Two Essays on Convertible Debt

by

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ABSTRACT

This dissertation examines two different topics related to the issuance of a convertible debt security. The first essay addresses the question of how managers set the equity value in a convertible debt issue. A convertible debt security has value derived from an equity component and a debt component. As a result, managers must decide how much of the convertible debt's value will be derived from equity at issuance. I examine three hypotheses in addressing this question. Empirical evidence is provided supporting the assertion that managers issue more equity-like debt when the firm will have lower future operating performance and a greater potential for underinvestment. Empirical support is not found for managers take into consideration asset substitution concerns when setting the equity value in a convertible debt issue.

The second essay examines why are abnormal returns negative for the equity during the convertible debt's issuance period. This has been documented by Dann and Mikkelson (1984), Mikkelson and Partch (1986, 1988), and also by this dissertation. I furnish evidence that is consistent with a bid-ask spread bias not causing the negative equity abnormal returns during the issuance period of a convertible debt security. Tests are also performed that provide results that are consistent with the issue period returns being partially due to a resolution of

uncertainty.

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Chapter 1: Introduction

This dissertation deals with two different issues concerning the offering of a convertible debt security.

The first essay attempts to address the question of how managers set the equity value in a convertible debt issue. A convertible debt security has value derived from an equity component and a debt component. Thus, the manager by choosing to issue a convertible debt security, as opposed to an equity security or a non-convertible debt security, must decide how much of the convertible debt's value at issuance is derived from equity. I examine three hypotheses in addressing this question. The three hypotheses are that managers take into consideration future operating performance, underinvestment concerns, and asset substitution concerns. It was predicted that firms issuing more equity-like convertible debt will have a lower future operating performance, a greater potential for underinvestment, and a greater potential for asset substitution. Empirical evidence is found supporting that managers issue more equity-like debt the lower the future operating performance and the greater the potential for underinvestment. Empirical support was not found that managers take into consideration asset substitution concerns when setting the equity value in a convertible debt issue.

The second essay deals with the question of why the abnormal returns are negative for the firm's equity during the convertible debt's issuance period. This has been documented by Dann and Mikkelson (1984), and Mikkelson and Partch (1986, 1988). Negative issue period returns have also been documented for equity issuances by Mikkelson and Partch (1986,

1988), Officer and Smith (1986), and Lease, Masulis and Page (1991). In the case of a seasoned equity offering on the issue day, the firm's equity can be sold only in the secondary market, but it can be purchased in both the primary and secondary markets. The result is a buy-sell order flow imbalance in the secondary market that influences the firm's equity returns. Lease, Masulis and Page (1991) find evidence that part of the negative issue day returns are due to a bid-ask induced bias. However, on the issue day of a convertible debt offering, the equity can only be bought and sold in the secondary market. I provide evidence that is consistent with a bid-ask spread bias not contributing to the negative equity abnormal returns on the issuance day of a convertible debt security.

A second hypothesis is tested regarding why issue period abnormal returns are negative. The hypothesis is the negative issue period equity abnormal returns are partially due to a resolution of uncertainty regarding the completion of the proposed offering. If the equity returns during the convertible debt issuance period are from a resolution of uncertainty regarding the completion of the proposed offering, you should see a relationship between the announcement abnormal returns, and the abnormal returns at issuance or withdrawal. I conduct my tests by regressing the issuance or withdrawal abnormal returns on the announcement abnormal returns. Overall, the results of the regression tests are consistent with the issue period returns being partially due to a resolution of uncertainty.

The remainder of the dissertation is organized as follows. The first essay regarding how managers set the equity value in a convertible debt issue appears in Chapter 2. The second essay involving why the equity abnormal returns are negative for the issuance of a convertible debt security appears in Chapter 3. The overall conclusion of the dissertation

appears in Chapter 4.

Chapter 2: How do managers set the equity value in a convertible debt issue ?

1.0 Introduction

Convertible debt is a hybrid security whose value consists of debt and equity. Convertible debt has equity characteristics since the convertible debt holder has equity conversion rights. In effect, it is a package of callable straight debt and callable equity warrants. The decision to issue convertible debt, as opposed to traditional debt or equity, requires that managers set the debt and equity levels in the convertible debt issue. When managers set the equity value in a convertible debt issue, they may be affected by their expectation of the firm's future operating performance. In addition, they may be influenced by underinvestment and asset substitution concerns.

I find evidence that firms issuing more equity-like convertible debt have a lower future operating performance.[1] This result is consistent with the theories of Ross (1977), Kim (1990) and Stein (1992).

Also, I find evidence that firms with a higher potential for underinvestment issue more equity-like convertible debt, which is consistent with Myers (1977) and Stulz (1990). Tobin's Q proxies for the potential of having an underinvestment problem.[2] The underinvestment

[1] Operating performance is operating income before depreciation and interest expense standardized by asset book value or sales.

[2] The Tobin's Q proxy has been used previously by Bayless and Chaplinsky (1996), and Chaplinsky and Ramchand (1996). The higher Q's value the greater the potential for underinvestment due to not

problem can occur for two different reasons. First, underinvestment can occur because equity holders do not make the discretionary investment needed to take a positive net present value (NPV) project. In certain cases, a positive NPV project will be foregone since the investment gains will accrue to debt holders and not the equity holders. Another reason why underinvestment can occur is that debt limits a manager's discretionary investments. A manager must make timely debt payments or incur the penalties of default which may include the manager's dismissal. Thus, debt helps mitigate the incentive of a manager to invest in negative NPV projects that reduce shareholder wealth, but may benefit the manager's compensation or career. The cost of mitigating the managerial incentive to invest in negative NPV projects is that a manager may not pursue some positive NPV projects. In summary, the underinvestment problem results in sub-optimal investment or a "dead-weight" loss from not taking positive NPV projects in certain situations.

Finally, I do not find empirical support that firms with a higher potential for asset substitution issue more equity-like convertible debt.[3] An insignificant statistical relationship is inconsistent with the theories of Jensen and Meckling (1976) and Green (1984). Asset substitution happens because equity holders prefer to substitute more risky assets for less risky assets. The more risky the asset the larger is the upper tail of the return distribution. This

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undertaking discretionary investments which are profitable. The underinvestment problem is described briefly next in the introduction, and in section 3.3. The use of the proxy is described further in section 4.2.2.2.

[3] The asset substitution proxy of the firm's discretionary asset level is 1 - (net or gross fixed assets standardized by the book value of assets). Shome and Singh (1995) and Prowse (1990) proxy for asset substitution by the firm's discretionary asset level. They define the discretionary asset level as 1 - (gross fixed assets/total assets). The asset substitution problem is described briefly next in the introduction, and in section 3.4. The use of the proxy is described further in section 4.2.2.3.

increases the value of the equity holders' claim. Because equity holders only receive the upper tail of the return distribution as a residual claimant, they are not concerned with the lower tail of the return distribution. Thus, equity holders prefer to substitute risky assets (high variance projects) for less risky assets (low variance projects).

The remainder of this chapter is organized as follows. Section 2 contains a literature review. Section 3 contains the hypothesis formation of what influences managers when they set the equity value in a convertible debt issue. Section 4 discusses methodology and sampling. Section 5 provides the empirical results. Section 6 contains the conclusion.

2.0 Literature review

This section reviews the relevant survey literature, theory and empirical work concerning the issuance of convertible debt.

2.1 Survey literature on convertible debt issuance

Brigham (1966), Hoffmeister (1977) and Billingsley and Smith (1996) survey corporate managers to find out their motives for issuing convertible debt. Brigham (1966) surveys 42 firms which account for 76% of the funds raised by convertible debt from 1961 to 1963 and received responses from 22 firms. 16 firms or 73% were "primarily interested in obtaining equity". 15 firms or 68% felt convertible debt was a way of selling common equity above the existing market price. The remaining 6 firms or 27% used convertible debt to reduce the interest rate paid relative to straight debt.

The survey results of Brigham (1966) suggest managers use convertible debt to raise "delayed" equity. The rationale is the market currently underprices the firm's equity. In the future, the market will correctly price the stock and the convertible debt's conversion to equity will occur. The "delayed" equity argument does not differentiate whether the undervaluation is of the market in general or the firm's stock.

Hoffmeister (1977) surveys 69 firms which issued convertible debt from June 1970 to June 1972 and receives 53 usable questionnaires. The survey asked for the motivating influence for using convertible debt from six reasons and asked the respondents to list their top

three choices. 58% of the firms selected "to reduce the interest cost of the debt issue" as a top three choice with 30% selecting it as the top choice. 70% of the firms listed "to eventually shift this debt to common stock when stock prices rise" as a top three choice with 34% selecting it as the top choice.

Billingsley and Smith (1996) find that firms use the conversion value associated with the convertible debt to lower the interest rate paid relative to straight debt. They also show that managers use convertible debt to get delayed equity in the capital structure.

Overall, the survey literature indicates managers primarily issue convertible debt to obtain delayed equity at a price above the current price.

2.2 Theoretical literature on convertible debt issuance

The theoretical literature provides motivations for why a firm chooses to issue convertible debt. The motivations include signalling future operating performance, an alternative method of reducing wealth transfers from debt holders, reducing sub-optimal investment, reducing asset substitution agency costs, and underpricing of the firm's equity.

2.2.1 Signalling

If market prices do not reflect all information both public and private, then public actions of managers with private information convey information to the market. The managers' choice to raise external funds, the security characteristics, the amount of funds raised and the

choice of leverage may all convey information.

Ross (1977) presents a framework where leverage increases are credible signals, because false signalling results in a penalty to the manager. Higher quality firms have higher leverage due to higher earnings. Managers who falsely signal via leverage can incur the penalties associated with default which includes a reduction in the manager's authority and possible dismissal.

The signalling models of Kim (1990) and Stein (1992) both deal specifically with the issuance of convertible debt. Kim uses an equilibrium signalling model to explain the announcement reaction to the financing choice between debt, equity and convertible debt. Kim considers straight debt and equity as special cases of convertible debt. A straight debt issuance means issuing convertible debt with no equity option value. An equity issuance means issuing convertible debt who value is completely an equity option. In Kim's signalling model, managers signal earnings by their willingness to share the firm's future earnings with new security holders. The conversion price, which indicates the level of new equity shares contingently issued, sets the earning sharing level. Kim's model is analogous to Ross (1977) with managers signalling firm quality by increasing leverage. The higher the leverage the greater the firm's quality. In the context of Kim, the higher the debt proportion of the security's value the greater the firm's future earnings. With Kim's model (in the limit), firms with the highest future earnings issue straight debt and firms with the lowest future earnings issue equity. For convertible debt, the lower the conversion premium (the greater the equity option value) the lower the future earnings.

Stein (1992) presents a model where firms use convertible debt to signal firm quality

and issue "backdoor" or delayed equity. Firms use a convertible debt issue when information asymmetry of the firm's quality makes an immediate equity issue unattractive. Stein's model emphasizes the call provision of convertible debt and the role of financial distress in the credibility of the convertible debt signalling. In Stein's signalling model, good firms issue debt, medium firms issue convertible debt, and bad firms issue equity. For a firm desiring to issue equity, the market views a firm issuing convertible debt as being a higher quality than a firm making an immediate equity issue. The credibility of the delayed equity issuance comes from the managers incurring the penalty of default if they falsely signal. Stein's model is more general than the model of Kim (1990). Stein does not explicitly model the convertible debt's value as part equity and part debt. The model of Stein implies the more the convertible debt's value depends on debt the higher quality of the firm.

2.2.2 Sub-optimal investment

Convertible debt may reduce the sub-optimal investment problem due having to much debt ex-post. Stulz (1990) shows debt can mitigate the managerial incentive to overinvest, but at the cost of having underinvestment in certain states of nature. The underinvestment problem occurs from a firm having too much debt ex-post. If debt can be converted into equity, then the level of underinvestment can be reduced.

Myers (1977) shows how sub-optimal investments can occur with risky debt. Equity holders will not take positive NPV projects in certain situations with risky debt. The discretionary investment of equity holders results in sub-optimal investment since in some

states of nature the investment gains will accrue primarily to debt holders. The debt overhang or underinvestment problem is greater for firm's with more discretionary investment opportunities and with few assets in place. Callable convertible debt is a possible solution to the "debt overhang" problem. If the equity holders can credibly contract or inform the market of their intentions, then the market will impound the project's value into the stock price. Firms can then force conversion to equity by calling the bond. An alternative is equity holders can commit new funds to the growth opportunities. This is a credible signal to the market since the equity holders have wealth at risk. The market will incorporate the growth opportunities value into the firm's stock price and then the firm can force conversion.

2.2.3 Asset substitution

Reducing asset substitution agency costs may be a motivation for the issuance of convertible debt. Jensen and Meckling (1976) argue there is an optimal capital structure due to agency costs. Equity agency costs occur from the principal-agent relationship existing between managers and shareholders. Debt agency costs due to asset substitution result from debt holders charging higher ex ante interest rates as compensation for wealth transfer activities equity holders may undertake. Jensen and Meckling suggest convertible debt as a method of reducing agency costs between debt and equity holders. If the debt is convertible into equity, equity holders have less incentive to engage in wealth expropriation behavior. Convertible debt holders are less concerned with wealth transfers by equity holders given the ability to convert their security into equity. Green (1984) shows that debt which is convertible into equity or

debt with warrants will alter the equity payoff. The altering of the equity payoff structure changes the incentive of equity holders to take risk.

2.3 Empirical literature on convertible debt issuance

The empirical literature for convertible debt issuance has examined the issuance from several view points. Eckbo (1986) and Hansen and Crutchley (1990) examine earnings and convertible debt. Fields and Mais (1991) examine private placements and Janjigian (1985, 1987) examines leverage consequences of convertible debt financing. Davidson, Glascock and Schwarz (1995) examine signalling as a motive for issuing convertible debt.

2.3.1 Earnings

The issuance of a security may be revealing information regarding future earnings performance. Eckbo (1986), and Hansen and Crutchley (1990) have examined this issue empirically.

Eckbo (1986) examines firms issuing straight or convertible debt over the period 1961-81 for firms appearing on the 1982 Compustat Expanded Primary Secondary and Tertiary files. For convertible debt, Eckbo does not find a statistically significant relationship between abnormal earnings changes in years 0, +1, and +2, and announcement abnormal returns. For straight debt, Eckbo does find a statistically significant positive relationship between year +2 abnormal earnings and the announcement abnormal returns of straight debt. However, Eckbo

can not reject the hypothesis of the regression coefficients being jointly equal to zero.

Looking at a sample of large industrial firms Hansen and Crutchley (1990) find earnings decrease over the four years after a security issuance of debt, convertible debt or straight debt. Earnings decline most for firms issuing common stock, followed by convertible debt issuers and the least decline is for straight debt issuers. Firms with larger offerings have larger earnings declines. Hansen and Crutchley find a relationship between announcement period abnormal returns and both the security type issued and the offering size. They do not find a relationship between announcement period abnormal returns and abnormal earnings changes. They find a positive relationship between the offering size and the earnings decline subsequent to the security issuance.

2.3.2 Private placements

The majority of empirical work on convertible debt has involved public issuance of convertible debt. Fields and Mais (1991) filled a void in the literature by examining private placements. Fields and Mais (1991) find significant abnormal returns of 1.80% on the announcement of privately placed convertible debt. This result is in contrast to the significantly negative abnormal returns of public convertible debt issue studies such as Dann and Mikkelson (1984), Eckbo (1986), Mikkelson and Partch (1986), and Hansen and Crutchley (1990). Fields and Mais (1991) find a positive relationship between the announcement period abnormal returns and the issue size. They find an insignificant and positive relationship between the announcement period abnormal returns and the conversion premium.

2.3.3 Convertible debt's equity value and leverage changes

Janjigian (1985, 1987) looks at the leverage change associated with a convertible debt issue. He estimates the market's perception of the convertible debt's leverage value using market return data. Janjigian (1985, 1987) estimates a convertible debt's value as being between 40% to 70% equity. Industrial firms have more negative announcement period abnormal returns the greater the leverage decrease and the greater the proportion of the convertible debt estimated to be equity.

2.3.4 Signalling

Davidson, Glascock and Schwarz (1995) test whether the conversion price is a credible signal of future earnings (Kim's (1990) model) and whether convertible debt is a method of backdoor equity (Stein's (1992) model). Davidson, Glascock and Schwarz (1995) find evidence consistent with both hypotheses.

3.0 The question and formulation of the hypotheses

3.1 The question

This section develops the hypotheses dealing with the following question: What influences managers when they set the equity value in a convertible debt issue? Three different hypotheses are examined in addressing this question.

3.2 Future operating performance

Hypothesis One: The lower the expected future operating performance the higher the equity value set by managers in a convertible debt issue.

This hypothesis tests the theories of Ross (1977), Kim (1990) and Stein (1992). Ross (1977) presents a framework where leverage increases are credible signals of firm quality. Higher quality firms have higher leverage due to higher earnings. Leverage increases are credible signals because false signalling may result in the firm defaulting on its debt. If the firm does default on its debt, the manager may be penalized by a reduction in decision making authority and possible dismissal. The framework of Ross (1977) predicts a higher future operating performance will result in the issuance of more debt-like convertible debt.

In Kim's (1990) model, managers provide information by their willingness to share the firm's future earnings with new security holders. Kim's model is similar to the model of Ross

(1977) where higher quality firms have higher leverage. In the context of Kim's model, the higher the debt proportion of the new security's value the greater the firm's expected future operating performance. With Kim's model (in the limit), firms with the highest expected future operating performance issue straight debt and firms with the lowest expected future operating performance issue equity. In other words, the greater the equity value of the security issued the lower the future operating performance. Thus, Kim's model predicts the higher the convertible debt's equity value at issuance the lower the firm's future operating performance.

Stein's (1992) model suggests the more the convertible debt's value depends on equity, the lower the firm's quality and expected future operating performance. In Stein's model, investors infer a firm's quality from the security issued with good quality firms issuing debt, medium quality firms issuing convertible debt, and bad quality firms issuing equity. The higher the firm's quality, the higher the expected future operating performance. Firms with a higher expected future operating performance will have a greater capacity to support a more debt-like security issuance. Also, they will have a lower chance of financial distress. If investors associate a security type with a certain quality firm, then a good quality firm issuing debt issues a correctly priced security. However, a lower quality firm issuing debt will issue an overpriced security. If investors knew the firm's true quality, they would assign a lower value to a new debt issue by a lower quality firm. However, firms correctly signal their firm's quality by the security issued since financial distress costs exceed the benefits from selling an overpriced security.

In summary, the models of Ross (1977), Kim (1990) and Stein (1992) predict the more equity-like the convertible debt issued the greater the subsequent operating performance

decrease.

3.3 Underinvestment

Hypothesis Two: Manager issue more equity-like convertible debt if the firm has a greater potential for underinvestment.

This hypothesis tests the theories of Myers (1977) and Stulz (1990). Myers (1977) suggests that firms with more growth options will issue a more equity-like convertible debt security to help mitigate the underinvestment problem. The underinvestment or sub-optimal investment problem can occur from equity holders not taking positive NPV projects when the investment gains will accrue to debt holders. The discretionary investment of equity holders can result in underinvestment with the underinvestment problem being greater for firm's having more discretionary investment opportunities. Callable convertible debt is a possible solution to the underinvestment problem. The ability to force the conversion of convertible debt into equity will allow equity holders to invest where they would not otherwise. If the equity holders can credibly contract or inform the market of their intentions, then the market will incorporate the project's value into the stock price. Firms can then force conversion of the convertible debt to equity by calling the bond.

Stulz (1990) shows that equity holders can use debt to limit a manager's discretionary investment in projects which reduce shareholder wealth. A manager must make timely debt payments or incur the penalties of default which may include the manager's dismissal. Thus,

debt helps mitigate the incentive of a manager to invest in negative NPV projects that reduce shareholder wealth, but may benefit the manager's compensation or career. The expense of reducing the managerial incentive to invest in negative NPV projects is that a manager may not take some positive NPV projects. The result is underinvestment due to forgoing some positive NPV projects.

In summary, Myers (1977) and Stulz (1990) predict that firms with a higher potential for an underinvestment problem will issue a more equity-like convertible debt security.

3.4 Asset substitution

Hypothesis Three: Manager issue more equity-like convertible debt when the firm has a greater potential for asset substitution.

Since equity holders are residual claimants receiving only the upper tail of the return distribution, they prefer risky assets (high variance projects) to less risky assets (low variance projects). Asset substitution happens because equity holders prefer to replace less risky assets with more risky assets to the increase the upper tail of the return distribution. This increases the value of the equity holders claim due to a wealth transfer from debt holders. Because debt holders know of the asset substitution incentive of equity holders, debt holders will seek ex-ante compensation for the expected asset substitution. However, if debt holders can convert to equity, then the asset substitution incentive of equity holders is mitigated which reduces the asset substitution agency costs.

Jensen and Meckling (1976) and Green (1984) suggest that firms with a greater potential for an asset substitution problem will issue a more equity-like convertible debt security. Jensen and Meckling (1976) argue there is an optimal capital structure due to agency costs. Equity agency costs occur from the principal-agent relationship existing between managers and shareholders. Debt agency costs due to asset substitution result from debt holders charging higher ex-ante interest rates as compensation for wealth transfer activities taken by equity holders. Jensen and Meckling suggest convertible debt as a method of reducing asset substitution agency costs between debt and equity holders. If the debt is convertible into equity, equity holders have less incentive to engage in wealth expropriation behavior. Convertible debt holders are less concerned with wealth transfers by equity holders given the ability to convert their security into equity. Green (1984) hypothesizes that equity holders can alter the equity payoff and reduce asset substitution agency costs through a debt issue that is convertible to equity.

In summary, Jensen and Meckling (1976) and Green (1984) predict that firms with a greater potential for an asset substitution problem will issue a more equity-like convertible debt security.

4.0 Sample selection and methodology

4.1 Convertible debt issuance sample

The convertible debt issues in the sample are the underwritten public offerings for cash from 1980 to 1987 appearing on the Securities and Exchange Commission's Registered Offerings of Securities tape.[4] Sampling constraints requires the firms to have Compustat data, CRSP stock data, and an announcement on the Dow Jones News Wire.[5] The sample excludes utilities and financial firms. Firms having a shelf registration, dual classes of shares, unit offerings, rights offered, exchange offered, puttable convertible debt, conversion restrictions, etc. do not appear in the sample. Table 1 presents the impact of the forementioned restrictions on the sample. The final sample contains 302 announcements for 263 different firms. Six firms have three announcements, 27 firms have two announcements and 230 firms have one announcement. 192 of the announcements are for NYSE or AMEX listed firms, and 110

[4] The sample ends in 1987 due to the differing characteristics of the convertible debt issued after 1987. For example, Kang and Lee (1996) use a sample of 91 convertible debt issues issued from 1988-1992. There are 56 coupon bonds (62% of the sample) and 35 zero-coupon bonds (38% of the sample). In my sample, there are no zero-coupon bonds. In Kang and Lee's (1996) sample, all the zero-coupon bonds and 32 coupon bond (74% of the sample) had a put feature. It is not explained whether this put feature is an "event risk" put or the bond is puttable back to the firm at specific times. The zero-coupon bonds may be puttable at specific dates (i.e. Merrill Lynch's LYONs (Liquid Yield Option Notes)). In my sample, four puttable bonds were excluded and there were no "event risk" puttable bonds in my initial sample.

[5] The 1994 Compustat (Standard and Poor's) Primary, Supplementary and Tertiary file, the Research file, and the Full Coverage file are used for financial data. Stock return data is from the CRSP (Center for Research in Security Prices at the University of Chicago Graduate School of Business) files covering NYSE, AMEX and NASDAQ firms.

announcements for NASDAQ listed firms.[6] Tables 2 presents the top ten industries represented in the sample by two digit SIC codes.[7] Table 3 presents the year of issuance for the sample. The convertible debt issues are all fixed non-zero coupon paying securities with a fixed conversion price. The gathering of conversion price information is from the Dow Jones News Wire issuance announcement, Moody's Bond Record, Standard & Poor's Bond Record, and Moody's Manuals.

4.2 Regression specification

4.2.1 Dependant variables - convertible debt equity value proxies

There are three different variables used to proxy for the equity level in a convertible debt issue.[8] The first proxy is the conversion premium which is the percentage the conversion

[6] For the 192 NYSE/AMEX listed firm announcements, five firms have three announcements, 19 firms have two announcements, and 139 firms have one announcement. For the 116 NASDAQ listed firm announcements, one has three announcements, eight firms have two announcements and 91 firms have one announcement.

[7] Two digit SIC codes from Compustat are used.

[8] Kang and Lee (1996) document an underpricing at the issuance of an average excess return of 1.11% for a sample of convertible debt from 1988-1992. In Kang and Lee's (1996) sample of 91 issues, there are 56 coupon bonds (62% of the sample) and 35 zero-coupon bonds (38% of the sample). In my sample, there are no zero-coupon bonds. In Kang and Lee's (1996) sample, all the zero-coupon bonds and 32 coupon bond had a put feature (74% of the sample). It is not explained whether this put feature is an "event risk" put or the bond is puttable back to the firm at specific times. In my sample, four puttable bonds were excluded and there were no "event risk" puttable bonds in my initial sample. Kang and Lee (1996) use the Wall Street Journal as their source for the first end of day bond price. Kang and Lee (1996) note that underwriters may not be reporting trading activity of the issue even after trading on an exchange starts. Kang and Lee (1996) say one motivation for this may

price is above the stock price on issue day -1.[9] Field and Mais (1991) use the conversion premium as a proxy for the degree the convertible debt is out-of-the-money at issuance. The more the convertible debt is out-of-the-money the smaller is the equity option value. All other things being equal, a higher conversion premium means the equity option value is lower since it is farther out-of-the-money. The conversion premium (CP) as a proxy suffers from the problem of being an incomplete measure of the equity option value. The expected maturity of the debt influences the equity option value. The expected maturity of the convertible debt is a function of the probability and timing of bankruptcy, a forced conversion to equity, a voluntarily conversion to equity and a redemption in cash. The mean value of the conversion premium is 21.59% and the median is 21.43%.

The second equity proxy is SINTBBB which is the interest rate on the convertible debt less the Moody's BAA yield in the issuance month standardized by the Moody's BAA yield in the month of issuance. The mean value of the interest rate on the convertible debt less the Moody's BAA yield in the issuance month is -4.44 and the median is -4.72%. The mean value of SINTBBB is -.33 and the median is -.36. The more negative is SINTBBB the greater the convertible debt's equity value.[10] The rating of most of the convertible debt issues is BAA, less

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be to maintain a higher bid-ask spread for the bond.

[9] The conversion premium in percentage terms is also defined as the bond price divided by the conversion value. At issuance, the bond's price equals the product of the conversion price and the number of shares received in conversion. The conversion value is the product of the market price and the number of shares received in conversion. At issuance, the definition used in this paper and the typical definition of the conversion premium associated with convertible debt used after issuance are the same.

[10] Firms issue 288 of 302 of the issuances at par with 13 issued at a discount and none issued at a premium.

than BAA or unrated. The issue ratings are shown in Table 4.

The third equity proxy is SDV which is the straight debt value less the offering price standardized by the offering price. The straight debt value is the present value of the interest payments and par value discounted at the Moody's BAA rate in the month of issuance. The straight debt value is calculated by discounting the cashflows assuming the convertible debt remains held as a debt instrument until maturity. The mean value of SDV is -.31 and the median is -.34. The more negative is SDV the greater the convertible debt's equity value.

4.2.2 Independent variables

4.2.2.1 Operating performance

The measure of operating performance is operating income before depreciation and interest expense standardized by asset book value or sales. Yearly changes in operating performance are the difference in operating performance from one year to the next. Although asset book value is usually used in the finance literature to standardized operating income before depreciation and interest expense to create an operating performance measure, asset book value suffers from being a historical measure of asset cost less accumulated deprecation. This becomes more of a concern given the differing levels of inflation which occur during the sample period of 1980-1987.[11] Thus, an operating performance measured based on sales will

[11] Although the convertible debt sample covers 1980 to 1987, the regressions use data from Year -1 to Year 5. The announcement year occurs between Year -1 and Year 0. Thus, the effective period of data usage is from 1979-1992 for the operating performance measures.

help reduce apparent operating performance increases that are due to inflation.

4.2.2.2 Underinvestment proxy

Firms with more growth opportunities have a greater potential for underinvestment due to the discretionary investment associated with the growth opportunities. Tobin's Q proxies for the level of growth opportunities in the firm. The specification of Q is the sum of the book value of long-term debt, the preferred stock liquidation value, and the equity market value, divided by the asset book value. This proxy for Tobin's Q has been previously used by Bayless and Chaplinsky (1996), and Chaplinsky and Ramchand (1996).

4.2.2.3 Asset substitution proxies

Assets which are discretionary are more subject to the asset substitution activities of managers relative to non-discretionary assets. Shome and Singh (1995) and Prowse (1990) proxy for asset substitution costs by the firm's discretionary asset level. They define the discretionary asset level as 1 - (gross fixed assets/total assets). The idea behind this proxy is that the greater the firm's discretionary asset level the easier it is for managers to engage in asset substitution activities. In this study, the firm's discretionary asset level is proxied by two different methods using gross or net plant, property and equipment (gross or net PPE). The proxy is 1 - (gross or net PPE/assets).

4.2.2.4 Control variables

The natural log of the asset book value in year -1 helps control for firm size effects. The binary issue year variables assist in controlling for issue year effects related to general economic and market conditions. The binary variables for the Moody's rating of the issue serves to control for default risk and measurement error in the proxies of SDV and SINTBBB. The Moody's rating binary groups are A or above, BAA, BA, B and unrated/not rated.[12]

4.2.3 Regression model

Equity value proxy = INTERCEPT

$+ \alpha_1$ OI (Year -1 to Year 0 change) $+ \alpha_2$ OI (Year 0 to Year 1 change)

$+ \alpha_3$ OI (Year 1 to Year 2 change) $+ \alpha_4$ OI (Year 2 to Year 3 change)

$+ \alpha_5$ OI (Year 3 to Year 4 change) $+ \alpha_6$ OI (Year 4 to Year 5 change)

$+ \alpha_7$ OI (Year -1)

$+ \beta$ Q

[12] Excluding the unrated or not rated issuances from the regressions does not qualitatively effect the results.

+ Γ 1 - (PPE/assets)

+ δ Size, Year, and Rating Variables

Dependent Variables:

Equity value proxy =

conversion premium, SINTBBB or SDV

Independent Variables:

Operating Performance Variables :

OI (Year -1), (Year -1 to Year 0 Change), (Year 0 to Year 1 Change), (Year 1 to Year 2 Change), (Year 2 to Year 3 Change), (Year 3 to Year 4 Change), (Year 4 to Year 5 Change)

OI = operating performance is operating income before depreciation and interest expense standardized by sales or asset book value; OIS and OIA are operating income before depreciation and interest expense standardized by sales and asset book value respectively;

Underinvestment Variables :

Q (Year -1), (Year 0) and (Year -1 to Year 0 Change)

Q = the sum of the book value of long-term debt, the preferred stock liquidation value, and the equity market value, divided by the asset book value

Asset Substitution Variables :

1 - (PPE/assets) (Year -1), (Year 0) and (Year -1 to Year 0 Change)

PPE = net or gross plant, property and equipment standardized by the book value of assets

Size, Year, and Rating Variables :

natural log of the asset book value in year -1, binary variables for the year of issuance, and binary variables for the issue's Moody's rating[13]

4.2.3.1 Operating performance coefficient predictions

The yearly operating performance change regression coefficients are α_1 to α_6. It is expected that some of the coefficients, α_1 to α_6, will be positive and significant. The more negative the equity proxy the more equity-like the convertible debt offered. Thus, if managers offer more equity-like convertible debt when they expect lower future operating performance, then we will have a positive regression coefficient on the operating performance proxies. A positive significant coefficient in a given change year implies a change in the relationship between the equity proxy and the operating performance level which starts in that year and

[13] The Moody's rating binary groups are A or above, BAA, BA, B and unrated/not rated.

continues in subsequent years also. For example, if the coefficient for the operating performance change from year 1 to year 2 is significant and positive, this implies a change in the operating performance level relationship with the equity proxy starting in year 2 and it continues through year 5.

4.2.3.2 Underinvestment proxy coefficient predictions

It is predicted that firms with more growth opportunities will issue a more equity-like convertible debt security. Firms with more growth opportunities have a greater potential for having an underinvestment problem. The lower the equity proxy's value the more equity-like the convertible debt. Thus, we expect that low values of the equity proxy will be associated with high values of the underinvestment proxy. It is predicted that β will have a negative and significant coefficient. Underinvestment is proxied by three different methods which are Q in Year -1 (before the issuance), Year 0 (after the issuance), and the change in Q from Year -1 to Year 0 while controlling for Year -1 Q. Bradley, Jarrell and Kim (1984), Long and Malitz (1985), and Prowse (1990) examine the relationship between absolute levels of debt in a firm's capital structure and a firm's growth options. If we view convertible debt as marginal financing, then it may be reasonable to examine marginal changes in growth opportunities.[14] However, Jung, Kim and Stulz (1996) and Bayless and Chaplinsky (1991) examine the debt-

[14] The mean convertible debt issue size is $58.04 million and the median issue size is $40 million. The change in debt (long-term debt plus debt in current liabilities) from Year -1 to Year 0 (the issuance

equity choice by using logit models with underinvestment proxies as independent variables. In those two papers, they are examining a marginal financing choice by using a non-marginal underinvestment proxy. If the change in the issuance year underinvestment proxy is related to how a manager sets the equity value in a convertible debt issue, omitting the variable in the regression will cause an omitted variables bias. Thus, underinvestment is proxied by three different methods which are Q in Year -1 (before the issuance), Year 0 (after the issuance), and the change in Q from Year -1 to Year 0 while controlling for Year -1 Q.

4.2.3.3 Asset substitution proxy coefficient predictions

Jensen and Meckling (1976) and Green (1984) predict that firms with a greater potential for an the asset substitution problem will issue a more equity-like security. The more discretionary assets a firm has the easier it is for the managers to substitute the current assets with more risky assets. Firms with more discretionary assets will have a high value for the asset substitution proxy. The more equity-like the convertible debt issue the more negative are the equity proxies. We should expect high values of the asset substitution proxy are associated with low values of the equity proxy. Thus, the coefficient Γ which is associated with the asset substitution proxy is predicted to be significant and negative. Asset substitution is proxied by 1- (gross or net PPE/assets). The three specifications used are the asset substitution proxy in Year -1 (before the issuance), Year 0 (after the issuance), and the change in from Year -1 to Year 0 while controlling for Year -1. The three alternative specifications of the asset

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year) has a mean of $59.63 million and a median of $32.39 million.

substitution proxy is done help avoid an omitted variables bias and in the interest of checking the regressions for robustness.

5.0 Empirical results for the issuance of convertible debt

5.1 Descriptive statistics

5.1.1 Descriptive statistics of the securities issued and sample firms

Table 5 presents the descriptive statistics on the securities issued and sample firm characteristics. The average gross amount of capital raised is $58.49 million with an average coupon rate of 8.84%. The average yield rate in the issuance month for bonds with a rating of AAA by Moody's is 11.65% and 13.36% for bonds with a rating of BAA by Moody's. The maturity of the convertible debt is on average 22.31 years with the time to the first call being 0.80 years or 9.6 months. However, the median time of call protection is .08 years or about 1 month. The average conversion price is 21.83% above the price one day before issuance. The mean level of dilution (potential conversion of shares divided by the shares outstanding) is 18.96% and the relative issue size (gross amount raised divided by the market value of equity) is 22.72%.

5.1.2 Descriptive statistics of the regression variables

Table 6 presents the descriptive statistics for the regression variables. The dependant

variables are the equity value proxies CP (the conversion premium), SDV and SINTBBB.[15] [16] The average conversion price is 21.83% above the price one day before issuance. The mean value of SINTBBB is -0.3372 and the mean value of SDV is -0.3092. The operating performance hypothesis is tested using the post-issuance operating performance changes. The operating performance measure based on the book value of assets shows a post-issuance operating performance decrease with some of the changes being significant and negative. The operating performance measure based on the book value of assets in Year -1 (the year before the issuance) has a mean of 16.52% and a median of 16.02%. The operating performance measure based on sales shows decreasing operating performance, but only one year is significantly negative. The operating performance measure based on sales in Year -1 (the year before the issuance) has a mean of 16.13% and a median of 13.31%. The underinvestment hypothesis is tested with Q as a proxy for growth opportunities.[17] The sample firms show a significant increase in Q in the issuance year (Year -1 to Year 0). In Year -1, Q has an average value of 1.34 and a median value of 1.10. In Year 0, Q has an average value of 1.49 and a median of 1.36. The asset substitution hypothesis is tested with the firm's discretionary asset

[15] SDV is the offering price less the straight debt value standardized by the offering price. The straight debt value is the present value of the interest payments and par value discounted at the Moody's BAA rate in the month of issuance. The straight debt value is calculated by discounting the cashflows assuming the convertible debt remains held as a debt instrument until maturity. The more negative is SDV the greater the convertible debt's equity value.

[16] SINTBBB is the interest rate on the convertible debt less the Moody's BAA yield in the issuance month standardized by the Moody's BAA yield in the month of issuance. The more negative is SINTBBB the greater the convertible debt's equity value.

[17] The specification of Q is the sum of the book value of long-term debt, the preferred stock liquidation value, and the equity market value, divided by the asset book value. This proxy for Tobin's Q has been previously used by Bayless and Chaplinsky (1996), and Chaplinsky and Ramchand (1996).

level. This is proxied by 1 - (gross or net PPE standardized by the asset book value).[18] There is a significant increase in the discretionary asset proxy in the issuance year (Year -1 to Year 0). The gross PPE based asset substitution proxy has an average value of 0.39 in Year -1 and 0.42 in Year 0. The net PPE based asset substitution proxy has an average value of 0.59 in Year -1 and 0.60 in Year 0.

5.2 Regression results

5.2.1 Operating performance hypothesis results

The results appear in Table 7 for the equity proxies regressed on the operating performance changes based on standardization by the asset book value. In Table 7, the control variables for underinvestment and asset substitution are based on their Year -1 values. The equity proxies provide evidence of a relationship between the equity level in a convertible debt security at issuance and future operating performance changes. I see evidence of lower future operating performance changes resulting in the issuance of a more equity-like convertible debt security. The lower the equity proxy's value the more equity-like the convertible debt. Table 7 shows that all the equity proxies have positive and significant relationships with the operating performance changes from year 2 to year 3. The results are consistent with Ross (1977) where firms' signal their quality by leverage. The results are also consistent with the theories of Stein

[18] PPE is plant, property and equipment. Shome and Singh (1995) and Prowse (1990) proxy for asset substitution costs by the firm's discretionary asset level. They define the discretionary asset level as 1 - (gross fixed assets/total assets).

(1992) and Kim (1990). The results in Table 7 are confirmed by using alternative specifications of the control variables for underinvestment and asset substitution. These results are presented in Tables 9 and 11. Table 9 uses the control variables for underinvestment and asset substitution specified as the Year -1 values and the change from Year -1 to Year 0. Table 11 uses the control variables for underinvestment and asset substitution specified as the Year 0.

Table 8 presents confirmatory evidence of the operating performance results in Table 7. In Table 8, operating performance is defined as operating income before depreciation and interest expense standardized by sales, and the control variables for underinvestment and asset substitution based on their Year -1 proxy values. The results in Table 8 are confirmed by using alternative specifications of the control variables for underinvestment and asset substitution. These results are presented in Tables 10 and 12. Table 10 uses the control variables for underinvestment and asset substitution specified as the Year -1 values and the change from Year -1 to Year 0. Table 12 uses the control variables for underinvestment and asset substitution specified as the Year 0.

5.2.2 Underinvestment hypothesis results

Table 7 (asset book value based operating performance variables) and Table 8 (sales based operating performance variables) present the results with Year -1 Q with the asset substitution control variable for Year -1. The greater the growth opportunities the more likely there will be underinvestment. This is due to the discretionary investment needed to take

advantage of the growth opportunities. I predict that firms with more growth opportunities issue more equity-like convertible debt. The conversion premium is significantly and negatively related to Year -1 Q. This result is consistent with the hypothesized result of a negative relationship between the issue year change in Q and the conversion premium. This result indicates that managers issue more equity-like convertible debt when there is an increasing potential for an underinvestment problem. SDV and SINTBBB have negative significant coefficients on Year -1 Q in Table 8 (sales based operating performance regressions), and negative insignificant coefficients in Table 7 (asset based operating performance regressions).[19]

It may be the case that the incremental change in the underinvestment proxy is a factor in how the equity value is set in a convertible debt issue. If we view the convertible debt issued as marginal financing, then both the absolute level and the change in the year of issuance may both contribute to the decision of how the equity value is set. Two alternative specifications are used. The first alternative specification uses the change in from Year -1 to Year 0, and Year -1 Q. The second alternative specification uses Year 0 Q.

Table 9 (asset book value based operating performance variables) and Table 10 (sales based operating performance variables) present the results with Year -1 Q and the change from Year -1 to Year 0 with the asset substitution control variables for Year -1 and the change from Year -1 to Year 0. Tables 9 and 10 both show that the conversion premium is not statistically related as predicted to the underinvestment proxy. This result is in contrast to the results in

[19] The regressions were re-done by changing the asset substitution proxy from using only Year -1 to using both Year -1 and the change from Year -1 to Year 0. This was done to see if the asset substitution variables were responsible for the inconsistent regression results. The results were not found to be influenced by how the asset substitution control variables are specified.

Tables 7 and 8 which use only Year -1 underinvestment and asset substitution variables. The difference in the results may be due to a mispecification of the regression model when using only Year -1 underinvestment and asset substitution variables.[20] [21] Tables 9 and 10 both show that the equity proxies SDV and SINTBBB are negatively and significantly related to the underinvestment proxy as predicted. The results in Tables 9 and 10 are confirmed by Table 11 and 12 which have the underinvestment and the control variable for asset substitution specified as Year 0. The results in Tables 9 and 11 are in contrast to the results in Table 7. Tables 7, 9, and 11 all use the asset based operating performance measure. The difference between the tables is how the underinvestment variable and the control variable for asset substitution are specified. The results indicate that both the level of growth opportunities and the issuance year change in growth opportunities influence how the equity value is set in a convertible debt issue.

In summary, the overall results indicate that firms issuing more equity-like convertible debt have more growth opportunities which increases the potential for underinvestment. The results are consistent with Myers (1977) and Stulz (1990).

5.2.3 Asset substitution hypothesis results

[20] See previous footnote.

[21] The regressions were re-done by having the asset substitution proxy as Year -1 as opposed to include the change from Year -1 to Year 0 with Year -1. In these regressions, underinvestment was specified as Year -1 Q and the change in Q from Year -1 to Year 0. This was done to see if the asset substitution variables were responsible for the inconsistent regression results. The results were not found to be influenced by the asset substitution variable specification.

Table 7 (asset book value based operating performance variables) and Table 8 (sales based operating performance variables) present the results with the Year -1 asset substitution proxy with the underinvestment control variable for Year -1. The asset substitution proxy is specified two different ways. The first asset substitution specification is 1 - (Gross PPE/Assets). The second asset substitution specification is
1 - (Net PPE/Assets). In Tables 7 and 8, it is shown that the equity proxies do not have a statistical relationship with either specification of the asset substitution proxies based on the Year -1 values. This is inconsistent with Jensen and Meckling (1976) and Green (1984).

The results in Table 7 and 8 are confirmed by using alternative specifications of asset substitution and the control variable for underinvestment. These results are presented in Tables 9 and 11 (asset book value based operating performance variables), and Table 10 and 12 (sales based operating performance variables). Tables 9 and 10 uses the control variables for underinvestment and asset substitution specified as the Year -1 values and the change from Year -1 to Year 0. Tables 11 and 12 uses the control variables for underinvestment and asset substitution specified as Year 0. In Tables 9 and 10, there is a negative statistically significant relationship between the equity proxy SINTBBB and the change from Year -1 to Year 0 for the asset substitution proxy 1 - (Gross PPE/Assets) at the .08 level of significance. All the other coefficients for the asset substitution proxies in Tables 7, 8, 9, 10, 11 and 12 are insignificantly related to the equity proxies.

Overall, the results are inconsistent with the predictions of Jensen and Meckling (1976) and Green (1984) that the greater the potential for asset substitution, the more equity-like the convertible debt issued.

6.0 Conclusion

This chapter focuses on what factors influence managers when they set the equity value in a convertible debt issue. In contrast to a traditional debt or equity issue, the managers must set the debt and equity values in a convertible debt issue. I examined three hypotheses to address this question and find support for the operating performance and underinvestment hypotheses. I find no empirical support for the asset substitution hypothesis.

I find evidence that firms issuing more equity-like convertible debt have greater decreases in future operating performance. This is consistent with the theories of Ross (1977), Kim (1990) and Stein (1992). I provide empirical support that underinvestment concerns influence how managers set the equity value in a convertible debt issue. This result is consistent with Myers (1977) and Stulz (1990). Firms issuing more equity-like convertible debt have a greater potential for underinvestment in the issuance year. I do not find empirical support that asset substitution concerns influence managers when they set the equity value in a convertible debt issue. Not finding a significant relationship between the asset substitution proxies and the equity value proxies is inconsistent with the theories of Jensen and Meckling (1976) and Green (1984).

The overall implication of this research is that managers appear to consider future operating performance and underinvestment concerns when setting the equity value in a convertible debt issue. Managers likely focus on future operating performance, because the firm's future operating performance will be what enables the managers to make timely debt payments. Failure to make timely debt payments can result in the manager having their

decision making authority limited or eliminated completely by being fired. Also, managers probably integrate underinvestment concerns into how they set the equity value in the convertible debt, because of how underinvestment can effect the managers. Underinvestment comes from forgoing profitable projects. If the profitable projects were taken, the firm's stock price would be higher. Managers who fail to take the firm's profitable projects will be replaced with new managers by the shareholders or by another firm in a takeover. Also, managers generally own the firm's stock and so they will bear some of the underinvestment cost along with other shareholders. In addition, managers usually have some part of their compensation package, like stock options, linked to the firm's stock price performance.

In summary, the empirical evidence supports the conclusion that the firm's expected future operating performance and the increased potential for underinvestment influences managers when they set the convertible debt's equity value. Evidence is not found that asset substitution concerns influence managers setting of the equity value in a convertible debt issue.

Chapter 2 Tables

Table 1

Impact of the sampling restrictions on the convertible debt issuance sample

Sampling characteristic	Sample size
Public offerings as listed on the ROS tape for convertible debt from 1980-1987	522
Underwritten offerings	498
Data on CRSP and Compustat, but may be incomplete data	473
Dow Jones News Wire announcement	418
Announcements not dropped for being a shelf offering, having dual classes of shares, etc. *	363
Announcements for firms not in SIC codes 6000-6999 (financial firms) and 4900-4999 (regulated utilities) **	302
Final sample	302

* - The decrease from 418 announcements for the Dow Jones New Wire to 363 announcements for those announcements not dropped for various reasons is accounted for in the continuation of this table on the next page.

** - For announcements of firms not in SIC code 6000-6999 (financial firms) and 4900-4999 (regulated utilities) there were 302 announcements left from the previous sample of 363 firms. Excluding SIC code firms 6000-6999 involved 54 announcement and excluding SIC code firms 4900-4999 involved 7 announcements.

Table 1 (continued)

Impact of the sampling restrictions

The decrease from 418 announcements for the Dow Jones News Wire sample to 363 announcement for those announcements not dropped for various reasons is accounted for below.

Reason for dropping	Number dropped
Firm has more than one class of stock (two firms, Comcast and Wang, account for 9 of these)	20
Exchangeable into another firm's stock	10
Shelf registration	5
Puttable	4
Exchange offered (improper coding on the ROS tape)	3
Original registered as common stock	2
Rights offered	2
Adjustable interest rate	2
Offered as part of a unit	2
Non-convertible debt (improper coding on the ROS tape)	1
Converts into preferred stock	1
Originally registered as straight debt	1
Adjustable conversion price	1
Limited conversion period	1
Total	55

Table 2

Sample industries

Top 10 2-digit SIC code industries in the sample

2 Digit SIC Code	Industry Name	Number of Observations	Percentage of Sample	Percentage of Sample
36	Electrical Equipment Excluding Computers	30	9.9%	9.9%
35	Industrial and Commercial Machinery, Computer Equipment	28	9.3%	19.2%
80	Health Services	19	6.3%	25.5%
38	Measurement Instruments, Photographic Goods, and Watches	18	6.0%	31.5%
45	Air Transportation	16	5.3%	36.8%
13	Oil and Gas Extraction	13	4.3%	41.1%
37	Transportation Equipment	13	4.3%	45.4%
53	General Merchandise Stores	10	3.3%	48.7%
73	Business Services	10	3.3%	52.0%
58	Eating and Drinking Places	9	3.0%	55.0%

Table 3

Issuance year

Year	Number Issued that Year	Percentage of the Total Sample	Cumulative Number Issued	Cumulative Percentage of the Total Sample
1980	55	18.2	55	18.2
1981	34	11.3	89	29.5
1982	49	16.2	138	45.7
1983	45	14.9	183	60.6
1984	15	5.0	198	65.6
1985	37	12.3	235	77.8
1986	33	10.9	268	88.7
1987	34	11.3	202	100.0

Table 4

Moody's Ratings of the Issues

The Moody's rating is the rating in the Moody's Bond Record in the first three months after issuance. Those convertible debt issues not found in the Moody's Bond Record in the first three months after issuance are considered to have an "unknown" rating. "Not Rated" mean they were listed in the Moody's Bond Record with a rating of "NR" which means "Not Rated."

Rating	Observations	Percentage	Cumulative Observations	Cumulative Percentage
AA	3	1.0%	3	1.0%
A	16	5.3%	19	6.3%
BAA	41	13.6%	60	19.9%
BA	79	26.2%	139	46.0%
B	103	34.1%	242	80.1%
Not Rated	35	11.6%	277	91.7%
Unknown	25	8.3%	302	100.0%

Table 5

Descriptive statistics of the convertible debt issued
and the issuing firms

Characteristics of the convertible debt issued

Item	Obs	Mean	Median
Gross amount raised (millions of dollars)	302	58.04	40.00
Coupon interest rate	302	8.86%	8.75%
AAA Moody's yield	302	11.31%	11.73%
BAA Moody's yield	302	13.35%	13.69%
Coupon rate - BAA Moody's yield	302	-4.44%	-4.72%
Coupon rate - BAA Moody's yield standardized by the BAA Moody's yield	302	-.33	-.36
Maturity from issue (years)	302	22.24	24.98
Time to first call from issue (years)	302	0.79	0.08
First call price	302	107.94	108.25
Conversion premium (price used to calculate is issue day -1)	300	21.59%	21.43%
Dilution (conversion shares to shares outstanding)	298	19.27%	15.63%
Relative issue size (gross amount raised to market value of equity)	298	23.13%	18.65%

Table 5 (continued)

Descriptive statistics of the convertible debt issued and the issuing firms

Characteristics of the firms issuing convertible debt

Item	Obs	Mean	Median
Market value of equity (in millions of dollars - price used to calculate is issue day -1)	298	563.01	221.26
Long-term debt to book value of assets at the end of the fiscal year before issuance	294	29.18%	27.78%
Book value of assets at the end of the fiscal year before issuance (in millions of dollars)	294	629.19	208.88
Operating performance at the end of the fiscal year before the issuance (operating income before deprecation and interest expense standardized by the book value of assets)	294	16.52%	16.02%

Table 6

Descriptive statistics of the regression variables

Operating performance is the operating income before depreciation and interest expense standardized by the asset book value (OIA) or sales (OIS). The underinvestment proxy is Q. Q is specified as the sum of the book value of long-term debt, the liquidating value of preferred stock, and the market value of equity, divided by the book value of assets. The asset substitution proxy is 1 - (gross or net plant, property and equipment standardized by asset book value). The dependant variables are the equity proxies CP, SDV and SINTBBB. CP is the convertible debt's conversion premium. SDV is the offer price less the straight debt value standardized by the offering price. The straight debt value is the present value of the interest and principal discounted at the Moody's issue month BAA yield assuming the bond is held to maturity. SINTBBB is the convertible debt's coupon rate less the Moody's BAA yield standardized by the Moody's BAA yield. The change variables are tested to see if they are significantly different from zero. The mean test is a t-test. The median test is a sign test.

Equity Value Proxies

Dependant Variables	Obs	Mean	25 % Quartile	Median	75 % Quartile
CP	300	0.2159	0.1445	0.2143	0.2852
SDV	302	-0.3092	-0.3744	-0.3382	-0.2704
SINTBBB	302	-0.3347	-0.3926	-0.3606	-0.3028

Firm size

Independent Variable: Firm size	Obs	Mean	25 % Quartile	Median	75 % Quartile
Asset Book Value Year -1 (in millions of dollars)	294	629.19	75.85	208.88	534.59

Table 6 (continued)

Operating Performance (Operating Income Standardized by Asset Book Value)

Independent Variables: Operating Performance	Obs	Mean	25 % Quartile	Median	75 % Quartile	T-test P-value	Rank sign test P-value
OIA Year -1	294	0.1652	0.1201	0.1602	0.2053		
OIA Year -1 to Year 0 Change	290	-0.0190	-0.0458	-0.0140	0.0099	.00	.00
OIA Year 0 to Year 1 Change	273	-0.0092	-0.0325	-0.0018	0.0165	.01	.02
OIA Year 1 to Year 2 Change	263	-0.0132	-0.0383	-0.0056	0.0161	.00	.00
OIA Year 2 to Year 3 Change	250	-0.0055	-0.0309	-0.0016	0.0178	.30	.06
OIA Year 3 to Year 4 Change	239	-0.0018	-0.0319	0.0001	0.0201	.72	.29
OIA Year 4 to Year 5 Change	228	-0.0110	-0.0377	-0.0079	0.0146	.00	.00

Table 6 (continued)

Operating Performance (Operating Income Standardized by Sales)

Independent Variables: Operating Performance	Obs	Mean	25 % Quartile	Median	75 % Quartile	T-test P-value	Rank sign test P-value
OIS Year -1	293	0.1613	0.0870	0.1331	0.2092		
OIS Year -1 to Year 0 Change	288	-0.0052	-0.0125	0.0020	0.0179	.31	.20
OIS Year 0 to Year 1 Change	272	-0.0077	-0.0235	-0.0025	0.0102	.21	.01
OIS Year 1 to Year 2 Change	263	-0.0124	-0.0264	-0.0018	0.0132	.09	.03
OIS Year 2 to Year 3 Change	248	-0.0033	-0.0256	-0.0007	0.0133	.55	.11
OIS Year 3 to Year 4 Change	236	-0.0091	-0.0279	-0.0021	0.0107	.06	.02
OIS Year 4 to Year 5 Change	227	-0.0101	-0.0274	-0.0043	0.0129	.04	.01

Table 6 (continued)

Underinvestment Proxies

Independent Variables: Underinvestment	Obs	Mean	25 % Quartile	Median	75 % Quartile	T-test P-value	Rank sign test P-value
Q Year -1	294	1.3408	0.7766	1.1017	1.5607		
Q Year 0	293	1.4900	0.9769	1.3617	1.7641		
Q Year -1 to Year 0 Change	290	0.1447	0.0311	0.1851	0.4428	.00	.00

Asset Substitution Proxies

Independent Variables: Asset Substitution	Obs	Mean	25 % Quartile	Median	75 % Quartile	T-test P-value	Sign test P-value
1 - (Gross PPE/Assets) Year -1	294	0.3905	0.1608	0.4317	0.6341		
1 - (Gross PPE/Assets) Year 0	293	0.4221	0.1853	0.4758	0.6547		
1 - (Gross PPE/Assets) Year -1 to Year 0 Change	290	0.0318	-0.0114	0.0225	0.0662	.00	.00
1 - (Net PPE/Assets) Year -1	294	0.5877	0.4121	0.6244	0.7750		
1 - (Net PPE/Assets) Year -1	293	0.6039	0.4164	0.6448	0.7817		
1 - (Net PPE/Assets) Year -1 to Year 0 Change	290	0.0164	-0.0158	0.0137	0.0472	.00	.00

Table 7

Regressions with operating performance defined as operating income before depreciation and interest expense standardized by asset book value

Underinvestment and asset substitution proxies based on Year -1

Operating performance (OIA) is the operating income before depreciation and interest expense standardized by asset book value. The underinvestment proxy is Q. Q is specified as the sum of the book value of long-term debt, the liquidating value of preferred stock, and the market value of equity, divided by the book value of assets. The asset substitution proxy is 1 - (gross or net plant, property and equipment standardized by asset book value). Binary variables are for the issuance year and the issue's Moody's rating. The rating binary groups are A or above, BAA, BA, B and unrated/not rated. The dependant variables are the equity proxies CP, SDV and SINTBBB. CP is the convertible debt's conversion premium. SDV is the offer price less the straight debt value standardized by the offering price. The straight debt value is the present value of the interest and principal discounted at the Moody's issue month BAA yield assuming the bond is held to maturity. SINTBBB is the convertible debt's coupon rate less the Moody's BAA yield standardized by the Moody's BAA yield. P-values appear in parentheses below the regression coefficients.

Variable	CP	CP	SDV	SDV	SINTBBB	SINTBBB
Intercept	0.2238	0.2973	-0.1008	-0.1159	-0.1320	-0.1487
	(0.01)	(0.00)	(0.02)	(0.02)	(0.00)	(0.00)
OIA	0.0220	-0.0311	0.0009	0.0158	0.0039	0.0199
Year -1 to Year 0 Change	(0.94)	(0.92)	(0.99)	(0.64)	(0.98)	(0.89)
OIA	0.0389	-0.0226	-0.0901	-0.0709	-0.1016	-0.0812
Year 0 to Year 1 Change	(0.89)	(0.93)	(0.52)	(0.91)	(0.44)	(0.54)
OIA	-0.3442	-0.4032	0.0720	0.0913	0.0698	0.0903
Year 1 to Year 2 Change	(0.16)	(0.10)	(0.57)	(0.79)	(0.56)	(0.45)
OIA	0.4860	0.4469	0.3612	0.3730	0.3121	0.3246
Year 2 to Year 3 Change	(0.03)	(0.04)	(0.00)	(0.00)	(0.00)	(0.00)
OIA	0.2633	0.2383	0.1865	0.1952	0.1326	0.1417
Year 3 to Year 4 Change	(0.17)	(0.21)	(0.05)	(0.11)	(0.15)	(0.12)
OIA	-0.1083	-0.1060	0.0853	0.0791	0.1042	0.0979
Year 4 to Year 5 Change	(0.67)	(0.68)	(0.51)	(0.37)	(0.40)	(0.43)
OIA	0.1700	0.1187	-0.3480	-0.3285	-0.3194	-0.2989
Year -1	(0.49)	(0.62)	(0.01)	(0.01)	(0.01)	(0.01)

Table 7 (continued)

Regressions with operating performance defined as operating income before depreciation and interest expense standardized by asset book value

Underinvestment and asset substitution proxies based on Year -1

Q Year -1	-0.0267 (0.05)	-0.0277 (0.04)	-0.0017 (0.80)	-0.0021 (0.75)	-0.0007 (0.91)	-0.0011 (0.87)
1 - (Gross PPE/Assets) Year -1	0.0126 (0.75)		-0.0182 (0.36)		-0.0185 (0.33)	
1 - (Net PPE/Assets) Year -1		-0.0652 (0.25)		-0.0021 (0.94)		-0.0007 (0.98)
Natural Log of Assets Year -1	-0.0108 (0.39)	-0.0153 (0.22)	-0.0131 (0.04)	-0.0118 (0.07)	-0.0132 (0.03)	-0.0118 (0.05)
Binary variables for Issuance Year and Moody's Rating	results omitted	results omitted	results omitted	results omitted	results omitted	results omitted
Adjusted R-squared	6.12%	6.69%	31.93%	31.65%	29.75%	29.42%
F Value	1.689	1.758	6.003	5.938	5.517	5.446
Prob > F	0.03	0.03	0.00	0.00	0.00	0.00
Observations	223	223	225	225	225	225

Table 8

Regressions with operating performance defined as operating income before depreciation and interest expense standardized by sales

Underinvestment and asset substitution proxies based on Year -1

Operating performance (OIS) is the operating income before depreciation and interest expense standardized by sales. The underinvestment proxy is Q. Q is specified as the sum of the book value of long-term debt, the liquidating value of preferred stock, and the market value of equity, divided by the book value of assets. The asset substitution proxy is 1 - (gross or net plant, property and equipment standardized by asset book value). Binary variables are for the issuance year and the issue's Moody's rating. The rating binary groups are A or above, BAA, BA, B and unrated/not rated. The dependant variables are the equity proxies CP, SDV and SINTBBB. CP is the convertible debt's conversion premium. SDV is the offer price less the straight debt value standardized by the offering price. The straight debt value is the present value of the interest and principal discounted at the Moody's issue month BAA yield assuming the bond is held to maturity. SINTBBB is the convertible debt's coupon rate less the Moody's BAA yield standardized by the Moody's BAA yield. P-values appear in parentheses below the regression coefficients.

Variable	CP	CP	SDV	SDV	SINTBBB	SINTBBB
Intercept	0.2362	0.3182	-0.1574	-0.1664	-0.1790	-0.1898
	(0.00)	(0.00)	(0.00)	(0.09)	(0.00)	(0.03)
OIS	0.0910	0.0424	0.0012	0.0085	-0.0345	-0.0256
Year -1 to Year 0 Change	(0.69)	(0.85)	(0.99)	(0.94)	(0.76)	(0.82)
OIS	0.1087	0.0576	-0.0128	-0.0052	-0.0375	-0.0282
Year 0 to Year 1 Change	(0.58)	(0.77)	(0.90)	(0.96)	(0.69)	(0.77)
OIS	-0.0315	-0.1061	0.1602	0.1708	0.1376	0.1506
Year 1 to Year 2 Change	(0.87)	(0.58)	(0.11)	(0.08)	(0.14)	(0.11)
OIS	0.6467	0.5933	0.4432	0.4514	0.3840	0.3940
Year 2 to Year 3 Change	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
OIS	0.2158	0.1832	0.2336	0.2384	0.1793	0.1852
Year 3 to Year 4 Change	(0.23)	(0.31)	(0.01)	(0.01)	(0.04)	(0.03)
OIS	0.1309	0.1431	0.1496	0.1462	0.1329	0.1288
Year 4 to Year 5 Change	(0.48)	(0.44)	(0.12)	(0.12)	(0.14)	(0.15)
OIS	0.2310	0.1375	-0.0144	-0.0004	-0.0311	-0.0141
Year -1	(0.08)	(0.28)	(0.83)	(0.99)	(0.62)	(0.82)

Table 8 (continued)

Regressions with operating performance defined as operating income before depreciation and interest expense standardized by sales

Underinvestment and asset substitution proxies based on Year -1

Q Year -1	-0.0332 (0.03)	-0.0305 (0.04)	-0.0139 (0.07)	-0.0146 (0.05)	-0.0121 (0.09)	-0.0129 (0.07)
1 - (Gross PPE/Assets) Year -1	0.0467 (0.30)		-0.0124 (0.59)		-0.0153 (0.48)	
1 - (Net PPE/Assets) Year -1		-0.0439 (0.50)		-0.0020 (0.95)		-0.0027 (0.93)
Natural Log of Assets Year -1	-0.0124 (0.33)	-0.0171 (0.18)	-0.0105 (0.11)	-0.0098 (0.13)	-0.0112 (0.07)	-0.0104 (0.09)
Binary variables for Issuance Year and Moody's Rating	results omitted	results omitted	results omitted	results omitted	results omitted	results omitted
Adjusted R-squared	4.21%	3.91%	27.92%	27.82%	26.13%	25.95%
F Value	1.456	1.422	5.059	5.038	4.706	4.671
Prob > F	0.10	0.11	0.00	0.00	0.00	0.00
Observations	219	219	221	221	221	221

Table 9

Regressions with operating performance defined as operating income before depreciation and interest expense standardized by asset book value

Underinvestment and asset substitution proxies based on Year -1 and the change from Year -1 to Year 0

Operating performance (OIA) is the operating income before depreciation and interest expense standardized by asset book value. The underinvestment proxy is Q. Q is specified as the sum of the book value of long-term debt, the liquidating value of preferred stock, and the market value of equity, divided by the book value of assets. The asset substitution proxy is 1 - (gross or net plant, property and equipment standardized by asset book value). Binary variables are for the issuance year and the issue's Moody's rating. The rating binary groups are A or above, BAA, BA, B and unrated/not rated. The dependant variables are the equity proxies CP, SDV and SINTBBB. CP is the convertible debt's conversion premium. SDV is the offer price less the straight debt value standardized by the offering price. The straight debt value is the present value of the interest and principal discounted at the Moody's issue month BAA yield assuming the bond is held to maturity. SINTBBB is the convertible debt's coupon rate less the Moody's BAA yield standardized by the Moody's BAA yield. P-values appear in parentheses below the regression coefficients.

Variable	CP	CP	SDV	SDV	SINTBBB	SINTBBB
Intercept	0.1963	0.2404	-0.0205	-0.0387	-0.0426	-0.0636
	(0.04)	(0.02)	(0.65)	(0.44)	(0.32)	(0.18)
OIA	-0.0510	-0.1038	0.1528	0.1590	0.1684	0.1743
Year -1 to Year 0 Change	(0.87)	(0.74)	(0.31)	(0.30)	(0.23)	(0.22)
OIA	-0.0352	-0.0749	0.0307	0.0537	0.0263	0.0520
Year 0 to Year 1 Change	(0.90)	(0.79)	(0.82)	(0.69)	(0.84)	(0.68)
OIA	-0.2987	-0.3417	-0.0375	-0.0198	-0.0502	-0.0300
Year 1 to Year 2 Change	(0.23)	(0.17)	(0.76)	(0.87)	(0.66)	(0.80)
OIA	0.5241	0.4945	0.2643	0.2817	0.2052	0.2262
Year 2 to Year 3 Change	(0.02)	(0.03)	(0.02)	(0.01)	(0.04)	(0.03)
OIA	0.3073	0.2862	0.0956	0.1013	0.0340	0.0405
Year 3 to Year 4 Change	(0.12)	(0.14)	(0.31)	(0.29)	(0.69)	(0.65)
OIA	-0.1461	-0.1829	0.1679	0.1673	0.1940	0.1964
Year 4 to Year 5 Change	(0.57)	(0.49)	(0.18)	(0.19)	(0.09)	(0.09)
OIA	0.0761	0.0805	-0.1455	-0.1428	-0.0993	-0.0991
Year -1	(0.77)	(0.66)	(0.25)	(0.25)	(0.40)	(0.40)

Table 9 (continued)

Regressions with operating performance defined as operating income before depreciation and interest expense standardized by asset book value

Underinvestment and asset substitution proxies based on Year -1 and the change from Year -1 to Year 0

Q Year -1 to Year 0 Change	0.0275 (0.27)	0.0248 (0.32)	-0.0520 (0.00)	-0.0535 (0.00)	-0.0355 (0.00)	-0.0355 (0.01)
Q Year -1	-0.0106 (0.60)	-0.0119 (0.55)	-0.0340 (0.00)	-0.0341 (0.00)	-0.0559 (0.00)	-0.0574 (0.00)
1 - (Gross PPE/Assets) Year -1 to Year 0 Change	-0.0297 (0.81)		-0.0772 (0.19)		-0.0973 (0.08)	
1 - (Gross PPE/Assets) Year -1	0.0049 (0.91)		-0.0190 (0.35)		-0.0209 (0.27)	
1 - (Net PPE/Assets) Year -1 to Year 0 Change		0.1507 (0.44)		-0.0045 (0.88)		-0.0427 (0.63)
1 - (Net PPE/Assets) Year -1		-0.0546 (0.35)		-0.0262 (0.78)		-0.0043 (0.87)
Natural Log of Assets Year -1	-0.0083 (0.55)	-0.0085 (0.53)	-0.0231 (0.00)	-0.0203 (0.00)	-0.0245 (0.00)	-0.0213 (0.00)
Binary variables for Issuance Year and Moody's Rating	results omitted	results omitted	results omitted	results omitted	results omitted	results omitted
Adjusted R-squared	5.77%	6.62%	37.87%	37.28%	38.18%	37.20%
F Value	1.591	1.684	6.936	6.789	7.015	6.768
Prob > F	0.05	0.03	0.00	0.00	0.00	0.00
Observations	223	223	225	225	225	225

Table 10

Regressions with operating performance defined as operating income before depreciation and interest expense standardized by sales

Underinvestment and asset substitution proxies based on Year -1 and the change from Year -1 to Year 0

Operating performance (OIS) is the operating income before depreciation and interest expense standardized by sales. The underinvestment proxy is Q. Q is specified as the sum of the book value of long-term debt, the liquidating value of preferred stock, and the market value of equity, divided by the book value of assets. The asset substitution proxy is 1 - (gross or net plant, property and equipment standardized by asset book value). Binary variables are for the issuance year and the issue's Moody's rating. The rating binary groups are A or above, BAA, BA, B and unrated/not rated. The dependant variables are the equity proxies CP, SDV and SINTBBB. CP is the convertible debt's conversion premium. SDV is the offer price less the straight debt value standardized by the offering price. The straight debt value is the present value of the interest and principal discounted at the Moody's issue month BAA yield assuming the bond is held to maturity. SINTBBB is the convertible debt's coupon rate less the Moody's BAA yield standardized by the Moody's BAA yield. P-values appear in parentheses below the regression coefficients.

Variable	CP	CP	SDV	SDV	SINTBBB	SINTBBB
Intercept	0.1603	0.2404	-0.0565	-0.0387	-0.0699	-0.0636
	(0.09)	(0.02)	(0.22)	(0.44)	(0.11)	(0.18)
OIS	-0.0723	-0.1247	0.1903	0.1798	0.1679	0.1569
Year -1 to Year 0 Change	(0.76)	(0.60)	(0.11)	(0.13)	(0.13)	(0.16)
OIS	-0.0372	-0.0874	0.1235	0.1470	0.1055	0.1337
Year 0 to Year 1 Change	(0.86)	(0.67)	(0.23)	(0.15)	(0.27)	(0.16)
OIS	-0.0215	-0.0680	0.1348	0.1516	0.1093	0.1288
Year 1 to Year 2 Change	(0.91)	(0.73)	(0.16)	(0.11)	(0.22)	(0.15)
OIS	0.7288	0.7000	0.3378	0.3563	0.2704	0.2919
Year 2 to Year 3 Change	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
OIS	0.2811	0.2609	0.1600	0.1647	0.1007	0.1063
Year 3 to Year 4 Change	(0.12)	(0.15)	(0.07)	(0.07)	(0.23)	(0.21)
OIS	0.1156	0.1031	0.1766	0.1685	0.1624	0.1538
Year 4 to Year 5 Change	(0.53)	(0.58)	(0.05)	(0.07)	(0.06)	(0.07)
OIS	0.1587	0.0731	0.0592	0.0644	0.0469	0.0440
Year -1	(0.24)	(0.58)	(0.37)	(0.32)	(0.45)	(0.36)

Table 10 (continued)

Regressions with operating performance defined as operating income before depreciation and interest expense standardized by sales

Underinvestment and asset substitution proxies based on Year -1 and the change from Year -1 to Year 0

Q Year -1 to Year 0 Change	0.0517 (0.16)	0.0547 (0.14)	-0.0541 (0.00)	-0.0564 (0.00)	-0.0574 (0.00)	-0.0601 (0.00)
Q Year -1	-0.0070 (0.73)	-0.0031 (0.87)	-0.0417 (0.00)	-0.0420 (0.00)	-0.0417 (0.00)	-0.0421 (0.00)
1 - (Gross PPE/Assets) Year -1 to Year 0 Change	0.0001 (0.99)		-0.0936 (0.15)		-0.1084 (0.08)	
1 - (Gross PPE/Assets) Year -1	0.0303 (0.54)		-0.0085 (0.72)		-0.0124 (0.58)	
1 - (Net PPE/Assets) Year -1 to Year 0 Change		0.1241 (0.54)		0.0109 (0.91)		0.0029 (0.98)
1 - (Net PPE/Assets) Year -1		-0.0462 (0.48)		0.0098 (0.76)		0.0091 (0.76)
Natural Log of Assets Year -1	-0.0049 (0.72)	-0.0062 (0.65)	-0.0217 (0.00)	-0.0185 (0.00)	-0.0234 (0.00)	-0.0198 (0.00)
Binary variables for Issuance Year and Moody's Rating	results omitted	results omitted	results omitted	results omitted	results omitted	results omitted
Adjusted R-squared	5.05%	5.38%	34.19%	33.51%	34.62%	33.58%
F Value	1.504	1.539	5.968	5.821	6.065	5.837
Prob > F	0.07	0.06	0.00	0.00	0.00	0.00
Observations	219	219	221	221	221	221

Table 11

Regressions with operating performance defined as operating income before depreciation and interest expense standardized by asset book value

Underinvestment and asset substitution proxies based on Year 0

Operating performance (OIA) is the operating income before depreciation and interest expense standardized by asset book value. The underinvestment proxy is Q. Q is specified as the sum of the book value of long-term debt, the liquidating value of preferred stock, and the market value of equity, divided by the book value of assets. The asset substitution proxy is 1 - (gross or net plant, property and equipment standardized by asset book value). Binary variables are for the issuance year and the issue's Moody's rating. The rating binary groups are A or above, BAA, BA, B and unrated/not rated. The dependant variables are the equity proxies CP, SDV and SINTBBB. CP is the convertible debt's conversion premium. SDV is the offer price less the straight debt value standardized by the offering price. The straight debt value is the present value of the interest and principal discounted at the Moody's issue month BAA yield assuming the bond is held to maturity. SINTBBB is the convertible debt's coupon rate less the Moody's BAA yield standardized by the Moody's BAA yield. P-values appear in parentheses below the regression coefficients.

Variable	CP	CP	SDV	SDV	SINTBBB	SINTBBB
Intercept	0.2028	0.2497	-0.0311	-0.0401	-0.0557	-0.0658
	(0.03)	(0.02)	(0.50)	(0.43)	(0.20)	(0.17)
OIA	0.1111	0.0864	0.0569	0.0687	0.0575	0.0705
Year -1 to Year 0 Change	(0.73)	(0.78)	(0.70)	(0.64)	(0.68)	(0.61)
OIA	0.0973	0.0604	-0.0349	-0.0155	-0.0482	-0.0267
Year 0 to Year 1 Change	(0.73)	(0.83)	(0.80)	(0.91)	(0.71)	(0.83)
OIA	-0.4013	-0.4410	0.0165	0.0318	0.0113	0.0284
Year 1 to Year 2 Change	(0.11)	(0.08)	(0.89)	(0.79)	(0.93)	(0.80)
OIA	0.4427	0.4162	0.3133	0.3238	0.2620	0.2736
Year 2 to Year 3 Change	(0.05)	(0.06)	(0.00)	(0.00)	(0.02)	(0.01)
OIA	0.2115	0.1941	0.1435	0.1494	0.0884	0.0950
Year 3 to Year 4 Change	(0.27)	(0.31)	(0.12)	(0.11)	(0.31)	(0.28)
OIA	-0.0512	-0.0372	0.1170	0.1129	0.1359	0.1312
Year 4 to Year 5 Change	(0.84)	(0.89)	(0.35)	(0.37)	(0.25)	(0.27)
OIA	0.1199	0.0902	-0.1887	-0.1718	-0.1512	-0.1325
Year -1	(0.64)	(0.73)	(0.14)	(0.17)	(0.20)	(0.26)

Table 11 (continued)

Regressions with operating performance defined as operating income before depreciation and interest expense standardized by asset book value

Underinvestment and asset substitution proxies based on Year 0

Q Year 0	-0.0065 (0.74)	-0.0064 (0.75)	-0.0353 (0.00)	-0.0365 (0.00)	-0.0369 (0.00)	-0.0382 (0.00)
1 - (Gross PPE/Assets) Year 0	0.0111 (0.79)		-0.0223 (0.28)		-0.0247 (0.20)	
1 - (Net PPE/Assets) Year 0		-0.0357 (0.54)		-0.0122 (0.67)		-0.0134 (0.62)
Natural Log of Assets Year -1	-0.0091 (0.50)	-0.0126 (0.35)	-0.0206 (0.00)	-0.0193 (0.00)	-0.0215 (0.00)	-0.0200 (0.00)
Binary variables for Issuance Year and Moody's Rating	results omitted	results omitted	results omitted	results omitted	results omitted	results omitted
Adjusted R-squared	4.29%	4.43%	36.41%	36.09%	35.53%	35.08%
F Value	1.474	1.491	7.107	7.024	6.879	6.764
Prob > F	0.09	0.08	0.00	0.00	0.00	0.00
Observations	223	223	225	225	225	225

Table 12

Regressions with operating performance defined as operating income before depreciation and interest expense standardized by sales

Underinvestment and asset substitution proxies based on Year 0

Operating performance (OIS) is the operating income before depreciation and interest expense standardized by sales. The underinvestment proxy is Q. Q is specified as the sum of the book value of long-term debt, the liquidating value of preferred stock, and the market value of equity, divided by the book value of assets. The asset substitution proxy is 1 - (gross or net plant, property and equipment standardized by asset book value). Binary variables are for the issuance year and the issue's Moody's rating. The rating binary groups are A or above, BAA, BA, B and unrated/not rated. The dependant variables are the equity proxies CP, SDV and SINTBBB. CP is the convertible debt's conversion premium. SDV is the offer price less the straight debt value standardized by the offering price. The straight debt value is the present value of the interest and principal discounted at the Moody's issue month BAA yield assuming the bond is held to maturity. SINTBBB is the convertible debt's coupon rate less the Moody's BAA yield standardized by the Moody's BAA yield. P-values appear in parentheses below the regression coefficients.

Variable	CP	CP	SDV	SDV	SINTBBB	SINTBBB
Intercept	0.1911	0.2442	-0.0735	-0.0873	-0.0900	-0.1055
	(0.04)	(0.02)	(0.11)	(0.09)	(0.04)	(0.03)
OIS	0.2348	0.2023	0.0932	0.1013	0.0490	0.0589
Year -1 to Year 0 Change	(0.28)	(0.36)	(0.38)	(0.34)	(0.62)	(0.55)
OIS	0.2538	0.2064	0.0638	0.0758	0.0296	0.0450
Year 0 to Year 1 Change	(0.18)	(0.27)	(0.49)	(0.40)	(0.73)	(0.59)
OIS	-0.0251	-0.0788	0.1377	0.1514	0.1127	0.1290
Year 1 to Year 2 Change	(0.90)	(0.69)	(0.15)	(0.11)	(0.21)	(0.15)
OIS	0.6272	0.5904	0.3717	0.3814	0.3116	0.3234
Year 2 to Year 3 Change	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
OIS	0.2117	0.1941	0.1763	0.1811	0.1211	0.1267
Year 3 to Year 4 Change	(0.25)	(0.29)	(0.05)	(0.04)	(0.15)	(0.13)
OIS	0.1339	0.1483	0.1668	0.1633	0.1507	0.1462
Year 4 to Year 5 Change	(0.47)	(0.43)	(0.07)	(0.07)	(0.08)	(0.09)
OIS	0.1506	0.0849	0.0483	0.0649	0.0347	0.0551
Year -1	(0.27)	(0.52)	(0.46)	(0.31)	(0.57)	(0.36)

Table 12 (continued)

Regressions with operating performance defined as operating income before depreciation and interest expense standardized by sales

Underinvestment and asset substitution proxies based on Year 0

Q Year 0	-0.0013 (0.95)	0.0032 (0.87)	-0.0424 (0.00)	-0.0435 (0.00)	-0.0427 (0.00)	-0.0441 (0.00)
1 - (Gross PPE/Assets) Year 0	0.0386 (0.44)		-0.0099 (0.68)		-0.0142 (0.53)	
1 - (Net PPE/Assets) Year 0		-0.0237 (0.72)		0.0058 (0.87)		0.0040 (0.90)
Natural Log of Assets Year -1	-0.0078 (0.57)	-0.0117 (0.40)	-0.0187 (0.01)	-0.0177 (0.01)	-0.0199 (0.00)	-0.0187 (0.00)
Binary variables for Issuance Year and Moody's Rating	results omitted	results omitted	results omitted	results omitted	results omitted	results omitted
Adjusted R-squared	1.87%	1.64%	33.50%	33.46%	33.09%	32.96%
F Value	1.198	1.173	6.278	6.267	6.181	6.151
Prob > F	0.26	0.28	0.00	0.00	0.00	0.00
Observations	219	219	221	221	221	221

Chapter 3: Why are issue day returns negative ?

1.0 Introduction

On the convertible debt issue day, the average abnormal returns on the issuing firm's equity are negative (Dann and Mikkelson (1984), and Mikkelson and Partch (1986, 1988)). This evidence is consistent with managers only issuing overpriced securities. I will examine an alternative explanation that has not been previously tested formally. The alternative explanation is the issue day returns may be due to a resolution of uncertainty regarding whether the proposed offering will be completed or withdrawn. If the equity returns on the convertible debt issuance day are partially due to a resolution of uncertainty regarding whether the proposed offering will be completed or withdrawn, we should expect a relationship between the announcement returns and the returns at the issuance or withdrawal. The issuance or withdrawal abnormal returns are regressed on the announcement abnormal returns. Overall, the results of the regression tests are consistent with the issue day returns being partially due to a resolution of uncertainty.

Negative issue day abnormal returns have also been documented for equity issuances (Mikkelson and Partch (1986, 1988), Officer and Smith (1986), and Lease, Masulis and Page (1991)). On the issue day of a seasoned equity offering, the firm's equity can be sold only in the secondary market, but it can be purchased in both the primary and secondary markets. This results in a buy-sell order flow imbalance in the secondary market that influences the firm's equity returns. Lease, Masulis and Page (1991) examine the impact of bid-ask induced biases

on issue day returns for seasoned equity offerings. They find part of the negative issue day returns are due to a bid-ask induced bias. Lease, Masulis, and Page use both a closing order flow ratio and bid-ask midpoint returns to provide evidence that a bid-ask induced bias causes part of the issue day negative abnormal returns. Since the issue day of a convertible debt offering, the equity can only be bought and sold in the secondary market. It is predicted that a bid-ask spread bias does not contribute to the negative equity abnormal returns on the issuance day of a convertible debt offering. I provide evidence that is consistent with this prediction.

The remainder of this chapter is organized as follows. Section 2 contains the literature review while section 3 provides the hypothesis formation. Section 4 discusses methodology and sampling. Section 5 provides the empirical results. Section 6 contains the conclusion.

2.0 Literature review

2.1 Security issuance and withdrawals

Mikkelson and Partch (1988) examine the abnormal returns associated with announced convertible debt offerings. Their proposed offering sample consists of 22 announcements which were later withdrawn and 132 announcements where the proposed offering was completed. For completed convertible debt offerings, they find significant negative abnormal returns for the announcement period of -1.60% and the issuance period of -0.97%. For convertible debt announcements which were withdrawn, they find significant negative abnormal returns for the announcement of -2.89% and insignificant abnormal returns at the withdrawal of 0.34%. The results of Mikkelson and Partch suggest the returns on the issuance and withdrawal days may be partially related to uncertainty on whether the proposed offering will be completed or canceled.

Proposed equity offerings involving both issuance and withdrawals have been examined by Mikkelson and Partch (1988), and Officer and Smith (1986). Mikkelson and Partch (1988) find for completed common stock offerings significant negative abnormal returns for the announcement of -3.39% and issuance of -0.65%. Withdrawn common stock offerings have significant negative abnormal returns for the announcement of -3.08% and positive significant abnormal returns of 1.74%. Officer and Smith (1986) find significant negative issue abnormal returns of -4.66% and significant positive withdrawal abnormal returns of 2.54%.

Proposed security offerings involving both issuance and withdrawals have been

examined by Mikkelson and Partch (1986). They find significant negative announcement returns for equity of -3.44%, straight debt of -0.39%, and convertible debt of -1.57%, and insignificant announcement returns to preferred stock of 0.10%.[22] Mikkelson and Partch (1986) find significant negative issue returns for equity of -0.70% and convertible debt of -1.71%, and insignificant issue returns to straight debt of 0.19% and preferred stock of -0.74%. Mikkelson and Partch (1986) also examine withdrawn offerings, but they have only 10 canceled equity offerings and 4 canceled convertible debt offerings. They combine the canceled equity and convertible debt offerings into a sample of 14. Thus, their results are not directly comparable to those of Mikkelson and Partch (1988), and Officer and Smith (1986) who examine withdrawn and completed offerings by security type. Mikkelson and Partch (1986) find significant announcement returns for withdrawn offerings of -5.72% and for completed offering of -2.88%. They find significant abnormal returns at the withdrawal of 4.13% and at the issuance of -1.01%.

Officer and Smith (1986) examine 30 proposed offerings of straight debt. They find significant negative abnormal returns of -2.66% at the issuance and insignificant negative abnormal returns of -0.34% at the withdrawal.

The results of Mikkelson and Partch (1986,1988), and Officer and Smith (1986) suggest that the completion or withdrawal of a proposed offering conveys information of the manager's assessment of the market's valuation of the proposed offering. An alternative interpretation is part of the market reaction to the issuance and withdrawal is related to uncertainty surrounding whether the proposed offering will be completed or canceled.

[22] The preferred stock sample in Mikkelson and Partch (1986) has 12 announcements.

2.2 Bid-ask induced bias in issue day returns

Lease, Masulis and Page (1991) examine the impact of bid-ask induced biases on issue day returns for seasoned equity offerings by NYSE firms. On the issue day of a seasoned equity offering, the equity can be purchased in the secondary and primary market, but can only be sold in the secondary market. This causes a buy-sell order flow imbalance in the secondary market. Lease, Masulis and Page find part of the negative issue day return for seasoned equity offerings is due to a bid-ask induced bias. They use both a closing order flow ratio, and closing bid-ask midpoint returns to provide evidence that a bid-ask induced bias causes part of the issue day negative abnormal returns.

3.0 Formulation of the hypotheses

3.1 Resolution of uncertainty

The negative abnormal issue period returns are partially due to the realization that the proposed offering was completed.

Hypothesis 1-A: For the issuance sample, the announcement period abnormal returns are positively related to the issue period returns.

Hypothesis 1-B: For the withdrawal sample, the announcement period returns are negatively related to the withdrawal period returns.

Previous studies (Dann and Mikkelson (1984), and Mikkelson and Partch (1986, 1988)) have documented negative abnormal returns to equity during the issuance period of convertible debt. Negative issue period abnormal returns have also been documented for equity issuances (Mikkelson and Partch (1986, 1988), Officer and Smith (1986), and Lease, Masulis and Page (1991)). These findings have been interpreted as being consistent with managers only offering overpriced securities.

In the case of equity offerings, this interpretation is strengthened based on the effect a withdrawn equity offering has on a firm's common stock return. Mikkelson and Partch (1988) and Officer and Smith (1986) have documented significant positive abnormal returns for

withdrawn common stock offerings. These results have been interpreted as being consistent with managers only offering overpriced securities. However, Mikkelson and Partch (1988) finds insignificant positive abnormal returns to equity for convertible debt withdrawals. These results are inconsistent with managers only offering overpriced securities.

An alternative interpretation to the "overpriced securities" hypothesis is the negative abnormal returns to equity during the convertible debt issuance period are related to the resolution of uncertainty of whether the announced offering will be completed or canceled. It is this resolution of uncertainty interpretation that I test.

When a firm makes an announcement that they intend to offer a security, there is uncertainty as to whether the proposed offering will be completed. Thus, only part of the full valuation effect of the security issuance occurs on the announcement day. The remainder of the valuation effect occurs if the offering is completed.

If the equity returns occurring on the convertible debt issuance day are partially due to the resolution of uncertainty regarding the completion or withdrawal of the proposed offering, we should expect a relationship between the announcement returns, and the issuance and withdrawal returns. For a sample of completed offerings, we should expect a positive relationship between the announcement abnormal returns and the issuance abnormal returns. Assume that all of the return associated with the announcement and the issuance or withdrawal is due purely to uncertainty regarding completion of the proposed offering. If the total return for the announcement and issuance is -10% and the probability of completing the offer was 80%, then we would have a -8% announcement return and a -2% issuance return. If the issuance return is regressed on the announcement return, this result implies a positive

regression coefficient of +0.25. If the issue were withdrawn (a probability of 20%), then we would expect a positive return of +8% due to the reversal of the -8% announcement return. This result implies a negative relationship between the announcement return and the withdrawal return.

One assumption in the above analysis is that the probabilities of completing the offering are the same for each proposed offering. If the probabilities are different, then there is a bias in not finding a positive relationship between the issuance and announcement abnormal returns. For example, if the completion probability of a different offering is 70%, then we would have a -7% announcement return and a -3% issuance return. Thus, less negative announcement returns would be associated with more negative issuance returns implying a negative relationship. If the offering was withdrawn and the probability of completion was 70%, the -7% announcement return would be reversed and there would be a 7% withdrawal return. This result implies a negative relationship between the withdrawal and announcement abnormal returns. Thus, it is not expected that differing probabilities will influence the relationship between withdrawal and announcement abnormal returns.

3.2 Bid-ask effects

The negative abnormal issue period returns are not due to a bid-ask induced bias.

Hypothesis 2-A: A closing order flow ratio during the issuance period is not significantly different than a control period.

Hypothesis 2-B: Alternative return calculations using closing bid and ask quotes provide insignificantly different results than returns calculated with closing prices.

The negative equity abnormal returns on the issuance day of a convertible debt security could be due to a bid-ask bias. For seasoned equity offerings by NYSE listed firms, Lease, Masulis, and Page (1991) have shown that part of the issue day negative abnormal returns are due to a bid-ask spread induced bias. In the case of a seasoned equity offering, on the issue day we have the primary and secondary markets for buying the equity, but only the secondary market is available for selling the equity. This creates a buy-sell order flow imbalance in the secondary market for the firm's equity on the issue day of a seasoned equity offering.

Lease, Masulis, and Page (1991) present evidence that a bid-ask induced bias contributes to the negative equity abnormal returns during a seasoned equity offering's issuance. They use an order flow ratio to provide evidence that a buy-sell order flow imbalance in the secondary market is causing the bid-ask bias in the computed issue day equity returns. The order flow ratio measures the relative positioning of a trade within the bid-ask spread. The

order flow ratio is calculated as:

$$Order\ flow\ ratio\ =\ \frac{(Ask - Price)}{(Ask - Bid)}$$

The order flow ratio is calculated by Lease, Masulis, and Page using the closing bid, closing ask, and the last transaction price of the day. Lease, Masulis and Page present confirmation of the order flow ratio evidence by contrasting returns calculated using closing bid-ask midpoints with returns calculated using closing prices.

In contrast to a seasoned equity offering, there is only the secondary market for buying and selling the firm's equity on the convertible debt issuance day. Thus, we should expect the closing order flow ratio on the issuance day to be insignificantly different from that of a control period. Also, we should expect the equity returns calculated with the closing price or the closing bid-ask midpoint to be insignificantly different from each other.

In summary, it is predicted that a bid-ask spread induced bias does not cause the negative equity issue period abnormal returns for a convertible debt offering. This assertion will be tested by calculating an abnormal order flow ratio for the issuance day, and by comparing abnormal returns calculating using closing prices, and closing bid-ask quotes.

4.0 Data and methodology

4.1 Convertible debt sample

The convertible debt issuance sample are the underwritten public offerings for cash from 1980 to 1987 appearing on the Securities and Exchange Commission's Registered Offerings of Securities tape.[23] [24] The weekly issues of *Investment Dealers Digest* were searched in the "Withdrawals" section from 1980 to 1989 for convertible debt issues which were registered between 1980 and 1987, but the registration was later withdrawn. The creation of the withdrawal sample follows the methodology of Officer and Smith (1986), and Mikkelson and Partch (1988). Table 1 shows the year of the announcement for the completed offerings and withdrawn offerings samples. Table 2 presents the year of the issuance or withdrawal for the completed offerings and withdrawn offerings samples. Sampling constraints require the firms to have Compustat data, CRSP stock data, and an announcement on the Dow Jones News Wire.[25] The sample excludes utilities and financial firms. Firms having a shelf

[23] The issuance sample is the same as that used in Chapter 2.

[24] The sample ends in 1987 due to the differing characteristics of the convertible debt issued after 1987. For example, Kang and Lee (1996) use a sample of 91 convertible debt issues issued from 1988-1992. There are 56 coupon bonds (62% of the sample) and 35 zero-coupon bonds (38% of the sample). In my sample, there are no zero-coupon bonds. In Kang and Lee's (1996) sample, all the zero-coupon bonds and 32 coupon bond (74% of the sample) had a put feature. It is not explained whether this put feature is an "event risk" put or the bond is puttable back to the firm at specific times. The zero-coupon bonds may be puttable at specific dates (i.e. Merrill Lynch's LYONs (Liquid Yield Option Notes)). In my sample, four puttable bonds were excluded and there were no "event risk" puttable bonds in my initial sample.

[25] The 1994 Compustat (Standard and Poor's) Primary, Supplementary and Tertiary file, the

registration, dual classes of shares, unit offerings, rights offered, exchange offered, puttable convertible debt, conversion restrictions, etc. do not appear in the sample. The convertible debt issues are all fixed non-zero coupon paying securities with a fixed conversion price.

4.2 Methodology - Resolution of uncertainty

4.2.1 Computed abnormal returns

Day 0 is the event day. The calculation of the abnormal returns is done with the CRSP equally weighted index as the market return. The pre announcement market model returns are calculated based on the returns over announcement days -260 to -11. The post issuance or withdrawal market model returns are calculated based on the returns over issue or withdrawal days +11 to +260. A firm can not be missing more than 2 trading days of returns in the market model estimation period to have the market model calculated.[26] The equally weighted market

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Research file, and the Full Coverage file are used for financial data. Stock return data is from the CRSP (Center for Research in Security Prices at the University of Chicago Graduate School of Business) files covering NYSE, AMEX and NASDAQ firms.

[26] For the issuance sample, there are 11 firms missing more than two trading days in the market model estimation period announcement day -260 to day -11. One firm is missing three days, one firms is missing six days and the other nine firms are missing from 25 to 166 days of return data. For the issuance sample, there are 11 firms missing more than two trading days in the market model estimation period issuance or withdrawal day +11 to day +260. Two firms are missing three days, and the other nine firms are missing from 14 to 153 days of return data. For the withdrawal sample, there are two firms missing more than two trading days in the market model estimation period announcement day -260 to day -11. One firm is missing 20 days and the other firm is missing 54 days. For the withdrawal sample, there are two firms missing more than two trading days in the market model estimation period issuance or withdrawal day +11 to day +260. One firm is missing 72 days and the other firm is missing 230 days.

adjusted returns are calculated by subtracting the CRSP equally weighted market index from a firm's raw return.

Table 3 shows the overall announcement sample has significant announcement period (day -1, 0, and +1) abnormal returns of -1.91% with the pre announcement market model. For firms that did issue convertible debt, announcement abnormal returns were a significant -1.69% for the pre announcement market model. For firms that withdrew their intended issue of convertible debt, announcement abnormal returns were a significant -3.66% for the pre announcement market model. Table 3 also presents the abnormal returns for the post issuance or withdrawal market model, and the CRSP equally weighted market adjusted abnormal returns. The abnormal returns from the different calculation methods are not significantly different from each other. Overall, the announcement abnormal return results are qualitatively similar to those of Mikkelson and Partch (1988).

Table 4 presents the abnormal returns from announcement day +2 to issue or withdrawal day -1. For the pre announcement market model, the overall sample returns are an insignificant -1.35%. The issuance sample has insignificant abnormal returns 0.41% and the withdrawal sample has significant abnormal returns of -14.1%. For the post issuance market model and the CRSP equally weighted market adjusted abnormal returns, the issuance sample abnormal returns are significantly positive and the withdrawal sample abnormal returns are significantly negative.

Table 5 shows the overall issue and withdrawal sample has significant issue and withdrawal period (day 0, and +1) abnormal returns of -0.79% for the pre announcement market model. For firms that did issue convertible debt, abnormal returns were a significant -

0.87% for the pre announcement market model. For firms that withdrew their proposed issue of convertible debt, abnormal returns were an insignificant -0.02% for the pre announcement market model. Table 5 also presents the abnormal returns for the post issue or withdrawal market model, and the CRSP equally weighted market adjusted abnormal returns. The abnormal returns from the different calculation methods are not significantly different from each other. Overall, the issue and withdrawal abnormal return results are qualitatively similar to those of Mikkelson and Partch (1988).

4.2.2 Regression specifications

With a sample of convertible debt issuances and withdrawals, I will test whether the negative issue period abnormal returns to equity are partially due to a resolution of uncertainty. If the equity returns occurring on the convertible debt issuance day are partially due to the resolution of uncertainty regarding the completion or withdrawal of the proposed offering, we should expect a relationship between the announcement returns, and the issuance and withdrawal returns. Regressions are done where the issue or withdrawal abnormal returns are regressed on the announcement abnormal returns.

We should expect a positive coefficient on α_1 in the following regression model used with the issuance sample:

$$\textit{Issue Period Abnormal Return} =$$

$$a_0 + a_1 \textit{ Announcement Period Abnormal Return}$$

We should expect a negative coefficient on β_1 in the following regression model used with the withdrawal sample:

$$\textit{Withdrawal Period Abnormal Return} =$$

$$b_0 + b_1 \textit{ Announcement Period Abnormal Return}$$

For the issuance sample, we should expect a positive coefficient on the announcement abnormal returns. Assume that all of the return associated with the announcement and the issuance or withdrawal is due purely to uncertainty regarding completion of the proposed offering. If the total return for the announcement and issuance is -10% and the probability of completing the offer was 80%, then we would have a -8% announcement return and a -2% issuance return. The results implies a positive regression coefficient of +0.25. If the issue were

withdrawn (a probability of 20%), then we would expect a positive return of +8% due to the reversal of the -8% announcement return. This result implies a negative coefficient on the announcement return of -1.

In summary, we should expect a positive coefficient on the announcement abnormal returns for issuance and a negative coefficient for withdrawals. This prediction is based on the assumption the probabilities of issuance associated with each announcement are the same. The greater this assumption is violated the greater is the bias in not finding the hypothesized result for the issuance sample. The expected positive coefficient for the issuance sample will be biased towards being negative.

In the preceding example, the total announcement and issuance return is 10% with a probability of 80% that the offering is completed. As a result, we have a -8% announcement return and a -2% issuance return. However, if the completion probability of a different offering is 70%, then we would have a -7% announcement return and a -3% issuance return. Thus, less negative announcement returns would be associated with more negative issuance returns implying a negative bias in the regression coefficient for the issuance sample. This bias is greater the more the probabilities differ between the announcements.

If the offering was withdrawn and the probability of completion was 70%, the -7% announcement return would be reversed and there would be a 7% withdrawal return. This result implies a negative coefficient on the announcement return of -1. Thus, it is not expected that differing probabilities will cause a bias in the withdrawal sample's hypothesized negative coefficient.

4.3 Methodology - Bid-ask bias tests

4.3.1 Order flow ratio

The order flow ratio has been used previously in empirical testing by Lease, Masulis and Page (1991), and Gosnell, Keown and Pinkerton (1996). The order flow ratio is a measure of the relative positioning of a trade within the bid-ask spread. The order flow ratio is calculated as:

$$Order\ flow\ ratio\ =\ \frac{(Ask - Price)}{(Ask - Bid)}$$

In this study, the order flow ratio is calculated by using the closing bid, closing ask, and the last transaction price of the day. Tests are also conducted using the bid-ask quote before the last transaction price of the day and a daily mean order flow ratio.[27] The daily mean order flow ratio is the mean of the intraday order flow ratio calculated using all trades and the quotes before each trade.

ISSM (Institute for the Study of Security Markets) data is used for the tests involving the NYSE and AMEX firms. Table 6 presents the impact of the data restrictions on the sample from using ISSM data.[28] Tests involving NASDAQ firms are not conducted.[29] Following

[27] The quotes are adjusted by adding five seconds as suggested by Lee and Ready (1991). This quote adjustment method is used by Gosnell, Keown and Pinkerton (1996) and others.

[28] There are a number of missing closing quotes in the period announcement day -31 to -2 (an order flow ratio control period), issue day +2 to +31 (an order flow ratio control period), and issue days -1,

Gosnell, Keown and Pinkerton (1996), trades and quotes are used only if it is from the exchange where it is listed. The price, bid, and ask must be more than zero and the ask must be more than the bid. The transaction and quotes used must be "normal" trades and quotes.[30]

A mean adjusted abnormal order flow ratio is calculated for issue days -1, 0 and +1 which is analogous to mean adjusted abnormal returns. For each firm a control period order flow ratio is calculated. Then, for each event day the order flow ratio on that day for the firm is subtracted from the mean of the firm's control period. The mean of each event day is the mean of the individual firm's abnormal order flow ratio. Two control periods are used. The first control period is announcement day -31 to announcement day -2. The second control period is issue day +2 to issue day +31. The five days before and after a stock dividend are excluded to help eliminate influences of dividend capture trading. Days that involve a different number of

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0, and +1. 321 of the 556 (58%) missing closing quotes occur in 1983, but only 30 of the 91 (33%) issuances occur in 1983. The problem is also concentrated in certain firms with 11 firms missing 20 or more closing quotes. Six firms are not found on the ISSM tapes (1-1984, 1-1986, 4-1987). Six firms had data on ISSM at some point between 1983 and 1987, but not during the required data period (4-1984, 1-1985, 1-1987).

[29] CRSP has the closing best bid and best ask for NASDAQ NMS (National Market System) firms. However, it appears the closing bid-ask quotes on CRSP are not a good indication of the "true" bid-ask in the market. Many times the closing best bid and ask are much above the highest or lowest daily trading price. For some stocks it appears the closing best bid-ask is set systematic either relatively high or low from the last transaction price of the day. In addition, generally the last transaction price is not between the closing best bid and ask. For the NASDAQ sample firm for the period from announcement day -31 to issue day +31 there are 3,942 daily data points. Out of the 3,942 NMS data points, 1,627 had the last trade price of the day higher than the closing best ask and 1,663 had the last trade price of the day lower than the closing best bid. Thus, only 652 or 16.5% of the NMS data points had the last transaction price between the closing best bid and ask.

[30] Only trades which are regular or non-regular settlement trades are used. A non-regular settlement trade would settle the same day, the next day or is seller specified. These are coded as C, N, and R on the ISSM tapes respectively. Only quotes which are BBO (best bid and offer) eligible, and those labeled as an opening or closing quote are used.

shares outstanding from the previous day are excluded. These type of events include stock dividends and stock splits. To calculate a control period, a firm must have an order flow ratio calculated for at least twenty of the thirty days in the control period.

$$Order\ flow\ \ ratio_{i,n} \;=\; \frac{(\,Ask_{i,n} - Price_{i,n}\,)}{(\,Ask_{i,n} - Bid_{i,n}\,)}$$

where i is the firm and n is the day.

$$Mean\ Order\ flow\ \ ratio_{i} \;=\; \frac{\sum_{n=1}^{q} Order\ flow\ \ ratio_{i,n}}{q}$$

where q is the number of days in the control period, i is the firm and n is the day.

$$\textit{Event day abnormal order flow ratio}_i = \textit{Event day order flow ratio}_i - \textit{Mean order flow ratio}_i$$

where i is the firm.

$$\textit{Mean event day abnormal order flow ratio} = \frac{\sum_{i=1}^{j} \textit{Event day abnormal order flow ratio}_i}{j}$$

where j is the number of firms with data available to calculate a mean adjusted abnormal order flow ratio for the event day, and where i is the firm.

I test the mean event day abnormal order flow ratio with a t-test to see if it is significantly different than zero. Tests examining the median of the event day abnormal order flow ratios are also conducted with a rank sign test.

4.3.2 Alternative abnormal return calculations

Alternative methods are used to calculate CRSP equally weighted market adjusted abnormal returns. These alternative calculations involve computing the firm's raw returns differently before adjusting for market influences. The standard way to calculated raw returns is to use the closing transaction price. As shown by Lease, Masulis and Page (1991), if there is a bias in the closing price's location within the bid-ask spread compared to the previous day, then there will be a bias in the computed abnormal returns. In this study, the raw returns are calculated by using the closing price, closing ask, closing bid and the closing bid-ask midpoint. These raw returns are then used to calculate abnormal returns using the CRSP equally weighted market index. Tests are done that compare the alternative return calculation means and medians to see if they are significantly different from each other.

5.0 Empirical results

Two hypotheses are tested regarding why equity abnormal returns are negative during convertible debt issuance. The first hypothesis tests if the negative issue period abnormal returns to equity are due to a resolution of uncertainty regarding whether the offering will be completed or withdrawn. The second hypothesis tests if a bid-ask bias is causing the issue period abnormal returns to be negative.

5.1 Issue day returns and the resolution of uncertainty regressions

These results provide evidence regarding whether the negative equity abnormal returns during the issuance period of convertible debt are due to a resolution of uncertainty. This resolution of uncertainty involves whether the offering will be completed or canceled.

The results for the issuance sample abnormal return regressions are presented in table 7. The CRSP equally weighted market adjusted abnormal return regression shows results consistent with part of the issue period returns being related to the resolution of uncertainty. The announcement abnormal return regression coefficient is positive and significant as predicted. The 250 day (day +11 to day +260) post issuance market model abnormal return regression shows confirmatory results in table 7.

In table 7, the 250 day (day -260 to day -11) pre announcement market model abnormal return regression provides results which are inconsistent with the hypothesized result. The coefficient on the announcement abnormal return is positive as predicted, but it is not

significant. This result may be due to market models calculated with different estimation periods having different abnormal return distributions even if the distribution means and medians are not significantly different. In addition, the market model coefficients for each firm are estimated with error and are subject to non-stationarity. We can see if the results with the 250 day pre announcement market model are influenced by the estimation period used by choosing a different estimation period. The alternative estimation period used is 125 days in length.[31] Both the pre announcement and post issuance market models are estimated again using a 125 day estimation period. The pre announcement market model is estimated over pre announcement days -135 to -11. The post issuance market model is estimated over the post issuance days +11 to +135.

In table 7, the 125 day pre announcement market model regression shows results that are consistent with issuance returns being related to the resolution of uncertainty. Also, this result demonstrates that the insignificant results found with the 250 day pre announcement market model are due to the estimation period chosen. The 125 day post issuance market model regression presents results in table 7 consistent with the predicted results.

If part of the issuance returns are due to a resolution of uncertainty regarding whether the offering will be completed or canceled, this implies withdrawal day returns should also be partially due to a resolution uncertainty. Finding results for a sample of withdrawn issues consistent with the resolution of uncertainty will reinforce the previously presented results for the issuance sample.

[31] This period was chosen because it is half of the 250 day estimation period.

The abnormal return regression results for the withdrawal sample are presented in table 8. The CRSP equally weighted market adjusted abnormal return regression shows results consistent with part of the withdrawal returns being related to the resolution of uncertainty. The announcement abnormal return regression coefficient is negative and significant as predicted. The result that part of the withdrawal return is related to the resolution of uncertainty reinforces the results that part of the issue returns are due to a resolution of uncertainty. The 250 day (day +11 to day +260) post withdrawal market model abnormal return regression presents confirmatory evidence in table 8.

The 250 day (day -260 to day -11) pre announcement market model abnormal return regression provides results in table 8 that are inconsistent with the hypothesized result. The coefficient on the announcement abnormal return is negative as predicted, but it is not significant. This is equivalent to the result for the issuance sample for the same market model estimation period. In that case, the announcement abnormal return coefficient had the correct sign, but was insignificant. The same difficulty with this market model that occurred for the issuance sample is occurring for the withdrawal sample. The tests are redone using a 125 day estimation period as was done with the issuance sample.

In table 8, the 125 day pre announcement market model regression shows results that are consistent with withdrawal returns being related to the resolution of uncertainty. As with the issuance sample, this result demonstrates the insignificant results found using a 250 day pre announcement market model are due to the estimation period chosen. The 125 day post withdrawal market model regression presents results in table 8 consistent with the predicted results.

In summary, the overall abnormal return regression results provide evidence consistent with the issuance abnormal returns being partially due to a resolution of uncertainty. This result is strengthened by finding that the withdrawal abnormal returns are also partially due to the resolution of uncertainty.

5.2 Bid-ask bias tests

These results provide evidence regarding whether negative abnormal returns on the issuance day of the convertible debt are due to a bid-ask bias. It is predicted a bid-ask bias does not cause the negative equity issue period abnormal returns for a convertible debt offering. This postulation is tested by using an order flow ratio and by using alternative methods of calculating abnormal returns. The alternative abnormal returns are calculated using the closing bid, the closing ask, or the closing bid-ask midpoint to calculate raw returns before adjusting for the market.

5.2.1 Order flow ratio test results

Table 9 presents the results of the abnormal order flow ratio for the firm's equity at the issuance of convertible debt. The abnormal order flow ratio is not significantly different from zero when using either the control period before the announcement of an intended convertible debt issue or the control period after the issuance. This result indicates that there are not an abnormal number of the closing prices finishing at a different location within the bid-ask spread

compared to other trading days. The order flow ratios for the issue event days and the control periods are presented in table 10. Table 11 presents the spread in dollars and as a percentage of the bid and the ask midpoint. It seems the mean and median spread is slightly less than the control periods. Thus, it appears the negative issue day returns are not being caused by a widening of the bid-ask spread. The above tests are conducted using the bid and ask quotes before the last trade of the day as opposed to the closing bid and ask quotes. The results for the abnormal order flow ratio are reported in table 12, the order flow ratios are presented in table 13, and the spreads are shown in table 14. Overall, the order flow results on the issuance day do not show an abnormality relative to a control period. Also, the spread in dollar and percentage terms does not appear to be influenced on the issuance day.

The two order flow ratio measures previously examined only use one specific point in time which is the last trade of the day. It may be the case that the last trade of the day is a poor proxy for capturing a buy-sell order flow imbalance. A daily mean order flow ratio is calculated for each day. The daily mean order flow ratio of each day is calculated using the intraday order flow ratio based on all trades and the quotes before those trades. Table 15 shows the abnormal order flow ratio for the daily mean order flow ratio. The issue period is not significantly different than the control periods. Table 16 presents the order flow ratios for the daily mean order flow ratio.

5.2.2 Alternative return calculation results

Tables 17 and 18 show the mean and median CRSP equally weighted market adjusted abnormal returns calculated using different measures of the firm's equity raw returns. The last transaction price of the day, closing ask, closing bid and the closing bid-ask midpoint are used to calculate the firm's raw returns. These alternatively calculated raw returns are then used to calculate CRSP equally weighted market adjusted abnormal returns. In table 17, the mean abnormal returns are negative and insignificantly different from zero on the issue day. Table 18 presents the median abnormal returns which are negative and significantly different from zero on the issue day. The different methods of calculating the raw returns do not yield significantly different mean or median abnormal returns during the issuance period.[32] The evidence presented suggests that a bid-ask bias does not influence the calculation of the abnormal returns on the issuance day.

[32] The tests are for a difference in the mean and median of the different return calculation methods. The p-values for the difference in means test are 1.00, 0.99 and 0.94 for issue days -1, 0 and +1 respectively. The p-values for the difference in median tests are 0.99, 0.98, and 0.86 for issue days -1, 0, and +1 respectively.

6.0 Conclusion

In this chapter, it was shown that a firm issuing convertible debt incurs negative abnormal returns on their equity during the issuance period. This result has been previous shown for convertible (Dann and Mikkelson (1984), and Mikkelson and Partch (1986, 1988)), and equity issuances (Mikkelson and Partch (1986, 1988), Officer and Smith (1986), and Lease, Masulis and Page (1991)). The question this chapter sought to address is why are the issuance period abnormal returns negative to equity for a convertible debt issue. Two hypotheses were tested in an attempt to explain the market's reaction.

The first hypothesis tested whether the issue day returns are partially caused by a resolution of uncertainty. When a convertible debt offering is announced, it is unknown whether the proposed offering will be completed or canceled. It was predicted the issuance day returns are partially due to a resolution of uncertainty. Regressions were done by regressing the issuance or withdrawal abnormal returns on the announcement abnormal returns. Evidence was found that is consistent with the predicted coefficients on the regression parameters. The overall result of the tests indicate that part of the issuance period abnormal returns are due to a resolution of uncertainty regarding whether the offering will be completed or canceled.

The second hypothesis tested whether there is a bid-ask bias which is causing the negative equity abnormal returns for the issuance period of convertible debt. Lease, Masulis, and Page (1991) have shown that a bid-ask bias contributes to negative equity abnormal returns on the issuance day for equity offerings. On the issuance day for an equity offering, the

equity can be purchased in the primary and secondary markets, but only sold in the secondary market. This creates a buy-sell order flow imbalance which leads to a bid-ask bias in computed abnormal returns. However, on the issuance day for a convertible debt offering, the equity can be purchased and sold only in the secondary market. For a convertible debt offering, it was predicted that a bid-ask bias does not cause or contribute to the negative equity abnormal returns on the issuance day. Evidence was found consistent with this prediction. The abnormal closing order flow for issue day -1, 0, and +1 were found not to be significantly different than zero. Also, alternative measures of the order flow ratio yield results similar to the closing order flow ratio. Alternative calculations of equally weighted returns were found to be significantly different from zero on the issuance day, but the returns were not significantly different than each other. The results suggest a bid-ask bias is not causing the negative equity abnormal returns during the issue period for convertible debt.

In summary, this chapter has found evidence that the negative abnormal returns to equity during the convertible debt issue period are not caused by a bid-ask bias in computed abnormal returns and are partially due to a resolution of uncertainty regarding the completion of the proposed offering.

Chapter 3 Tables

Table 1

Year of announcement for the completed offerings and withdrawn offerings samples

	Issuance Sample				Withdrawal Sample		
Year	NYSE/ AMEX	NASDAQ	Total		NYSE/ AMEX	NASDAQ	Total
1980	39	15	54		3	1	4
1981	21	13	34		7	1	8
1982	32	17	49		0	0	0
1983	28	17	45		0	0	0
1984	9	5	14		1	0	1
1985	22	15	37		2	5	7
1986	20	13	33		4	2	6
1987	21	13	34		7	6	13
Total	192	108	300		24	15	39

Table 2

Year of issuance or withdrawal
for the completed offerings and withdrawn offerings samples

	Issuance Sample				Withdrawal Sample		
Year	NYSE/ AMEX	NASDAQ	Total		NYSE/ AMEX	NASDAQ	Total
1980	37	13	50		1	1	2
1981	23	15	38		9	1	10
1982	29	17	46		0	0	0
1983	30	15	45		0	0	0
1984	10	7	17		1	0	1
1985	20	14	34		1	5	6
1986	22	12	34		4	2	6
1987	21	15	36		7	6	13
1988	0	0	0		1	0	1
Total	192	108	300		24	15	39

Table 3

Announcement period returns

Announcement day 0 is the day the Dow Jones News Wire announcement appears that the firm proposes to issue convertible debt. The market index is the CRSP equally weighted index. Pre announcement market model is based on announcement days -260 to -11. Post issuance or withdrawal market model is based on issuance or withdrawal days +11 to +260. The test of the mean is a t-test.

Pre announcement market model									
	All Announcements			Issuance Sample			Withdrawal Sample		
Event Period	Obs	Mean Return		Obs	Mean Return		Obs	Mean Return	
-1,0,+1	326	-1.91%	***	289	-1.69%	***	37	-3.66%	***

Post issuance or withdrawal market model									
	All Announcements			Issuance Sample			Withdrawal Sample		
Event Period	Obs	Mean Return		Obs	Mean Return		Obs	Mean Return	
-1,0,+1	326	-1.66%	***	289	-1.40%	***	37	-3.65%	***

CRSP equally weighted market adjusted abnormal returns									
	All Announcements			Issuance Sample			Withdrawal Sample		
Event Period	Obs	Mean Return		Obs	Mean Return		Obs	Mean Return	
-1,0,+1	339	-1.70%	***	300	-1.40%	***	39	-4.01%	***

*** - significantly different than zero at the 1% level
** - significantly different than zero at the 5% level
* - significantly different than zero at the 10% level

Table 4

Announcement day +2 to issue or withdrawal day -1 period returns

Announcement day 0 is the day the Dow Jones News Wire announcement appears that the firm proposes to issue convertible debt. Withdrawal day 0 is the day the Dow Jones News Wire withdrawal announcement appears. Issue day 0 is the day the firm issues convertible debt. The market index is the CRSP equally weighted index. Pre announcement market model is based on announcement days -260 to -11. Post issuance or withdrawal market model is based on issuance or withdrawal days +11 to +260. The test of the mean is a t-test.

Pre announcement market model									
	All Announcements			Issuance Sample			Withdrawal Sample		
Event Period	Obs	Mean Return		Obs	Mean Return		Obs	Mean Return	
Announcement Day +2 to Issue or Withdrawal Day -1	306	-1.35%		269	0.41%		37	-14.1%	***

Post issuance or withdrawal market model									
	All Announcements			Issuance Sample			Withdrawal Sample		
Event Period	Obs	Mean Return		Obs	Mean Return		Obs	Mean Return	
Announcement Day +2 to Issue or Withdrawal Day -1	306	0.31%		269	1.20%	**	37	-6.17%	**

CRSP equally weighted market adjusted abnormal returns									
	All Announcements			Issuance Sample			Withdrawal Sample		
Event Period	Obs	Mean Return		Obs	Mean Return		Obs	Mean Return	
Announcement Day +2 to Issue or Withdrawal Day -1	319	-0.85%		280	1.16%	***	39	-15.2%	***

*** - significantly different than zero at the 1% level
** - significantly different than zero at the 5% level
* - significantly different than zero at the 10% level

Table 5

Issue and withdrawal period returns

Withdrawal day 0 is the day the Dow Jones News Wire withdrawal announcement appears. Issue day 0 is the day the firm issues convertible debt. The market index is the CRSP equally weighted index. Pre announcement market model is based on announcement days -260 to -11. Post issuance or withdrawal market model is based on issuance or withdrawal days +11 to +260. The test of the mean is a t-test.

Pre announcement market model									
	All Announcements			Issuance Sample			Withdrawal Sample		
Event Period	Obs	Mean Return		Obs	Mean Return		Obs	Mean Return	
0,+1	325	-0.79%	***	289	-0.87%	***	36	-0.02%	

Post issuance or withdrawal market model									
	All Announcements			Issuance Sample			Withdrawal Sample		
Event Period	Obs	Mean Return		Obs	Mean Return		Obs	Mean Return	
0,+1	326	-0.46%	**	289	-0.60%	***	37	0.58%	

CRSP equally weighted market adjusted abnormal returns									
	All Announcements			Issuance Sample			Withdrawal Sample		
Event Period	Obs	Mean Return		Obs	Mean Return		Obs	Mean Return	
0,+1	338	-0.41%	*	300	-0.51%	**	38	0.44%	

*** - significantly different than zero at the 1% level
** - significantly different than zero at the 5% level
* - significantly different than zero at the 10% level

Table 6

ISSM data

Firms are considered to have data for a day even if the data is incomplete. For example, a firm could be missing the closing quote, but it will be considered to have data for that day.

Issuances having data	Data Restriction
300	Issuance Sample
192	On NYSE or AMEX (ISSM covers NYSE/AMEX)
103	On NYSE or AMEX 1983-1987 (ISSM Data Period)
97	ISSM data at some point between 1983-1987
91	ISSM data at some point between Announcement Day -31 and Issue Day +31
88	ISSM data at some point between Announcement Day -31 and -2
90	ISSM data at some point between Issue Day +2 and +31
83	ISSM data on Issue Day -1
75	ISSM data on Issue Day 0
78	ISSM data on Issue Day +1
80.4	Average number of firms for each day for the ISSM data between Announcement Day -31 and -2
76.5	Average number of firms for each day for the ISSM data between Issue Day +2 and +32

Table 7

Regression of the issue period abnormal returns
on the announcement period abnormal returns

The market index is the CRSP equally weighted index. Pre announcement market model BMM-250 is based on announcement days -260 to -11. Pre announcement market model BMM-125 is based on announcement days -135 to -11. Post issuance market model AMM-250 is based on issuance days +11 to +260. Post issuance market model AMM-125 is based on issuance days +11 to +135. The equally weighted market adjusted abnormal returns (EW) use the CRSP equally weighted index. P-values appear in parentheses below the regression coefficients.

Variable	EW issue abnormal returns	AMM-250 issue abnormal returns	BMM-250 issue abnormal returns	BMM-125 issue abnormal returns	AMM-125 issue abnormal returns
Intercept	-0.0035 (0.13)	-0.0039 (0.16)	-0.0077 (0.00)	-0.0067 (0.00)	-0.0046 (0.04)
Announcement Abnormal Returns	0.1140 (0.02)	0.1234 (0.04)	0.0603 (0.21)	0.1148 (0.02)	0.0932 (0.06)
Adjusted R-squared	1.40%	1.13%	0.20%	1.42%	0.89%
F Value	5.246	4.299	1.570	5.223	3.663
Prob > F	0.02	0.04	0.00	0.00	0.00
Observations	300	289	289	295	298

Table 8

Regression of the withdrawal period abnormal returns
on the announcement period abnormal returns

The market index is the CRSP equally weighted index. Pre announcement market model BMM-250 is based on announcement days -260 to -11. Pre announcement market model BMM-125 is based on announcement days -135 to -11. Post withdrawal market model AMM-250 is based on withdrawal days +11 to +260. Post withdrawal market model AMM-125 is based on withdrawal days +11 to +135. The equally weighted market adjusted abnormal returns (EW) use the CRSP equally weighted index. P-values appear in parentheses below the regression coefficients.

Variable	EW withdrawal abnormal returns	AMM-250 withdrawal abnormal returns	BMM-250 withdrawal abnormal returns	BMM-125 withdrawal abnormal returns	AMM-125 withdrawala bnormal returns
Intercept	-0.0167 (0.15)	-0.0183 (0.10)	-0.0083 (0.49)	-0.0185 (0.09)	-0.0087 (0.40)
Announcement Abnormal Returns	-0.5459 (0.00)	-0.6582 (0.00)	-0.1930 (0.42)	-0.5520 (0.00)	-0.5390 (0.00)
Adjusted R-squared	18.44%	26.96%	-0.93%	22.01%	20.57%
F Value	9.367	14.285	0.677	11.444	10.584
Prob > F	0.00	0.00	0.42	0.00	0.00
Observations	38	37	36	38	38

Table 9

Abnormal order flow ratio
using the closing transaction price, and closing bid and ask quotes

The order flow ratio is calculated using the closing bid, closing ask and the last transaction price of the day. The order flow ratio is (ask - transaction price)/(ask - bid).

The mean test is a t-test and the median test is a rank sign test. The p-values are in parentheses.

Comparison Period - Announcement Days -2 to -31			
Issue Day	Obs	Abnormal Order Flow Ratio Mean	Abnormal Order Flow Ratio Median
-1	62	0.0021 (0.97)	0.0042 (0.90)
0	52	0.0420 (0.47)	0.0218 (0.68)
1	55	0.0125 (0.80)	0.0208 (0.79)

Comparison Period - Issue Days +2 to +31			
Issue Day	Obs	Abnormal Order Flow Ratio Mean	Abnormal Order Flow Ratio Median
-1	64	0.0017 (0.97)	-0.0032 (1.00)
0	54	0.0281 (0.62)	0.0283 (0.68)
1	59	0.0095 (0.84)	0.0179 (0.79)

Table 10

Order flow ratio
using the closing transaction price, and closing bid and ask quotes

The order flow ratio is calculated using the closing bid, closing ask and the last transaction price of the day. The order flow ratio is (ask - transaction price)/(ask - bid).

Issue Day	Obs	Order Flow Ratio Mean	Order Flow Ratio Median
-1	71	.4953	.5000
0	61	.5082	.5000
1	66	.4949	.5000
Announcement Days -31 to -2	1,772	.4830	.5000
Issue Days +2 to +31	1,847	.4892	.5000

Period	Total Firms	Firms with 20 of 30 days with an order flow ratio
Announcement Days -31 to -2	88	72
Issue Days +2 to +31	90	78

Table 11

Closing bid and ask spreads

Issue Day	Obs	Mean (Median) Spread in Dollars	Mean (Median) Spread Standardized by (Bid+Ask)/2
-1	71	.2342 (.25)	.0095 (.0078)
0	61	.2418 (.25)	.0105 (.0092)
1	66	.2670 (.25)	.0117 (.0096)
Announcement Days -31 to -2	1,772	.2759 (.25)	.0115 (.0095)
Issue Days +2 to +31	1,847	.2685 (.25)	.0110 (.0093)

Table 12

Abnormal order flow ratio
using the closing transaction price, and the bid and ask quotes
before the closing transaction price

The order flow ratio is calculated using the last transaction price of the day. The bid and ask are the bid and ask before the last transaction price of the day. The order flow ratio is (ask - transaction price)/(ask - bid).

The mean test is a t-test and the median test is a rank sign test. The p-values are in parentheses.

Comparison Period - Announcement Days -2 to -31			
Issue Day	Obs	Abnormal Order Flow Ratio Mean	Abnormal Order Flow Ratio Median
-1	65	-0.0303 (0.56)	0.0361 (0.80)
0	61	0.0275 (0.61)	0.0000 (0.80)
1	60	0.0147 (0.79)	-0.0060 (1.00)

Comparison Period - Issue Days +2 to +31			
Issue Day	Obs	Abnormal Order Flow Ratio Mean	Abnormal Order Flow Ratio Median
-1	73	-0.0481 (0.35)	-0.0402 (0.48)
0	67	0.0029 (0.96)	-0.0062 (1.00)
1	65	-0.0215 (0.69)	-0.0222 (0.46)

Table 13

Order flow ratio
using the closing transaction price, and the bid and ask quotes
before the closing transaction price

The order flow ratio is calculated using the last transaction price of the day. The bid and ask are the bid and ask before the last transaction price of the day. The order flow ratio is (ask - transaction price)/(ask - bid).

Issue Day	Obs	Order Flow Ratio Mean	Order Flow Ratio Median
-1	78	.4220	.5000
0	72	.4907	.5000
1	70	.4643	.5000
Announcement Days -31 to -2	1,941	.4800	.5000
Issue Days +2 to +31	2,123	.4784	.5000

Table 14

Bid and ask spreads
based on the bid and ask before the last transaction price of the day

Issue Day	Obs	Mean (Median) Spread in Dollars	Mean (Median) Spread Standardized by (Bid+Ask)/2
-1	78	.2468 (.25)	.0102 (.0081)
0	72	.2569 (.25)	.0107 (.0098)
1	70	.2679 (.25)	.0116 (.0095)
Announcement Days -31 to -2	1,941	.2776 (.25)	.0117 (.0102)
Issue Days +2 to +31	2,123	.2717 (.25)	.0113 (.0097)

Table 15

Abnormal order flow ratio
using the daily mean order flow ratio

The abnormal order flow ratio is calculated using the daily mean order flow ratio. The daily mean order flow ratio is the mean of the individual order flow ratios for a given trading day. The order flow ratio is (ask - transaction price)/(ask - bid).

The mean test is a t-test and the median test is a rank sign test. The p-values are in parentheses.

Comparison Period - Announcement Days -2 to -31			
Issue Day	Obs	Abnormal Order Flow Ratio Mean	Abnormal Order Flow Ratio Median
-1	69	-0.0167 (0.38)	-0.0352 (0.15)
0	63	0.0200 (0.32)	0.0162 (0.61)
1	65	0.0235 (0.19)	-0.0156 (0.72)

Comparison Period - Issue Days +2 to +31			
Issue Day	Obs	Abnormal Order Flow Ratio Mean	Abnormal Order Flow Ratio Median
-1	75	-0.0102 (0.57)	-0.0275 (0.25)
0	68	-0.0133 (0.42)	-0.0027 (0.90)
1	70	0.0078 (0.64)	-0.0037 (1.00)

Table 16

Daily mean order flow ratio

The daily mean order flow ratio is the mean of the individual order flow ratios for a given trading day. The order flow ratio is (ask - transaction price)/(ask - bid).

Issue Day	Obs	Order Flow Ratio Mean	Order Flow Ratio Median
-1	80	.4725	.4623
0	73	.5101	.4730
1	76	.5121	.5048
Announcement Days -31 to -2	2,019	.4917	.4800
Issue Days +2 to +31	2,195	.4895	.4826

Table 17

Mean CRSP equally weighted market adjusted abnormal returns
in percentage terms based on the closing transaction price and quotes

The raw return is calculated by using the last transaction price, the closing ask, the closing bid, or the average of the closing bid and ask (midpoint). The market index is the CRSP equally weighted market index. The mean test of the abnormal returns is a t-test. The p-values are in parentheses.

Mean abnormal returns

Issue Day	Obs	Price Returns	Ask Returns	Midpoint Returns	Bid Returns
-1	67	0.17 (0.60)	0.17 (0.62)	0.20 (0.55)	0.23 (0.50)
0	61	-0.32 (0.25)	-0.39 (0.16)	-0.42 (0.13)	-0.45 (0.12)
1	57	-0.12 (0.65)	0.10 (0.68)	0.03 (0.90)	-0.04 (0.89)
Announcement Days -31 to -2	1,776	0.16 (0.01)	0.17 (0.01)	0.17 (0.01)	0.17 (0.01)
Issue Days +2 to +31	1,895	-0.01 (0.77)	-0.02 (0.66)	-0.02 (0.61)	-0.03 (0.58)

Table 18

Median CRSP equally weighted market adjusted abnormal returns
in percentage terms based on the closing transaction price and quotes

The raw return is calculated by using the last transaction price, the closing ask, the closing bid, or the average of the closing bid and ask (midpoint). The market index is the CRSP equally weighted market index. The median test of the abnormal returns is a rank sign test. The p-values are in parentheses.

Median abnormal returns

Issue Day	Obs	Price Returns	Ask Returns	Midpoint Returns	Bid Returns
-1	67	0.11 (1.00)	-0.18 (0.46)	0.19 (1.00)	0.02 (1.00)
0	61	-0.34 (0.07)	-0.51 (0.04)	-0.60 (0.07)	-0.54 (0.07)
1	57	-0.13 (0.29)	-0.10 (0.60)	-0.26 (0.43)	-0.32 (0.43)
Announcement Days -31 to -2	1,776	0.03 (0.73)	0.03 (0.62)	0.02 (0.83)	0.01 (1.00)
Issue Days +2 to +31	1,895	-0.09 (0.03)	-0.10 (0.01)	-0.11 (0.01)	-0.01 (0.01)

Chapter 4: Conclusion

This dissertation has examined two questions regarding the issuance of a convertible debt security.

The first topic examined how managers set the equity value in a convertible debt issue at the offering. A convertible debt security has value derived from both a debt component and an equity component. Thus, if managers choose to issue a convertible debt security, they must also choose how much of the convertible debt's value is equity at the offering. I find empirical support that managers issue more equity-like convertible debt when the firm will have a lower future operating performance and a greater potential for underinvestment. Empirical support was not found that managers take into consideration asset substitution concerns when setting the equity value in a convertible debt issue. When setting the equity value in a convertible debt security at issuance, the manager most likely take future operating performance and underinvestment concerns into consideration due to how these two items can effect the managers. Future operating performance is what enables managers to service the convertible debt's interest payments. Failure to make timely debt payments can result in the manager's decision making authority being limited by creditors or eliminated completely due to dismissal. If a manager creates a situation where a potential underinvestment problem is realized due to the manager's decision making, the firm's shareholder may remove the manager and hire a manager who will not create such underinvestment situations. Asset substitution concerns most likely don't influence managers because their compensation and employment status are most likely not influenced. Billingsley and Smith (1996) find in a survey of managers that on

average the choice to issue convertible debt is not due to asset substitution concerns.

The second topic addressed in this dissertation is why are the abnormal returns to equity negative during the issuance period of a convertible debt security. This dissertation along with Dann and Mikkelson (1984), and Mikkelson and Partch (1986, 1988) document that there are negative abnormal returns on the equity when the proposed convertible debt offering is completed. Mikkelson and Partch (1986, 1988), Officer and Smith (1986), and Lease, Masulis and Page (1991) find negative issue period returns for equity issuances. Lease, Masulis and Page (1991) find evidence that part of the negative issue day returns for a seasoned equity offering are due to a bid-ask induced bias. With a seasoned equity offering, the firm's equity can be sold only in the secondary market on the issuance day. However, the equity can be purchased in both the primary and secondary markets. The result is a buy-sell order flow imbalance in the secondary market influencing the firm's equity returns. However, on the issue day of a convertible debt offering, the equity can only be bought and sold in the secondary market. I hypothesized that a bid-ask induced bias was not contributing to the negative equity abnormal returns. I provided evidence supporting this hypothesis.

I examined a second hypothesis regarding why the abnormal returns to the equity are negative when the proposed convertible debt offering is completed. The hypothesis is that the issuance day returns are partially due to a resolution of uncertainty regarding whether the proposed offering would be completed. In my sample, only about 90% of the proposed offerings of a convertible debt security were completed. In regression tests, I find empirical support consistent with part of issue day return being due to a resolution of uncertainty.

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