) to total assets. All accounting data are for the end of the fiscal year before the issue. The firm's beta and the volatility of the firm's stock return are obtained using the CRSP daily data file for the period (-240, -40). + indicates results reported by Jung, Kim and Stulz [1996].]

Panel A. Means and Medians

	Convertible Debt Issues		Straight Debt Issues		Equity Issues	
	Mean	Median	Mean	Median	Mean	Median
Excess return	-1.51%	-1.44%	0.04%	-0.18%	-2.56%	-2.56%
Issue proceeds	55.92	35.00	141.42	100.00	48.88	28.50
Market value of equity (MVCS)	512.75	194.44	3220.88	896.47	671.94	185.85
Issue proceeds/MVCS	0.30	0.21	0.24	0.12	0.19	0.15
Dividend yield	1.96%	1.21%	4.08%	4.06%	2.02%	1.45%
Long-term debt/MVCS	0.70	0.34	0.70	0.39	0.62	0.41
Long-term debt/Total assets	0.25	0.24	0.22	0.20	0.29	0.27
Cash flow	0.08	0.08	0.08	0.08	0.08	0.08
Tax payments/Total assets	0.03	0.02	0.04	0.04	0.03	0.03
Cash and liquid assets/Total assets	0.08	0.04	0.06	0.04	0.05	0.04
Market-to-book	1.58	1.33	1.12	1.00	1.49	1.26
6-month leading indicators	0.01	0.01	-0.01	0.00	0.01	0.01
11-month prior cumulative excess return	18.74%	16.83%	-1.56%	-6.94%	20.95%	17.84%
Beta	1.18	1.14	1.12	1.06	1.25	1.20
Stock return volatility	7.19%	6.61%	4.00%	3.08%	6.74%	6.31%
3-year raw return	50.38%	32.01%	76.20% ⁺	52.49% ⁺	59.47% ⁺	37.86% ⁺
5-year raw return	69.86%	42.30%	146.75% ⁺	98.56% ⁺	98.88% ⁺	57.12% ⁺
Size-matched 3-year cumulative return	-11.27%	-20.47%	-5.16% ⁺	-3.64% ⁺	-7.89% ⁺	-13.90% ⁺
Size-matched 5-year cumulative return	-27.83%	-35.53%	2.03% ⁺	-18.60% ⁺	-32.69% ⁺	-46.81% ⁺
Total assets	1025.80	288.74	6941.82	1901.60	1345.19	226.95

*** indicates that the difference in means test is significant at the 0.01 level.

** indicates that the difference in means test is significant at the 0.05 level.

* indicates that the difference in means test is significant at the 0.10 level.

Table 1 (continued)

Excess returns and firm characteristics for 203 convertible debt issues, 259 straight debt issues and 182 equity issues from 1977 through 1984

Panel B. Pairwise Differences in Mean Values

	Convertible Debt Straight Debt Issues	Convertible Debt Equity Issues	Straight Debt and Equity Issues
Excess return	-1.55% ***	1.04% **	2.59% ***
Issue proceeds	-85.50 ***	7.03	92.54 ***
Market value of equity (MVCS)	-2708.10 ***	-159.20	2548.90 ***
Issue proceeds/MVCS	0.06	0.11 ***	0.05
Dividend yield	-2.12% ***	-0.01%	2.06% ***
Long-term debt/MVCS	0.00	0.09	0.09
Long-term debt/Total assets	0.03 **	-0.03	-0.06 ***
Cash flow	0.00	0.00	0.00
Tax payments/Total assets	-0.01 ***	0.00	0.01 ***
Cash and liquid assets/Total assets	0.02 **	0.02 ***	0.01
Market-to-book	0.46 ***	0.09	-0.37 ***
6-month leading indicators	0.02 ***	0.00	-0.02 ***
11-month prior cumulative excess return	20.29% ***	-2.21%	-22.50% ***
Beta	0.06	-0.07	-0.13
Stock return volatility	3.19% ***	1.35%	-2.74% ***
Total assets	-5916.00	-319.40	5596.60 ***

*** indicates that the difference in means test is significant at the 0.01 level.

** indicates that the difference in means test is significant at the 0.05 level.

* indicates that the difference in means test is significant at the 0.10 level.

Table 2

Logit Analysis of Security Issue Choice for 203 Convertible Debt Issues, 259 Straight Debt Issues and 182 Equity Issues from 1977 through 1984

Logistic regressions in which the dependent variable takes the value one for equity issues, a value equal to the risk-neutral probability that the convertible debt is converted into equity at maturity for the convertible debt, and zero for straight debt issues. Market-to-book is the ratio of firm market value (market value of equity plus total assets minus book value of equity) to total assets. Cash flow is operating income before depreciation minus total taxes adjusted for changes in deferred taxes, minus gross interest expense and dividends paid on common and preferred stock, divided by total assets. All book values are obtained from Compustat for the year prior to the issue announcement. The volatility of the stock return is for the period (-240, -40). The 11-month prior cumulative excess return is the excess return of issuing firms over firms with similar size before the issue. MVCS is the market value of equity. The pseudo- R^2 equals $1 - (\log\text{-likelihood at convergence}/\log\text{-likelihood at zero})$; Chi-square statistics are given in parentheses.

Independent variable	Regression Model			
	(1)	(2)	(3)	(4)
Intercept	-1.84 (22.55) ***	-0.91 (4.27) **	-1.86 (22.67) ***	2.74 (14.79) ***
Tax payments/Total assets	-8.15 (6.94) ***	-8.87 (7.88) ***	-6.56 (4.36) **	-10.59 (10.11) ***
Long-term debt/Total assets	1.34 (3.91) **	0.75 (1.14)	1.83 (6.86) ***	0.57 (0.62)
Market-to-book	1.08 (28.02) ***	0.95 (22.12) ***	0.85 (16.84) ***	1.04 (25.11) ***
Cash flow	2.44 (1.54)	2.11 (1.13)	1.91 (0.92)	2.96 (2.06)
Stock return volatility	-11.66 (0.90)	-27.14 (4.50) **	13.04 (0.88)	-50.93 (13.34) ***
6-month leading indicators	14.25 (20.46) ***	14.17 (20.14) ***	14.85 (21.46) ***	14.47 (19.34) ***
11-month prior cumulative excess return	1.35 (16.76) ***	1.31 (15.66) ***	1.51 (19.87) ***	1.04 (9.06) ***
Cash and liquid assets/Total assets	-0.24 (0.03)	0.15 (0.01)	0.54 (0.14)	-0.44 (0.08)
Total assets	- -	-0.00 (12.29) ***	- -	- -
Issue proceeds/MVCS	- -	- -	-1.92 (16.74) ***	- -
Log of (Amount/MVCS)	- -	- -	- -	-0.85 (56.73) ***
Pseudo R^2	0.12	0.14	0.14	0.19
Concordant responses	76.00%	77.60%	77.60%	80.40%

*** indicates that the difference in means test is significant at the 0.01 level.

** indicates that the difference in means test is significant at the 0.05 level.

* indicates that the difference in means test is significant at the 0.10 level.

Table 3

Excess Returns and Firm Characteristics for 259 Straight Debt Issues and 103 Debt-Like Convertible Debt Issues from 1977 through 1984 Designed as Debt-Type Issues

Excess return is computed for the day of the first public announcement and the previous day. Issue proceeds are the gross proceeds of the issue in millions of dollars. Long-term debt is the book value of the firm's long-term debt. Cash flow is operating income before depreciation minus total taxes adjusted for changes in deferred taxes, minus gross interest expense and minus dividends paid on common and preferred stock, divided by total assets. Market-to-book is the ratio of firm market value (market value of equity plus total assets minus book value of equity) to total assets. All accounting data are for the end of the fiscal year before the issue. The 11-month prior cumulative excess return is the excess return of issuing firms over firms with similar size before the issue. The firm's beta and the volatility of the firm's stock return are obtained using the CRSP daily data file for the period (-240, -40). Difference is the mean of a variable for debt issues minus the mean of the same variable for convertible issuers predicted to issue debt.

	Straight Debt Issues (N=259)	Convertible Debt Issues Designed to be Debt-Like (N = 103)	Difference	Discriminant Function Separating Groups
Excess return	0.03%	-1.57%	1.60% ***	0.304
Issue proceeds	141.42	47.86	93.56 ***	0.423
Market value of equity (MVCS)	3220.88	432.21	2788.67 ***	-0.222
Issue proceeds/MVCS	0.25	0.39	-0.14 ***	0.210
Dividend yield	4.08%	2.69%	1.39% ***	-0.395
Long-term debt/MVCS	0.70	1.01	-0.31 *	-0.258
Long-term debt/Total assets	0.22	0.26	-0.04 **	0.351
Cash flow	0.08	0.06	0.02 ***	0.048
Tax payments/Total assets	0.04	0.02	0.02 ***	0.396
Cash and liquid assets/Total assets	0.06	0.06	0.00	-0.012
Market-to-book	1.12	1.28	-0.16 ***	-0.344
6-month leading indicators	-0.01	0.01	-0.02 **	-0.331
11-month prior cumulative excess return	-1.56%	18.10%	-19.66% ***	-0.140
Beta	1.12	1.27	-0.15 **	0.131
Stock return volatility	4.00%	9.38%	-5.38% ***	-0.886
Total assets	6941.82	1366.45	5575.37 ***	0.253
Adjusted canonical correlation				0.603

*** indicates that the difference in means test is significant at the 0.01 level, assuming unequal variances for the two subsamples.

** indicates that the difference in means test is significant at the 0.05 level, assuming unequal variances for the two subsamples.

* indicates that the difference in means test is significant at the 0.10 level, assuming unequal variances for the two subsamples.

Table 4

Excess Returns and Firm Characteristics for 182 Equity Issuers and 100 Equity-Like Convertible Debt Issues from 1977 through 1984 Designed as Equity-Type Issues

Excess return is computed for the day of the first public announcement and the previous day. Issue proceeds are the gross proceeds of the issue in millions of dollars. Long-term debt is the book value of the firm's long-term debt. Cash flow is operating income before depreciation minus total taxes adjusted for changes in deferred taxes, minus gross interest expense and minus dividends paid on common and preferred stock, divided by total assets. Market-to-book is the ratio of firm market value (market value of equity plus total assets minus book value of equity) to total assets. All accounting data are for the end of the fiscal year before the issue. The 11-month prior cumulative excess return is the excess return of issuing firms over firms with similar size before the issue. The firm's beta and the volatility of the firm's stock return are obtained using the CRSP daily data file for the period (-240, -40). Difference is the mean of a variable for stock issues minus the mean of the same variable for convertible issuers predicted to issue equity.

	Equity Issuers (N=182)	Convertible Debt Issuers Designed to be Equity-Like (N = 100)	Difference	Discriminant Function Separating Groups
Excess return	-2.56%	-1.46%	-1.10% **	-0.221
Issue proceeds	48.88	64.05	-15.17 *	-0.573
Market value of equity (MVCS)	671.94	595.71	76.23	0.421
Issue proceeds/MVCS	0.19	0.21	-0.02	-0.196
Dividend yield	2.02%	1.22%	0.80% ***	0.427
Long-term debt/MVCS	0.62	0.39	0.23 ***	0.018
Long-term debt/Total assets	0.29	0.25	0.04 *	0.097
Cash flow	0.08	0.10	-0.02 **	0.066
Tax payments/Total assets	0.03	0.04	-0.01 **	0.081
Cash and liquid assets/Total assets	0.05	0.09	-0.04 ***	-0.350
Market-to-book	1.49	1.88	-0.39 ***	-0.431
6-month leading indicators	0.01	0.00	0.01 **	0.359
11-month prior cumulative excess return	20.95%	19.39%	1.56%	0.021
Beta	1.25	1.09	0.16 **	0.405
Stock return volatility	6.74%	5.24%	1.50% ***	0.442
Total assets	1345.19	674.93	670.26	0.056
Adjusted canonical correlation				0.469

*** indicates that the difference in means test is significant at the 0.01 level, assuming unequal variances for the two subsamples.

** indicates that the difference in means test is significant at the 0.05 level, assuming unequal variances for the two subsamples.

* indicates that the difference in means test is significant at the 0.10 level, assuming unequal variances for the two subsamples.

Table 5

Cross-Sectional Regressions of 203 Convertible Debt Issue Excess Returns on Issue and Issuer Characteristics from 1977 through 1984

Excess returns are computed for the day of the first public announcement and the previous day. The regression models are estimated using weighted least squares; the weight for each issue is the inverse of the variance of the market model residual for the firm issuing the security. The proceeds of an issue correspond to the gross proceeds in millions of dollars. Market-to-book is the ratio of firm market value (market value of equity plus book value of total assets minus book value of equity) to total assets. Cash flow is operating income before depreciation minus total taxes adjusted for changes in deferred taxes, minus gross interest expense and minus dividends paid on common and preferred stock. All book values are obtained from Compustat for the year before the announcement. The 11-month prior cumulative excess return is the excess return of issuing firms over firms with similar size before the issue. The volatility of the firm's stock return is obtained using the CRSP daily data file for the period (-240, -40). Credit quality equals 0(1) if the convertible bond has an investment (speculative) grade credit rating. *t*-statistics are given in parentheses.

Independent Variable	Regression Model			
	(5)	(6)	(7)	(8)
Intercept	-0.089 (-5.77) ***	-0.086 (-4.85) ***	-0.086 (-5.63) ***	-0.091 (-4.70) ***
Market-to-book	0.013 (2.92) ***	0.013 (2.90) ***	0.009 (1.91) *	0.014 (2.67) ***
Cash and liquid assets/Total assets	0.004 (0.08)	0.004 (0.08)	0.007 (0.15)	0.003 (0.07)
Tax payments/Total assets	0.113 (0.81)	0.107 (0.75)	0.147 (1.06)	0.106 (0.72)
Long-term debt /Total assets	0.069 (2.41) **	0.068 (2.36) **	0.083 (2.88) ***	0.070 (2.40) **
Cash flow	0.034 (0.50)	0.037 (0.48)	0.000 (0.00)	0.035 (0.50)
Stock return volatility	1.913 (5.24) ***	1.909 (5.21) ***	2.148 (5.75) ***	1.954 (4.37) ***
6-month leading indicators	-0.185 (-1.57)	-0.184 (-1.56)	-0.162 (-1.39)	-0.170 (-1.12)
11-month prior cumulative excess return	-0.017 (-1.69) *	-0.017 (-1.69) *	-0.014 (-1.45)	-0.016 (-1.25)
Credit quality	-0.032 (-2.67) ***	-0.034 (-2.52) **	-0.026 (-2.17) **	-0.032 (-2.66) **
Total assets	-	-0.000 (-0.28)	-	-
Issue proceeds/Market value of common stock	-	-	-0.032 (-2.38) **	-
Design surprise				0.005 (0.16)
Adjusted R ²	0.24	0.24	0.26	0.24

*** indicates that the difference in means test is significant at the 0.01 level.

** indicates that the difference in means test is significant at the 0.05 level.

* indicates that the difference in means test is significant at the 0.10 level.

Table 6

Cross-Sectional Regressions of Equity, Convertible Debt and Straight Debt Issue Excess Returns on Issue and Issuer Characteristics from 1977 through 1984

Excess returns are computed for the day of the first public announcement and the previous day. The regression models are estimated using weighted least squares with the weight for each issue equal to the inverse of the variance of the market model residual for the issuing firms's equity. The sample for Model (9) is all issues in the sample. The sample for Model (10) is all equity and equity-like convertible debt issues. The sample for Model (11) is all debt and debt-like convertible debt issues. The stock issue dummy equals one if the security offer is common equity and zero otherwise. The debt issue dummy equals one if the security offer is straight debt and zero otherwise. Market-to-book is the ratio of firm market value (market value of equity plus book value of total assets minus book value of equity) to total assets. Cash flow is operating income before depreciation minus total taxes adjusted for changes in deferred taxes, minus gross interest expense and minus dividends paid on common and preferred stock. All book values are obtained from Compustat for the year before the announcement. The 11-month prior cumulative excess return is the excess return of issuing firms over firms with similar size before the issue. The volatility of the firm's stock return is obtained using the CRSP daily data file for the period (-240, -40). *t*-statistics are given in parentheses.

Independent Variable	All Issues (9)	Equity and Equity-Type Issues (10)	Debt and Debt-Type Issues (11)
Intercept	-0.066 (-8.09) ***	-0.114 (-6.24) ***	-0.004 (-0.314)
Stock issue dummy	-0.008 (-1.78) *	-0.004 (-0.29)	- -
Debt issue dummy	0.021 (4.35) ***	- -	0.004 (0.428)
Market-to-book	0.015 (5.74) ***	0.017 (3.22) ***	-0.010 (-1.41)
Cash and liquid assets/Total assets	-0.045 (-1.73) *	-0.031 (-0.77)	-0.042 (-1.26)
Tax payments/Total assets	0.037 (0.67)	0.075 (0.72)	0.116 (1.75) *
Long-term debt/Total assets	0.010 (0.844)	0.019 (0.93)	0.040 (2.61) ***
Cash flow	-0.014 (-0.43)	0.075 (1.52)	0.024 (0.519)
Stock return volatility	0.973 (4.95) ***	2.165 (6.412) ***	-0.446 (-1.84) *
6-month leading indicators	-0.086 (-1.53)	0.096 (0.77)	-0.222 (-2.62) ***
11-month prior cumulative excess return	-0.002 (-0.30)	-0.022 (-1.88) **	0.008 (1.04)
Design surprise	0.001 (0.14)	0.002 (0.10)	-0.017 (-0.94)
Adjusted R ²	0.16	0.28	0.10
Observations	644	283	361

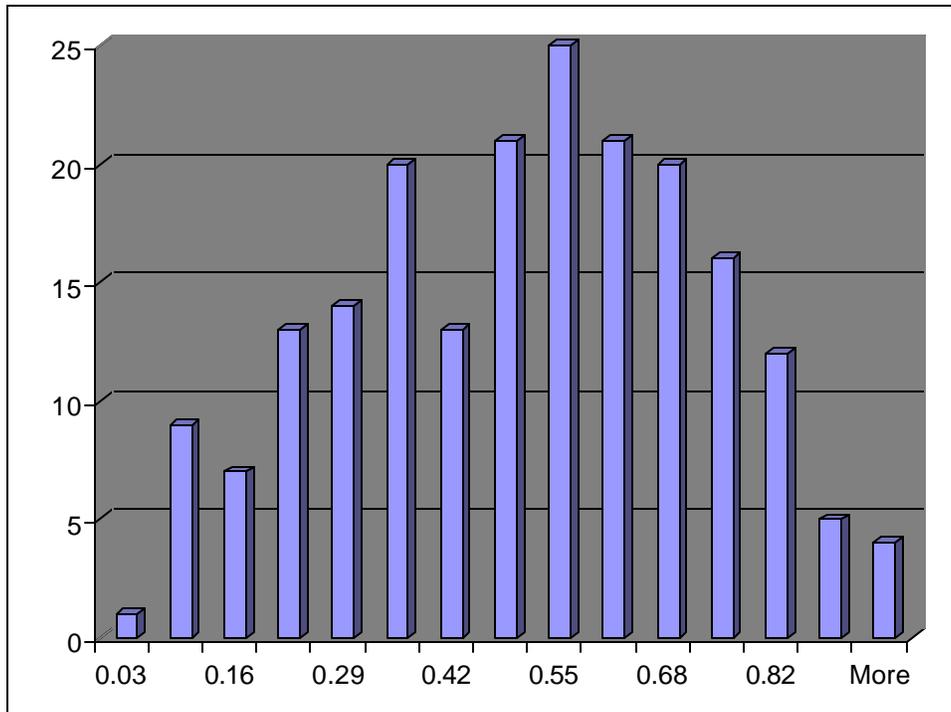
*** indicates that the difference in means test is significant at the 0.01 level.

** indicates that the difference in means test is significant at the 0.05 level.

* indicates that the difference in means test is significant at the 0.10 level.

Figure 1

Empirical distribution of the probability of conversion at issue for convertible debt issuers over the period 1977 to 1984.



¹ Sometimes the “risk-shifting” hypothesis is referred to as the “asset substitution” hypothesis.

² An alternative approach is the models proposed by Cornelli and Yosha (1997) and Mayers (1998), which suggest that convertible debt is useful for solving sequential financing problems. Mayers (1998) states that his theory has no directly testable implications in the case of announcement period excess returns.

³ An alternative financing arrangement that solves the risk-shifting problem is an all-equity capital structure. Green (1984) assumes an exogenous, but unspecified, motive to avoid such a capital structure. The inclusion of an equity-related financing cost such as a managerial discretion problem in his model would create an endogenous motivation for the use of convertible debt.

⁴ The predictive model assigns a score between 0 and 1 to each firm that issues straight debt or common equity. The score can be thought of as the probability or the likelihood that a firm issues either straight debt or common equity.

⁵ See, e.g., Eckbo (1986), Mikkelsen and Partch (1986) and Dann and Mikkelsen (1984).

⁶ A different risk-related explanation for the use of convertible debt is provided by Brennan and Schwartz (1988), who suggest that convertible debt resolves asymmetric information problems between existing claimants and new outside investors. High risk levels, or uncertainty about true risk, make issues of standard securities unattractive in their model.

⁷ We are grateful to Jung, Kim and Stulz (1996) for providing us with a complete list of their 192 equity issues and 276 straight debt issues. We were able to obtain full stock return and issuer firm characteristic data for only 182 equity issues and 259 straight debt issues, however. To determine whether this minor sample difference would significantly affect the results in our paper, we repeat the analysis in their paper and are able to replicate all their significant results.

⁸ Abnormal returns are calculated using the beta-matched portfolio method described in Asquith and Mullins (1986) and applied by Jung, Kim and Stulz (1996). Ten portfolios of all CRSP stock returns are formed each year by sorting firms on the basis of their market model betas. The abnormal return is estimated as the issuer firm’s actual return minus the return on its reference portfolio.

⁹ All previous studies of investor reactions to convertible debt offer announcements report negative abnormal returns: Eckbo (1986) reports abnormal returns of -1.25%; Dann and Mikkelsen (1984) report abnormal returns of -2.32%; Mikkelsen and Partch (1986) report abnormal returns of -1.39%; and Hansen and Crutchley (1990) report abnormal returns of -1.45%.

¹⁰ McLaughlin, Safieddine, and Vasudevan (1998) show that the post-offer operating performance of seasoned equity issuers and straight debt issuers declines, which they argue is consistent with the pecking-order model.

¹¹ The risk-neutralized drift rate, $r - div$, equals zero if $r - div$ is negative.

¹² It is possible to estimate the security choice model by treating convertible bonds as a separate security using, for example, an ordered probit model. The problem with the ordered probit model is that it requires the convertible issue decision to be modeled as a separate choice, which ignores the fact that some convertible debt issues are designed to be more “equity-like” than others. Our approach, which allows us to consider how “equity-like” or “debt-like” an issue is, represents a more direct method to test the theoretical motivations for the issuance of convertible debt.

¹³ We use the term “equity-type” to refer to convertible debt issues in which the conversion option value is high (or, equivalently, the straight bond value is low) and common stock issues. Conversely, we use the term “debt-type” to refer to convertible debt issues in which the conversion option value is low and straight debt issues.

¹⁴ We do not offer a formal analysis of misclassified securities here. This is not a significant limitation of our analysis because qualitatively similar results are obtained when we repeat our analysis using the *predicted* security type as the classification variable. These results are available upon request from the authors.

¹⁵ Brennan and Schwartz (1988) suggest that convertible debt is likely to provide the greatest protection against the adverse consequences of management policies that increase risk in smaller firms. Thus, the significant difference in issuer size is consistent with the risk-shifting hypothesis.

¹⁶ An analysis of the structure coefficients leads to the same conclusions about the significance of explanatory variables in our model. Statistical significance of the structure coefficients can be established by either a Burt-Banks test or by examining the standard errors of the Pearson product-moment correlation coefficients. For a discussion of these test procedures, see Koutsoyiannis (1973), pages 421-423, or Stevens (1992), pages 382-384. There is a correspondence between our discriminant analysis and a logistic regression that assigns straight debt issues a value of zero and debt-like convertible issues a value of one. We estimate this model and obtain the same results. Explanatory variables that are identified as significant in Table 3 also have statistically significant regression coefficients.

¹⁷ Non-rated bonds are treated as speculative-grade bonds.

¹⁸ We also include the issuer's fitted value from the Regression (1) security choice model as an explanatory variable. Although we do not report the results, the coefficient for the fitted value is statistically insignificant, while the other explanatory variables retain their signs and significance levels.

¹⁹ If we use a different measure of offer size (the natural logarithm of the offer proceeds), it produces a regression coefficient that is no longer significant. When combined with regression (7), this result implies that issue size does influence investor reactions to convertible debt security offers, but the effect is marginal.

²⁰ Akhigbe, Easterwood and Pettit (1997) provide evidence that stock market reactions to straight debt issues seem to be limited to firms that raise capital to meet cash flow shortfalls. Although not significant, Regression (12) demonstrates that the debt and debt-type issuers with higher cash flows have more positive stock price reactions to issue announcements.