STOCK PRICE RESPONSE TO CALLS OF CONVERTIBLE BONDS: STILL A PUZZLE

By

Ivan E. Brick*, Oded Palmon** and Dilip K. Patro***
Rutgers University
Rutgers Business School at Newark and New Brunswick

October 4, 2004

*ibrick@andromeda.rutgers.edu, Rutgers University, Rutgers Business School, Department of Finance and Economics, 111 Washington Street, Newark, NJ 07102, Tel: (973)353-5155;
**palmon@business.rutgers.edu, Rutgers University, Rutgers Business School, Department of Finance and Economics, 94 Rockafellar Road, Piscataway, NJ 08854;
***dilipk@andromeda.rutgers.edu, Rutgers University, Rutgers Business School, Department of Finance and Economics, 111 Washington Street, Newark, NJ 07102.
We thank William T. Moore, Avri Ravid and John Wald for their helpful comments on earlier drafts. We also thank Arnold Cowan in advising us in the use of Eventus and Louis Ederington and Jeremy Goh for allowing us to use their data.

STOCK PRICE RESPONSE TO CALLS OF CONVERTIBLE BONDS: STILL A PUZZLE

Abstract

The literature has suggested liquidity price pressure as an explanation for the negative abnormal returns surrounding the announcements of conversion-forcing calls of convertible bonds and preferred stock, and of mergers via common stock exchange. We confirm the negative abnormal returns around the conversion-forcing call announcement, and under some specifications we also document a subsequent price recovery. The *liquidity hypothesis* implies that the price recovery should be inversely related to the initial price decline, and that the abnormal returns during the announcement event and the post announcement event should be related to proxies measuring the stock's liquidity. Our estimates are not consistent with these implications. Finally, we also do not find support for alternative explanations offered in the literature. Hence, we conclude that the reason for the negative abnormal returns around the announcement of a conversion-forcing call is still a puzzle.

Key words: Convertible bonds, Conversion forcing call, Liquidity pressure, Asymmetric information

STOCK PRICE RESPONSE TO CALLS OF CONVERTIBLE BONDS: STILL A PUZZLE

I. Introduction

The literature concerning the motivations and implications of conversion-forcing calls of convertible bonds is at least a quarter-century old (see, for example, Ingersoll (1977a) and Brennan and Schwartz (1977)). Recently, Campbell, Ederington, and Vankudre (1991), Mazzeo and Moore (1992), and Ederington and Goh (2001) document negative abnormal returns for a short window around the conversion-forcing call announcement, followed by a long post-event period with positive abnormal returns. Mazzeo and Moore (1992), Byrd and Moore (1996), and Ederington and Goh (2001) interpret the initial decline and the following recovery as indicating liquidity pressures.[1]

In this paper, we further explore this *liquidity hypothesis* for a sample of conversion-forcing call announcements (COFCAs, hereafter) and check its robustness in two ways. First, we use alternative measures of abnormal returns to re-examine the price reversal. These alternative measures of abnormal returns include those developed by Fama and French (1993), Barber and Lyon (1997) and Lyon, Barber and Tsai (1999). Second, we examine the cross-sectional relationship between the abnormal returns during and after the COFCAs and illiquidity and asymmetric information proxies. The *liquidity hypothesis* implies that abnormal returns during the event period should be negatively related to illiquidity measures (i.e., the less liquid is the security the more negative should be the abnormal return). Furthermore, the post-event positive abnormal returns should be

---

[1] A similar interpretation is given by Kadapakkam and Tang (1996) for stock price reaction around the announcement of the forced conversion of preferred stocks, and by Mitchell, Pulvino and Stafford (2004) for the abnormal returns around merger announcements.

negatively related to the event abnormal returns and positively related to the illiquidity measures.

We confirm the negative abnormal returns during the COFCA event window and, under some specifications, a subsequent price recovery. However, these abnormal returns are not statistically related to illiquidity proxies. Furthermore, we do not find a robust statistical relationship between the post-event abnormal returns and the event abnormal returns.

The literature considers asymmetric information as another explanation for the negative abnormal returns around COFCAs (see, for example, Harris and Raviv (1985) and Kim and Kallberg (1998)). Consequently, we also include proxies for asymmetric information in our cross-section regressions, but do not find a relationship that is consistent with the predictions of the *asymmetric information hypothesis*.

Although the results are not presented in the paper (see footnotes 3, 5 and 12), we also examine alternative specifications of our cross-sectional regressions that include proxies for the impacts of the loss of tax shields (Mikkelson, 1985) and the realization of valuable investment options (Mayers, 1998). The estimates of these regressions do not offer empirical support for the tax shield and the investment option hypotheses. Hence, provided that the proxies for liquidity and asymmetric information we use are appropriate, we conclude that the negative reaction to COFCAs is still a puzzle.

The organization of the paper is as follows: Section II reviews the literature and delineates our empirical hypotheses. Section III describes the data and methodology. Section IV reports the results and Section V offers concluding remarks.

II. Literature Review and Empirical Hypotheses

The literature on calls of convertible bonds focuses on the optimal time to call and the market reaction of stock prices to these calls. Ingersoll (1977a) and Brennan and Schwartz (1977) demonstrate that stockholders expropriate the largest possible amount from holders of convertible bonds if they force conversion when the conversion value equals the call price. Nevertheless, Ingersoll (1977b), Shleifer and Jaffee (1988) and Dunn and Eades (1989) among others, document that most companies delay the conversion-forcing call.[2] Thus, the market should react positively when a firm finally forces the conversion to eliminate the option held by bondholders. However, Mikkelson (1981) and Ofer and Natarajan (1987) and others document that forcing a conversion is associated with negative abnormal equity return.

Harris and Raviv (1985) and Kim and Kallberg (1998) develop an asymmetric-information model that suggests that forcing a conversion is a negative signal regarding the value of the company. When managers have a negative signal about the company's value, they force conversion in order to save company's cash flow. When managers have a good signal, they distinguish their companies by not forcing a conversion, and let bondholders elect to convert voluntarily when the positive information is revealed.[3] Thus, the *asymmetric information hypothesis* implies that the market should react

[2] However, according to Asquith (1995), convertible bonds are usually called almost immediately after the expiration of the call deferment period and after the conversion value reaches (on average) 120% of the call price. Butler (2002) derives the optimal call policy given that firms must provide 30-day notification of their intent to call and finds that the optimal call announcement should be when the stock price is above its conversion price. Altintig and Butler (2004) show that after accounting for the 30-day notification of a call, COFCAs are not delayed.

[3] Mikkelson (1985) offers an alternative explanation for the negative abnormal returns, suggesting that calling convertible bonds reduces the level of debt. Hence, the negative abnormal returns around the announcement window are due to the loss of interest tax shields. However, given that conversion forcing calls are initiated voluntarily by management, the tax-related impact cannot be the only reason for the negative abnormal return.

negatively to COFCAs.[4] Furthermore, the magnitude of the negative abnormal return around the announcement should be positively related to the degree of information asymmetry regarding the company. We assume that this information asymmetry is negatively related to the number of analysts that follow the company. Additionally, if the negative information conveyed by COFCAs is immediately impounded in security prices, then we should not observe abnormal returns during the post announcement period.[5]

Ofer and Natarajan (1987) find long-term negative abnormal performance (in terms of equity returns and accounting measures) in support of the asymmetric-information explanation. However, as the authors mention, a long-term (post-event) abnormal equity return is also an indication of either market inefficiency or an inappropriate benchmark. Because convertible bonds are issued out of the money, and because conversion-forcing calls occur when these bonds have recently become at- or in-the-money, COFCAs usually follow an increase in stock price. Thus, using the pre-event period as an estimating period may introduce a downward bias in the estimated abnormal returns. Cowan, Nayar and Singh (1990) show that the long-term negative abnormal returns observed following calls of convertible bonds as shown by Ofer and Natarajan (1987) is indeed due to biased estimates for the market model when pre-event data are used to estimate the market model. Consistent with market efficiency, Cowan, Nayar and Singh (1990) document the absence of long-term (post-event) abnormal returns when

[4] Recall that, assuming that management makes voluntary decisions that enhance firm value, a negative abnormal return following a voluntary management decision is consistent only with new negative information that this decision reveals to the public.

[5] Mayers (1998) proposes that firms issue convertible bonds to provide them with necessary flexibility to finance future investment opportunities. In particular, Mayers assumes that convertible debt issuing firms hold valuable investment options. Should these investment options prove valuable and worth exercising, the firms will force the conversion of convertible debt, freeing up debt capacity, so that they issue new debt to finance the new investments. Consequently, the *investment option hypothesis* implies that the COFCAs should be associated with positive abnormal returns. However, the negative abnormal returns around the announcement date are not consistent with this theory.

post-event data are used to estimate the parameters for estimating abnormal returns of the market model. Nevertheless, consistent with other studies, they also find negative abnormal returns during the short-term event window surrounding the actual announcement.

In subsequent research, Campbell et al. (1991), Mazzeo and Moore (1992), Byrd and Moore (1996), and Ederington and Goh (2001) employ a post-event estimation period and document negative abnormal returns around the COFCAs, followed by positive abnormal returns. Further, Ederington and Goh (2001) find that insiders buy equity before the announcements and analysts increase their earnings forecasts. Thus, they conclude that the price decline is due to liquidity price pressures rather than asymmetric information. In an imperfect (or a relatively thin) market, the increase in the number of outstanding shares induces an initial price decline and a subsequent price recovery as the market absorbs the new shares. According to the *liquidity hypothesis*, the magnitude (i.e., absolute value) of the initial price decline should be positively related to illiquidity measures. Additionally, the post-event returns should be positively related to the magnitude of the initial price decline and/or to illiquidity measures.

In this paper, we complement this literature by demonstrating that the statistical significance of the price recovery during the long-term post-event period is sensitive to the empirical methodology used to obtain the abnormal returns. Furthermore, and more importantly, we document that the negative price decline and subsequent price recovery are not related to traditional illiquidity and asymmetric information proxies. Thus, the current paper raises doubts whether the negative abnormal returns around COFCAs should be attributed to liquidity price pressures.

III. Data and Methodology

Data

Our original sample includes 360 announcements of calls of in-the-money convertible bonds between December 1984 and April 2000. The sample from 1984-1993 is kindly made available to us by Ederington and Goh (2001). This sample is collected from *Standard and Poor's Bond* Guide and excludes zero coupon bonds and bonds with embedded options (such as LYONs). The announcement dates are collected from *Lexis-Nexis*. We collect 92 additional observations to update this sample until April 2000. We obtain notices of called convertible bonds from *Mergent's Industrial Manual* to identify those convertible debt issues that were called between 1993 and 2000 and find the earliest announcement dates of these calls using *Factiva* and *Lexis-Nexis*.

For the full sample, we obtain data on issue size, conversion ratio, and final maturity of the issues from *Factiva*, and the daily returns, market capitalization of equity, and the returns on the market indices from *CRSP*. For each of the firms we also obtain the three measures of liquidity (or illiquidity) that are discussed in Hasbrouck (2003, 2004) and are available on his web site. Furthermore, we obtain from *Compustat* accounting data for these firms, including the data needed to identify the appropriate matched firms. Finally, we use *I/B/E/S* to obtain the number of analysts for each firm in the sample. The final sample size used in each of our empirical tests varies depending upon data availability.

Event Study Methodology

As a starting point of our analysis, we use the traditional market model to estimate the abnormal returns. The market model for firm i is estimated as follows:

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t} \quad (1)$$

where, $R_{i,t}$ is its return on day t and $R_{m,t}$ is the corresponding return on the CRSP market index. We estimate our abnormal returns using the CRSP value weighted market index, and alternatively the CRSP equally weighted index and report both sets of results. After we estimate the parameters of the market model, we estimate the abnormal return for each day for each firm, as follows:

$$AR_{i,t} = (R_{i,t} - \hat{\alpha}_i - \hat{\beta}_i R_{m,t}) \quad (2)$$

These abnormal returns are averaged for each event day across firms (where t=0 is the announcement day). Next, the *Cumulative Abnormal Returns* (CARs) are computed for windows of interest by summing the average abnormal returns for those windows.

As we discuss above, the results from event studies around calls of convertible bonds are very sensitive to the estimation period of the market model. Where as traditional event studies use a period before the event as the estimation period, recent COFCA studies (such as Ederington and Goh (2001)) use the post-event period since the firms that announce calls often experience significant positive abnormal returns prior to the event. We first evaluate whether any difference between the results of this study and the corresponding results in previous studies could be attributed to a difference in the data set rather than the empirical methodology. Thus, we examine the event and post-event abnormal returns using estimation periods *both* before (as did Ofer and Natarajan (1987)) and after the event (as did Ederington and Goh (2001)). The pre-event estimation period is t = -506 to t = -251, while the post-event estimation period is t = 251 to t = 506. For both parametric estimation procedures we use, alternatively, the CRSP value weighted and equally weighted market indices.

We estimate the CARs for various event windows and use several alternative procedures to test whether the CARs are significantly different from zero. First, we use the standard Patell (1976) test, which we refer to as the Z statistic. This test is often referred to as the standardized abnormal returns test and assumes cross-sectional independence. Second, we report the standardized cross-sectional test introduced by Boehmer, Musumeci and Poulsen (1991), which we denote as *SCS Z*. Unlike the Patell test, this test allows for a possible increase in variance on an event date. Finally, we also estimate the generalized sign Z, which is a test of the hypothesis that the fraction of positive returns is the same during the event window and the estimation period. This non-parametric test complements the above two parametric tests and provides robustness for significance of our test results.

The sample size when we calculate the cumulative abnormal returns using the market model with a pre-event estimation period is 354. When we use a post-event estimation period our sample size is 321.

Long-Run Abnormal Stock Returns

Barber and Lyon (1997) and Lyon, Barber and Tsai (1999) show that the traditional event study methodology yields mis-specified test statistics in long-horizon studies. Furthermore, Campbell et al. (1991) note that if one accepts the existence of long-term positive abnormal returns following COFCAs, using the post-event period as an estimating period may bias the abnormal returns towards zero. Therefore, we employ the two methods advocated by these studies.

First, for the buy-and-hold return approach we match each company in our sample with a company that has equity capitalization and market to book value within +

or – 20 percent range. Because we do not find an appropriate match for all the firms in our sample, our sample size is reduced to 313 observations. We then employ the buy-and-hold return methodology as delineated by Tsai, Lyon and Barber (1999) to measure the abnormal returns of our sample firms. The buy-and-hold abnormal return is defined as the difference between the holding period returns of the sample and matched firms as follows.

$$BHAR_i(I,J) = BHR_i(I,J) - BHR_{m,i}(I,J) \qquad (3)$$

where $BHR_i(I,J)$ is the buy-and-hold return for the security i between days I and J and the $BHR_{m,i}(I,J)$ is the corresponding buy-and-hold return for its matched firm. The holding period returns for each firm is calculated as the product of the one plus the daily returns for the various event windows. Our inferences for the BHAR are based on the standardized cross-sectional *t* statistic as given by Brown and Warner (1985), and the bootstrapped skewness corrected t-statistic.[6] We check whether our choice of matched firms affects our results by using an alternative procedure in which we compute BHAR using the market index as the reference portfolio.

Second, we employ the calendar time portfolio approach using the Fama-French three factor model. This method controls for cross-sectional dependence across firms. The three factors are the excess return on the market proxied by the excess return in the CRSP value weighted index, the difference between returns of small and big firms (SMB) and the difference between returns of high and low book-to-market firms (HML). The data on these factors were obtained from Professor Kenneth French's website. The excess return on the portfolio of firms that have a COFCA on day t, $R_{pt} - R_{ft}$, is regressed

[6] Note that we do not employ the Boehmer et al. (1991) cross-sectional t-test for our buy-and-hold abnormal return calculations since with BHAR there is only one estimation per firm and the cross-sectional t-statistic is the approach recommended by Tsai, Lyon and Barber (1999).

on the three factors for that calendar day. The intercept is the estimated abnormal return during the event window. The model used is:

$$R_{pt} - R_{ft} = \alpha + \beta\,(R_{mt} - R_{ft}) + s(p)\,SMB_t + h(p)\,HML_t + \varepsilon_{pt} \qquad (4)$$

We estimate this model and test the intercept for two windows, (-1, 1), (1, 20), (2, 21) and (+21, +250).

Cross-Sectional Analysis of the Cumulative Abnormal Returns

We conduct cross-sectional analyses of the cumulative abnormal returns during the announcement window and a post-event window to ascertain whether there is empirical support for the *liquidity* and/or *asymmetric information hypotheses*. We use both the market model (post-event estimation period) and the matched-sample buy-and-hold methodologies to estimate the relevant abnormal returns. We estimate our regressions using OLS and, because of heteroskedasticity, report White t-statistics, which are heteroskedasticity-consistent. Below, we discuss the variables used in our cross-sectional analysis.

Dependent Variables: We examine the cumulative abnormal returns during a two-day and a three-day event window around the call announcement, as well as during a following twenty-day window. When we use the market model we denote the (-1, 0) and (-1,1) window abnormal returns as *CAR2* and *CAR3*, respectively. We denote the corresponding twenty-day post-event abnormal returns (i.e., (1, 20) and (2, 21)) as *POSTCAR2* and *POSTCAR3,* respectively. When the abnormal returns are based upon the buy-and-hold return methodology we denote the corresponding variables as *BHAR2, BHAR3, POSTBHAR2* and *POSTBHAR3,* respectively. Finally, we also calculated the abnormal returns using the Fama-French three-factor model.

Independent Variables: The independent variables that we use in the cross-sectional analyses belong to three categories: illiquidity proxies, asymmetric information proxies, and a size control variable.

Illiquidity proxies: Hasbrouck (2004) advocates using the Gibbs sampler estimate of trading costs as a measure of liquidity. We denote this proxy as *Gibbs*. This proxy estimates the average trading price deviation from the equilibrium price. Hasbrouck (2003) demonstrates that *Gibbs* has a correlation of .9 for individual securities (and .98 for portfolios) with the bid-ask spread reported by TAQ. We also use, and denote as *ilq*, the inverse of the Amivest measure. The Amivest measure (i.e., the ratio of volume to absolute return) is used by numerous studies (see, Cooper, Groth and Avera (1985), Amihud, Mendleson and Lauterbach (1997), and Berkman and Eleswarapu (1998)). We also check for the robustness of these measures by employing several alternative measures: Amihud's (2000) illiquidity measure, the standard deviation of the scaled daily price range, the volatility of daily returns, and the reciprocal of the price.[7] However, since the results are not qualitatively different from the estimates that are reported in the paper, we do not report them.

According to the *liquidity hypothesis,* the price declines around the COFCAs result from unexpected large infusion of shares into illiquid markets. Consequently, we also consider an interaction effect between our illiquidity proxies and the stock dilution that is caused by the call. We measure the infusion of new shares by the dilution of the stock, and denote this measure by the variable *DILUTION*. This variable is defined as the product of the conversion rate and the par value of the called convertible debt in

[7] We define the daily scaled price range as the difference between the highest and lowest prices of the day scaled by the closing price. We calculate the average and standard deviation of the scaled daily price

thousands of dollars divided by the number of shares prior to the COFCA. The product of *DILUTION* and *Gibbs* is denoted as *DGibbs* and the product of *DILUTION* and *ilq* is denoted as *Dilq*. According to the *liquidity hypothesis* the abnormal returns around the announcement date should be negatively related to these interaction variables, but the post-announcement buy-and-hold abnormal return should be positively related to interaction variables.

Asymmetric information proxies: The degree of asymmetric information is related to the importance of the new information that is implied by a management announcement. We posit that asymmetric information should be inversely related to the number of analysts that follow the company.[8] Because the marginal contribution of analysts to the resolution of the information asymmetry is likely to decrease as the number of analysts increases, we use as a measure of information symmetry, and denoted as *lnumber,* the logarithm of one plus the number of analysts during the fiscal year prior to the announcement Second, according to the *asymmetric information hypothesis*, firms call their convertible bonds when managers consider the stock overvalued. We use the abnormal returns in the (-21, -2) event window as a proxy for the degree of overvaluation.[9] We denote this variable as *CARB4* when we use the market model methodology (post-event estimation) and as *BHARB4* when we use the buy-and-hold methodology. According to the *asymmetric information hypothesis*, the abnormal returns during the announcement window should be positively related to *lnumber* and negatively related to either *CARB4*

---

range, and the volatility of daily returns using price and return data from t = -251 to t = -31 The reciprocal of the price of the stock is measured as of t = -2.

[8] The fraction of equity that is held by institutional investors for the quarter prior to the announcement (from Spectrum) is an alternative proxy for (the lack of) asymmetric information. However, the two measures are highly correlated, and using them yields similar estimates. Thus, the estimates obtained by using this alternative proxy are not reported, but are available upon request.

[9] We check the robustness of this event window by also using the (-251, -22) event window as a proxy for the degree of overvaluation.

or *BHARB4*. Additionally, the *asymmetric information hypothesis* implies that in an efficient market the post-event abnormal returns should not be significantly different from zero and should not be related to *lnumber*, *CARB4*, or *BHARB4*.

Control Variable: We include as a control variable the logarithm of the equity market capitalization of the firm, denoted as *lsize*. Note that firm size may be positively related to liquidity because larger firms tend to be more liquid, and negatively related to the degree of asymmetric information because larger firms are generally better covered by the media. Hence, we estimate our regressions with and without this control variable.

The sample size for our cross-sectional regressions is reduced by the lack of data availability on liquidity, the number of analysts and the dilution impact of the conversion-forcing call. The sample size for most of the cross-section regressions is 235, but the regressions that include *DGibbs* or *Dilq,* are based on a sample of 183 observations.

Descriptive Statistics of the Independent Variables Used in the Cross-sectional Analysis: Panel A of Table 1 provides summary statistics of our key independent variables, and Panel B presents their correlation matrix. For the sample used in our cross-sectional regressions, there are on average 15 analysts following a company. The minimum number of analysts reported by I/B/E/S is one and the maximum is 57. The average size of the company is almost $3 billion. The smallest firm has an equity capitalization of approximately $36 million, and the largest firm has an equity capitalization of approximately $118 billion. The call of convertible bonds is a dilutive event. The mean percentage increase of common shares due to the call is 13.37 percent and the maximum is 105 percent.

We find several significant correlations among our independent variables. In particular, *lnumber* is positively correlated with *size*, and negatively related with our proxies for illiquidity, *Gibbs* and *ilq*. The former is expected since large firms attract a large number of analysts. The latter is expected because there should be a negative relationship between liquidity and the level of information asymmetry. Interestingly, *size* and *Gibbs* are not correlated, but *size* is significantly negatively related to *ilq*. Next we discuss our empirical results.

IV. Results

Market Reaction to Announcements of Calls of Convertible Bonds: In order to verify that our sample is not the reason for any difference between our results and those in previous studies, we use the traditional event study methodology to estimate the abnormal returns during several pre-announcement, announcement, and post-announcement event windows. We repeat these estimates using two alternative estimation periods. Table 2 presents the estimates when we follow early studies and use a pre-announcement estimation period (t = -506 to t = -251). The estimates in Panel A are based upon the equally-weighted index, and those in Panel B are based upon the value-weighted index. The estimates are qualitatively similar to those in previous studies that use a pre-announcement estimation period (see, for example, Ofer and Natarajan (1987)). The pre-announcement abnormal returns are positive and significantly different from zero, while the abnormal returns during the short-term announcement period and the long-term post announcement period are negative and significantly different from zero.

Next we repeat these tests using a post-announcement estimation period (t = 251 to t = 506). The results presented in Table 3 are consistent with the previous literature (e.g., Mazzeo and Moore (1992), Datta and Datta (1996), and Ederington and Goh (2001)). The announcement-event-window abnormal returns are negative and similar to those obtained using the pre-announcement estimation period, while the pre-announcement abnormal returns are even more positive than their counterparts in Table 2. However, the long-term post announcement abnormal returns are now positive and significantly different from zero.

In summary, the estimates that are reported in Tables 2 and 3 indicate that the patterns of the returns on the equity of the conversion-forcing firms in our sample are very similar to the patterns reported in previous studies. However, the contrast between the estimates that are reported in Tables 2 and 3 motivates the use of a procedure that does not employ either a pre-event or a post-event period as a benchmark.

Recently, several studies (e.g., Barber and Lyon (1997) and Lyon, Barber and Tsai (1999)) indicate that the traditional measure of Cumulative Abnormal Returns that are generated by the event study methodology is inappropriate for long-term windows. Thus, we re-estimate the long-term abnormal returns before and after a COFCA using several procedures suggested by these studies. In Panel A of Table 4 we report estimates from a procedure in which we employ the buy-and-hold return on the market as the benchmark return. In Panel B of Table 4 we report the corresponding estimates when we employ as benchmarks the buy-and-hold returns on firms that are matched to our sample firms by size and market–to-book value. A graphic summary of the results for Tables 2 – 4 is given by Figure 1.

The estimates in Table 4 indicate that the buy-and-hold abnormal returns are qualitatively similar to the traditional cumulative abnormal returns prior to, and during, the conversion-forcing announcement period. However, in contrast to the estimates using the market model, the buy-and-hold abnormal returns during the year following the conversion-forcing announcement are insignificantly different from zero. For example, in Panel A of Table 3 we report that, employing the traditional market model methodology with a post-event estimation period and an equally-weighted index, the abnormal return during the post-event period (t = 21 to t =250) is 7.65 percent with a Z-statistic of 3.161. Ederington and Goh's (2001) corresponding estimate is 6.7 percent with a Z-statistic of 3.92. However, our estimate using the matched firm buy-and-hold abnormal return methodology (as reported in Panel B of Table 4) is only 1.06 percent and is not significantly different from zero (the cross-sectional t-statistic is 0.743).[10] Lyon, Barber, and Tsai (1999) indicate that estimates obtained from calendar time methodology developed by Fama and French (1993) are also superior to the Cumulative Abnormal Returns. Using this procedure we confirm the negative abnormal returns during the conversion-forcing announcement event window and the positive abnormal returns during the following 20-day period. However, we do not find abnormal returns beyond this 20-day period. These estimates are reported in Table 5.[11]

Cross-sectional Regressions:

First, we regress the post-event abnormal returns on the abnormal returns during the announcement window to test for mean-reversion of returns. Mazzeo and Moore (1992) use such a test to infer whether the price reaction is due to liquidity pressures. The results are reported in Table 6. Panels A and B report the results when we employ

[10] Because we do not find appropriate matched firms for all of our sample firms, our sample size using the buy-and-hold methodology is smaller than the sample size using the traditional market model methodology. Nevertheless we re-estimate the traditional market model methodology using the smaller sample that is used by the buy-and-hold methodology. We find that the abnormal returns using the market model methodology are very similar to that obtained using the larger sample. Thus, any difference between the two methodologies should not be attributed to the difference in samples.
[11] We also calculate the intercept using the Fama-French calendar time portfolio regression for days (0, +3). The alpha is identical to that reported in Table 5 but is significant at the 5 % level.

the market model and the buy-and-hold methodologies, respectively, to estimate the abnormal returns. We estimate the post-event abnormal returns for two windows: days (1, 20) and (2, 21). This facilitates the comparison of our findings to those of Mazzeo and Moore (1992).

The independent variables in the regressions reported in Panel A are *CAR2* and *CAR3,* respectively. For the regressions reported in Panel B they are *BHAR2* and *BHAR3,* respectively. In all four specifications (for the two-day and three-day event windows) we find no statistically significant relationship between the post-event abnormal returns and the announcement window abnormal return. Hence, these findings do not provide strong support for the *liquidity hypothesis.*

In Tables 7, 8 and 9, we present our cross-sectional regressions where we estimate the relationship between the abnormal returns and our illiquidity and asymmetric information proxies. The dependent variables in these tables are, respectively, the cumulative abnormal returns during the two-day and three-day windows surrounding the call announcement, and in the following twenty-day window. Panels A and B of Table 7 present the estimates of cross-sectional regressions where the dependent variables are *CAR2* and *BHAR2,* respectively. First, note that the dependent variables are not significantly related to the independent variables in the univariate specifications. Second, while most of the coefficients of the illiquidity proxies are not significantly different from zero in the multivariate specifications, none has the negative sign that is implied by the *liquidity hypothesis*. Third, we find mixed support for the *asymmetric information hypothesis*. The coefficients of *CARB4* and *BHARB4* in the multivariate regressions are negative and generally significantly different from zero. Moreover, the significant positive coefficients for *lsize* in several of the multivariate specifications are also consistent with the prediction of the *asymmetric information hypothesis,* if *lsize* is considered a proxy for the lack of information asymmetry. However, the coefficient of *lnumber* is always negative and therefore inconsistent with the prediction of the *asymmetric information hypothesis.* Thus, the estimates reported in Table 7 do not strongly support either the *liquidity hypothesis* or the *asymmetric information hypothesis.*

Table 8 is structured similarly to Table 7, but the dependent variables are *CAR3* and *BHAR3,* the three-day abnormal return proxies for the announcement event window (-1, 1). The coefficients that are reported in Table 8 are similar to those that are reported in Table 7 in two ways. First, none of the coefficients estimated in the univariate specifications is significantly different from zero. Second, in the multivariate regressions, the coefficients of *lsize* are positive and several of them are significantly different from zero, and the coefficients of *lnumber*, *CARB4*, and *BHARB4* are negative and some of them are significantly different from zero. Thus, the results reported in Table 8, as those reported in Table 7, do not provide strong support for either the *liquidity hypothesis* or the *asymmetric information hypothesis*

Table 9 presents the estimates of cross-sectional regressions where the dependent variables are *POSTCAR* and *POSTBHAR,* the twenty-day abnormal returns for the post-announcement event window (2, 21). We also estimate the twenty-day abnormal returns for days (1, 20) as an alternative proxy for the post-event abnormal returns. Additionally, we calculate the abnormal returns when the Fama-French three-factor model replaces the market model. All these results are similar to that reported in Table 9 and therefore are not formally presented.

Note that unlike for the announcement event window, we find that the coefficients for several of our illiquidity proxies are significantly positive. These results are consistent with the *liquidity hypothesis* that predicts that returns in the post event period should be positively related to the degree of illiquidity of the stock. However, the results are not robust as the coefficients of these variables are not statistically different from zero in the multivariate specifications.

Interestingly, the coefficients for *lnumber* are negative, but are significantly different from zero mainly in Panel B (when the dependent variables are the abnormal returns obtained from the buy-and-hold procedure). In contrast, the coefficients for *CARB4* (in Panel A) are positive and significantly different from zero, while those for *BHARB4* (in Panel B) are generally negative but are not significantly different from zero. Thus, the results that are reported in Table 9 also indicate that the estimates are not robust to alternative specifications and methodologies for obtaining the abnormal returns. Again, we do not find robust empirical support for either the *liquidity* or the *asymmetric information hypotheses.*[12]

V. Conclusion

Campbell et al. (1991), Mazzeo and Moore (1992), and Ederington and Goh (2001) document negative abnormal returns around the announcements of conversion-forcing calls of convertible debt. These negative abnormal returns are accompanied by a post-event period with positive abnormal returns. Mazzeo and Moore (1992), Byrd and Moore (1996), and Ederington and Goh (2001) interpret the initial decline and the

[12] The literature has offered additional explanations for the impact of a conversion-forcing call, most notably are the investment option hypothesis (see Mayers (1998)) and the loss of tax shields (see Mikkelson (1985)). In alternative specifications we include also variables that should be associated with the abnormal returns according to these hypotheses. These variables include the Market-to-Book ratio as a measure of the investment option, and John Graham's estimate of the effective tax rate (see, Graham 1996). We do not report the results from these specifications because the coefficients of these variables are not significantly different from zero, and because including them does not qualitatively affect the coefficients that are reported in Tables 7, 8 and 9.

following recovery as indicating liquidity pressures. The *liquidity hypothesis* implies that the price recovery should be inversely related to the initial price decline, and that the abnormal returns during the announcement event and post announcement event should be related to proxies of the stock's liquidity.

We contribute to this debate by using recent advances in measuring long-horizon abnormal returns and directly relating the abnormal returns to proxies for liquidity and private information. We confirm the existence of negative abnormal returns around forced-conversion call announcements of convertible bonds (COFCAs) and, for some specifications, the existence of price recoveries following the announcements. However, these negative abnormal returns around the announcement date are not statistically related to either the illiquidity or the asymmetric information proxies. Additionally, we do not find a statistical relationship between the post-event abnormal returns and the event abnormal returns. Even though the post-event returns are not always significantly different from zero, we find some cross-sectional relationship between abnormal returns and our illiquidity proxies that is consistent with the predictions of the *liquidity hypothesis*. Nevertheless, the results are not robust and are sensitive to the empirical specification. We also test for the empirical prediction that COFCAs are negative signals as well as other hypotheses such as interest tax loss and investment options. We find no consistent empirical support for these alternative hypotheses. Hence, we conclude that the negative market reaction to COFCAs is still a puzzle.

References

Altintig,Z. Ayca and Alexander W. Butler, 2004, "Are They Still Called Late? The Effect of Notice Period on Calls of Convertible Bonds, "*Journal of Corporate Finance*, forthcoming.

Asquith, Paul, 1995, "Convertible Bonds Are Not Called Late," *Journal of Finance,* 50, 1275-89.

Asquith, Paul, and David W. Mullins, 1991, "Convertible Debt: Corporate Call Policy and Voluntary Conversion," *Journal of Finance*, 46, 1273-89.

Barber, Brad M. and John D. Lyon, 1997, "Detecting Long-Run Abnormal Stock Returns: The Empirical Power And Specification Of Test Statistics," *Journal of Financial Economics*, 43, 341–372.

Boehmer, Ekkehart, Jim Musumeci, and Annette B. Poulsen, 1991, "Event-Study Methodology under Conditions of Event-Induced Variance," *Journal of Financial Economics*, 30, 253–272.

Brennan, Michael J., and Eduardo S. Schwartz, 1977, "Convertible Bonds: Valuation and Optimal Strategies for Call and Conversion," *Journal of Finance*, 32, 1699-1715.

Brown, Stephen J., and Jerold B. Warner, 1985, "Using Daily Stock Returns: The Case Of Event Studies," *Journal of Financial Economics*, 14, 3 –31.

Butler, Alexander W., 2002, "Revisiting Optimal Call Policy for Convertibles" *Financial Analysts Journal,* January/February, 50 –55.

Byrd, Anthony K., and William T. Moore, 1996, "On the Information Content of Calls of Convertible Securities," *Journal of Business*, 69, 89-101.

Campbell, Cynthia J., Louis H. Ederington, and Prashant Vankudre, 1991, "Tax Shields, Sample-Selection Bias, and the Information Content of Conversion-Forcing Bond Calls," *Journal of Finance*, 46, 1291-1324.

Cowan, Arnold R., Nandkumar Nayar, and Ajai K. Singh, 1990, "Stock Returns Before and After Calls of Convertible Bonds," *Journal of Financial and Quantitative Analysis*, 25, 549–554.

Cowan, Arnold R., Nandkumar Nayar, and Ajai K. Singh, 1992, "Underwriting Calls of Convertible Securities: A Note," *Journal of Financial Economics*, 31, 269-78.

Cowan, Arnold R., Nandkumar Nayar, and Ajai K. Singh, 1993, "Calls of Out-of-the-Money Convertible Bonds, *Financial Management,* 22, 106-16.

Cowan, Arnold R. and Anne M.A. Sergeant, 2001, "Interacting Biases, Non-Normal Distributions and the Performance of Tests for Long-Horizon Event Studies," *Journal of Banking and Finance*, 25, 745-65.

Datta, Sudip, and Mai Iskandar-Datta, 1996, "New Evidence on the Valuation Effects of Convertible Bond Calls," *Journal of Financial & Quantitative Analysis*, 31, 295-307.

Dunn, Kenneth B., and Kenneth M. Eades, 1989, "Voluntary Conversion of Convertible Securities and the Optimal Call Strategy," *Journal of Financial Economics*, 23, 273-301.

Ederington, Louis H, Gary L. Caton, and Cynthia J. Campbell, 1997, "To Call or Not to Call Convertible Debt," *Financial Management*, 26, 22-31.

Ederington, Louis H., and Jeremy C. Goh, 2001, "Is a Convertible Bond Call Really Bad News?" *Journal of Business*, 74, 459-76.

Emery, Douglas R., Mai E. Iskandar-Datta, and Jong-Chul Rhim, 1994, "Capital Structure Management as a Motivation for Calling Convertible Debt," *Journal of Financial Research*, 17, 91-104.

Fama, Eugene F. and Kenneth R. French, 1993, "Common Risk Factors in the Returns of Stock and Bonds," *Journal of Financial Economics,* 33, 3-56.

Graham, John R., 1996, Debt and the marginal tax rate, *Journal of Financial Economics* 41, 41-73.

Harris, Milton, and Artur Raviv, 1985, "A Sequential Signalling Model of Convertible Debt Call Policy," *Journal of Finance*, 40, 1263-81.

Hasbrouck, Joel, 2003, Trading Costs and Returns for US Equities: The Evidence from Daily Data, Working paper, New York University.

Hasbrouck, Joel, 2004, Liquidity in the Futures Pits: Inferring Market Dynamics from Incomplete Data, *Journal of Financial and Quantitative Analysis,* forthcoming.

Ingersoll, Jonathan E., 1977a, "A Contingent Claims Valuation of Convertible Securities," *Journal of Financial Economics*, 4, 289-322.

Ingersoll, Jonathan E., 1977b, "An Examination of Corporate Call Policies on Convertible Securities," *Journal of Finance*, 32, 463-78.

Jensen, M.C. and W.H. Meckling, 1976, "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure," *Journal of Financial Economics,* 3, 305-60.

Kadapakkam, Palani-Rajan, and Alex P. Tang, 1996, “Stock Reaction to Dividend Savings of Convertible Preferred Calls: Free Cash Flow or Price Pressure Effects?” *Journal of Banking & Finance*, 20, 1759-73.

Kim, Yong O., and Jarl Kallberg, 1998, “Convertible Calls and Corporate Taxes under Asymmetric Information,” *Journal of Banking & Finance*, 22, 19-40.

Kothari, S.P., and Jerald B. Warner, 1997, “Measuring Long-Horizon Security Price Performance,” *Journal of Financial Economics,* 43, 301-39.

Lewis, Craig M., 1991, “Convertible Debt: Valuation and Conversion in Complex Capital Structures,” *Journal of Banking & Finance*, 15, 665-82.

Lewis, Craig M., Richard J. Rogalski and James K. Seward, 1998, “Agency Problems, Information Asymmetries, and Convertible Debt Security Design,” *Journal of Financial Intermediation,* 7, 32-59.

Long, Michael S. and Ileen B. Malitz, 1985, "Investment Patterns and Financial Leverage," in *Corporate Capital Structure in the United States*, Benjamin M. Friedman, ed. (Chicago and London: University of Chicago Press).

Lyon, John D., Brad M. Barber and Chih-Ling Tsai, 1999, “Improved Methods for Tests of Long-Run Abnormal Stock Returns,” *Journal of Finance*, 54, 165–201.

Mayers, David, 1998, “Why Firms Issue Convertible Bonds: The Matching of Financial and Real Investment Options,” *Journal of Financial Economics*, 47, 83-102.

Mazzeo, Michael A., and William T. Moore, 1992, “Liquidity Costs and Stock Price Response to Convertible Security Calls,” *Journal of Business*, 65, 353-69.

Mikkelson, Wayne H., 1981, “Convertible Calls and Security Returns,” *Journal of Financial Economics*, 9, 237-264.

Mikkelson, Wayne H., 1985, Capital structure changes and decreases in stockholder’s wealth: A cross-sectional study of convertible security calls. In B.M. Friedman (ed.) *Corporate Capital Structure in the United States*. Chicago: University of Chicago Press for NBER.

Mitchell, Mark, Todd Pulvino and Erik Stafford, 2004, “Price Pressure around Mergers,” *Journal of Finance*, 59, 31-63.

Ofer, Aharon R, and Ashok Natarajan, 1987, “Convertible Call Policies: An Empirical Analysis of an Information-signaling Hypothesis,” *Journal of Financial Economics*, 19, 91-108.

Patell, James M., 1976, “Corporate Forecasts of Earnings Per Share and Stock Price Behavior: Empirical Tests,” *Journal of Accounting Research*, 14, 246–274.

Ravid, S.A., and O.H. Sarig, 1991, "Financial Signaling by Committing to Cash Outflows." *Journal of Financial and Quantitative Analysis* 26, 165-80.

Ross, S., 1977, "The Determination of Financial Structure, The Incentive Signaling Approach," *Bell Journal of Economics* 8, 23-40.

Shleifer, Andrei, and Dwight M. Jaffee, 1988, "Costs of Financial Distress, Delayed Calls of Convertible Bonds, and the Role of Investment Banks," National Bureau of Economic Research Working Paper: 2558.

Singh, Ajai K, Arnold R. Cowan, and Nandkumar Nayar, 1991, "Underwritten Calls of Convertible Bonds," *Journal of Financial Economics*, 29, 173-96.

Stein, Jeremy C., 1992, "Convertible Bonds as Backdoor Equity Financing," *Journal of Financial Economics*, 32, 3-21.

Table 1: Descriptive Statistics

This table provides the summary statistics of all of our independent variables for December 1984-April 2000. *Size* is the market capitalization of the firm in millions of dollars, *DILUTION* measures the dilution of the stock as the result of the call, defined as the product of the conversion rate and the par value of the called convertible debt in thousands of dollars divided the number of shares that will become outstanding after the conversion, *Gibbs* is Gibbs sampler estimate of trading costs, *CARB4* is the cumulative abnormal return for (-21, -2) based upon the market model, *BHARB4* is the buy-and-hold abnormal return for (-21,-2), *number* is the number of analysts following the firm and *DGibbs* is the product of *DILUTION* and *Gibbs*.

Panel A: Summary statistics

Variable Label	**N**	**Mean**	**Std Dev**	**Minimum**	**Maximum**
number	235	15.42553	11.79661	1	57
size	235	2969.22	11001.60	36.567	118554.4
Gibbs	235	0.003028	0.001801	0.000705	0.011999
DILUTION	183	0.1337	0.1167	0.0003	1.0513
Ilq	226	0.010698	0.018098	0.000014767	0.110132

Panel B: Correlation matrix of independent variables

The top number in each box is the correlation coefficient. The middle number is the p-value and the bottom number is the sample size.

	BHARB4	*Size*	*Gibbs*	*lnumber*	*CARB4*	*DGibbs*	*ilq*	*Dilq*
Size	0.10124 0.1217 235	1 226						
Gibbs	0.13014 0.0463 235	0.00285 0.966 226	1 226					
Lnumber	-0.02147 0.7434 235	0.27015 <.0001 226	-0.19415 0.0034 226	1 226				
CARB4		-0.01863 0.7806 226	0.12473 0.0612 226	-0.0841 0.2079 226	1 226			
DGibbs	0.11845 0.1103 183	-0.0983 0.1855 183	0.63564 <.0001 183	-0.30988 <.0001 183	0.22062 0.0027 183	1 183		
Ilq	0.09506 0.2056 179	-0.14568 0.0285 226	0.29922 <0.0001 179	-0.59807 <.0001 226	0.10544 0.1139 226	0.34591 <0.0001 179	1 226	
Dilq	0.07289 0.3322 179	-0.0949 0.2014 183	0.37463 <0.0001 179	-0.3979 <.0001 183	0.1689 0.0223 183	0.79706 <0.0001 179	0.7563 <.0001 183	1 183

Table 2: Abnormal Returns Around Announcements of Conversion of Convertible Bonds Using a Pre-Event Estimation Period and the Market Model

Our original sample includes 360 announcements of calls of convertible bonds between December 1984-April 2000. The table reports results from a market model using the CRSP equally weighted and value weighted indices. The Estimation period is between *t* = -506 and *t* = -251. Pos:Neg is the ratio of positive to negative CARs. ***Z*** is the standard Patell (1976) test that accounts for non-iid distributions of abnormal returns, ***SCZ- Z*** is the standardized cross-sectional *Z,* similar to the one used by Boehmer, Musumeci and Poulsen (1991), *Sign Z* is the Generalized sign test indicating whether the proportion of positive to negative abnormal returns is significantly different from one. $,*,**, and *** denote statistical significance at the 10%, 5%, 1% and 0.1% levels, respectively, using a 2-tail test.

Panel A: Equally Weighted Index

Window	N	CAR	Pos: Neg	Z	SCS Z	Sign Z
(-250,-1)	354	14.98%	226:128	4.880***	5.047***	6.559***
(-250,-31)	354	11.04%	210:144	3.875***	4.147***	4.854***
(-21,-2)	354	2.16%	198:156	3.506***	3.395***	3.575***
(-1,0)	354	-0.46%	151:203	-3.198**	-2.865**	-1.434
(-1,+1)	354	-0.71%	130:224	-4.220***	-3.637***	-3.672***
(0,+1)	354	-0.65%	130:224	-4.943***	-4.045***	-3.672***
(0,+3)	354	-1.11%	128:226	-5.695***	-4.915***	-3.885***
(+2,+21)	352	0.36%	181:171	0.093	0.087	1.867$
(+4,+10)	352	-0.13%	159:193	-1.13	-1.018	-0.484
(+4,+20)	352	0.75%	183:169	1.056	1.004	2.081*
(+21,+250)	349	-10.44%	151:198	-4.824***	-4.348***	-1.195

Panel B: Value Weighted Index

Window	N	CAR	Pos: Neg	Z	SCS Z	Sign Z
(-250,-1)	354	18.95%	234:120	6.359***	6.858***	7.424***
(-250,-31)	354	13.41%	220:134	4.860***	5.424***	5.932***
(-21,-2)	354	3.09%	216:138	5.205***	5.074***	5.505***
(-1,0)	354	-0.35%	150:204	-2.723**	-2.464*	-1.528
(-1,+1)	354	-0.58%	143:211	-3.686***	-3.210**	-2.274*
(0,+1)	354	-0.56%	129:225	-4.421***	-3.650***	-3.766***
(0,+3)	354	-0.90%	130:224	-4.885***	-4.268***	-3.660***
(+2,+21)	352	0.71%	191:161	0.633	0.604	2.948**
(+4,+10)	352	-0.03%	168:184	-0.708	-0.643	0.49
(+4,+20)	352	0.99%	195:157	1.453	1.383	3.376***
(+21,+250)	349	-5.32%	159:190	-2.896**	-2.734**	-0.324

Table 3: Abnormal Returns Around Announcements of Conversion of Convertible Bonds Using a Post-Event Estimation Period and the Market Model

Our original sample includes 360 announcements of calls of convertible bonds between December 1984-April 2000. The table reports results from a market model using the CRSP equally weighted and value weighted indices. The Estimation period is between *t* = 251 and *t* = 506. Pos:Neg is the ratio of positive to negative CARs. ***Z*** is the standard Patell (1976) test that accounts for non-iid distributions of abnormal returns, ***SCZ- Z*** is the standardized cross-sectional *Z,* similar to the one used by Boehmer, Musumeci and Poulsen (1991), *Sign Z* is the Generalized sign test indicating whether the proportion of positive to negative abnormal returns is significantly different from one. $,*,**, and *** denote statistical significance at the 10%, 5%, 1% and 0.1% levels, respectively, using a 2-tail test.

Panel A: Equally Weighted Index

Window	N	CAR	Pos: Neg	Z	SCS Z	Sign Z
(-250,-1)	321	34.93%	239:82	11.614***	12.358***	9.798***
(-250,-31)	321	29.27%	243:78	10.501***	11.304***	10.245***
(-21,-2)	321	3.16%	206:115	5.373***	5.970***	6.108***
(-1,0)	321	-0.40%	135:186	-1.786$	-1.497	-1.830$
(-1,+1)	321	-0.60%	123:198	-3.007**	-2.584**	-3.172**
(0,+1)	321	-0.61%	126:195	-4.298***	-3.612***	-2.837**
(0,+3)	321	-0.97%	121:200	-4.981***	-4.471***	-3.396***
(+2,+21)	321	1.83%	183:138	2.920**	2.938**	3.537***
(+4,+10)	321	0.44%	161:160	1.537	1.333	1.077
(+4,+20)	321	2.08%	188:133	3.819***	3.766***	4.096***
(+21,+250)	321	7.65%	193:128	3.161**	3.385***	4.655***

Panel B: Value Weighted Index

Window	N	CAR	Pos: Neg	Z	SCS Z	Sign Z
(-250,-1)	321	30.70%	238:83	10.669***	11.986***	9.540***
(-250,-31)	321	24.16%	228:93	9.131***	10.575***	8.423***
(-21,-2)	321	3.74%	213:108	6.348***	7.083***	6.746***
(-1,0)	321	-0.35%	136:185	-1.628	-1.354	-1.860$
(-1,+1)	321	-0.54%	130:191	-2.765**	-2.372*	-2.530*
(0,+1)	321	-0.54%	124:197	-3.873***	-3.258**	-3.201**
(0,+3)	321	-0.85%	121:200	-4.454***	-4.023***	-3.536***
(+2,+21)	321	1.62%	189:132	2.574*	2.750**	4.064***
(+4,+10)	321	0.36%	162:159	1.336	1.167	1.046
(+4,+20)	321	1.89%	191:130	3.428***	3.523***	4.288***
(+21,+250)	321	4.54%	190:131	2.057*	2.295*	4.176***

Table 4: Buy-and-Hold Abnormal Returns Using a Market Benchmark and Control Firms as Benchmarks

The market index benchmark in panel A is the CRSP value weighted index. Benchmark firms in panel B are matched to sample firms by size and market–to-book value (within 20%). Pos:Neg is the ratio of positive to negative BHARs. The t-statistic the cross-sectional standard deviation test t, similar to the one used by Brown and Warner (1985); *Sign Z* is the Generalized sign test indicating whether the proportion of positive to negative abnormal returns is significantly different from one. The significance of the Skewness corrected *t* is obtained using bootstrapping. $,*,**, and *** denote statistical significance at the 10%, 5%, 1% and 0.1% levels, respectively, using a 2-tail test.

Panel A: Market Index Benchmark

Window	N	BHAR	Pos: Neg	t-statistic	Sign Z	Skewness corrected T #
(-250,-1)	354	37.80%	279:75	14.918***	11.433***	21.447***
(-250,-31)	354	26.15%	264:90	12.122***	9.838***	16.940***
(-21,-2)	354	4.20%	231:123	7.544***	6.328***	9.501***
(-1,0)	354	-0.28%	157:197	-2.114*	-1.542	-1.671$
(-1,+1)	354	-0.47%	139:215	-2.974**	-3.456***	-2.109*
(0,+1)	354	-0.51%	131:223	-3.858***	-4.307***	-2.558*
(0,+3)	354	-0.71%	130:224	-3.811***	-4.413***	-2.681**
(+2,+21)	352	1.78%	197:155	3.078**	2.823**	3.518***
(+4,+10)	352	0.25%	166:186	0.498	-0.483	0.723
(+4,+20)	352	1.83%	200:152	3.644***	3.143**	3.940***
(+21,+250)	349	3.05%	173:176	1.608	0.42	1.539

#(bootstrapped significance levels as in Lyon, Barber and Tsai (1999))

Panel B: Benchmarks are Firms Matched by Size and Book-to-Market

Window	N	BHAR	Pos: Neg	t-statistic	Sign Z	Skewness corrected T #
(-250,-1)	313	18.27%	209:104	7.299***	9.549***	13.858***
(-250,-31)	313	12.88%	191:122	6.838***	7.716***	11.182***
(-21,-2)	313	2.06%	191:122	4.544***	4.516$	5.027***
(-1,0)	313	-0.15%	129:179	-1.038	-1.551	-1.031
(-1,+1)	313	-0.31%	122:190	-1.765	-2.458	-1.732
(0,+1)	313	-0.34%	121:191	-2.433$	-2.983	-2.362$
(0,+3)	313	-0.55%	123:190	-2.838*	-3.195	-2.724*
(+2,+21)	313	0.61%	170:143	1.329	1.575	1.325
(+4,+10)	313	-0.29%	157:156	-1.047	-0.977	-1.082
(+4,+20)	313	0.68%	173:140	1.701	2.027	1.657
(+21,+250)	313	1.06%	156:157	0.743	1.618	0.75

#(bootstrapped significance levels as in Lyon, Barber and Tsai (1999))

Table 5: Abnormal Returns Around Announcements of Conversion of Convertible Bonds from Fama-French Calendar-Time Portfolio Regressions

Table reports results from a calendar time approach, which involves forming portfolios of firms which had the event (conversion) during a certain day and then regressing it on Fama-French factors and testing if the intercept is zero (which is the test for abnormality). The data on Fama-French factors was obtained from Professor Kenneth French's website. The Table reports the averages of the intercepts and the coefficients for 352 events. The model used is:

$$R_{pt} - R_{ft} = \alpha + \beta\,(R_{mt} - R_{ft}) + s(p)\,SMB_t + h(p)\,HML_t + \varepsilon_{pt}$$

β, s(p), and h(p) are the exposures in the three Fama-French factors: the risk premium of the market index, the difference between the returns on portfolios of small and big capitalization stocks, and the difference between the returns on portfolios of high and low book-to-market stocks. $,*,**, and *** denote statistical significance at the 10%, 5%, 1% and 0.1% levels, respectively.

Average Day in (-1,+1)				**Average Day in (+21,+250)**		
Variable	Coefficient	OLS *t*	Hetero-scedasticity Consistent *t*	Coefficient	OLS *t*	Hetero-scedasticity Consistent *t*
α (Abnormal Return)	-0.0016	-2.00$	2.03$	0.0001	0.41	0.41
β	1.2679	7.94***	7.91***	1.2535	43.79***	38.92***
s(p)	0.8152	3.98***	3.96***	0.6308	17.75***	13.74***
h(p)	0.168	0.62	0.55	-0.2674	-5.47***	-2.50*
R-squared=0.0944				R-squared=0.5625		
Average Day in (+1,+20)				**Average Day in (+2,+21)**		
Variable	Coefficient	OLS *t*	Hetero-scedasticity Consistent *t*	Coefficient	OLS *t*	Hetero-scedasticity Consistent *t*
α (Abnormal Return)	0.0008	2.14$	2.10$	0.0010	2.44*	2.39*
β	1.0356	15.73***	9.89***	1.0476	15.97***	9.77***
s(p)	0.5969	6.87***	6.40***	0.5905	6.83***	6.37***
h(p)	-0.2144	-1.69	1.3	-0.2448	-1.95	1.48
R-squared=0.1549				R-squared=0.1617		

Table 6: Regression Results for the Post-event Announcement Window Abnormal Returns on Event Window Abnormal Returns

This table provides the coefficient estimates from an OLS regression in which the dependent variable is the post-event abnormal return and the independent variable is a corresponding event window return. The coefficient is followed by the heteroskedasticity consistent White t-values in parenthesis and the approximate Pr > |t| in brackets. *CAR2* and *CAR3*, are respectively the two-day (t=-1,0) and three-day (t=-1,1) cumulative abnormal returns based upon market model. *POSTCAR2* and *POSTCAR3* are the post-announcement market model based cumulative abnormal returns for (1, 20) and (2, 21), respectively. *BHAR2* and *BHAR3*, are respectively the two-day (t=-1,0) and three-day (t=-1,1) buy-and-hold abnormal returns. *POSTBHAR2* and *POSTBHAR3* are the post-announcement buy-and-hold abnormal returns for (1, 20) and (2, 21), respectively

Panel A: Market Model Abnormal Returns

	POSTCAR2	***POSTCAR3***
Intercept	0.012188 (1.95) [0.0521]	0.014502 (2.35) [0.0199]
CAR2	-0.25664 (-1.33) [0.1841]	
CAR3		-0.05248 (-0.31) [0.7570]
N	235	235
Adj R-Square	0.0034	-0.0039

Panel B: Buy-and-Hold Abnormal Returns

	POSTBHAR2	***POSTBHAR3***
Intercept	0.006677 (1.26) [0.2085]	0.010002 (1.85) [0.0650]
BHAR2	-0.15376 (-0.60) [0.5495]	
BHAR3		0.045556 (0.21) [0.8330]
N	235	235
Adj R-Square	-0.0019	-0.004

Table 7: Cross-sectional Regression Results for the Event Announcement Window Abnormal Returns

This table provides the coefficient estimates from a OLS regression in which in Panel A the dependent variable is *CAR2,* the cumulative abnormal return based upon the market model from t = -1 to 0 against a set of independent variables, and in Panel B, the dependent variable is *BHAR2*, the buy-and-hold abnormal return from (-1,0). The set of independent variables: *Gibbs* is Gibbs sampler estimate of trading costs, *lsize* is the logarithm of the firm's equity market capitalization, *CARB4* is the cumulative abnormal return for (-21, -2) based upon the market model, *BHARB4* is the buy-and-hold abnormal return for (-21,-2), *lnumber* is the logarithm of one plus the number of analysts following the firm, and *DGibbs* is the product of *DILUTION* and *Gibbs*. The coefficient is followed by White t-statistic in parenthesis and the approximate p-values in brackets. The sample size for all regressions is for 235 observations with the exception of those regressions that include *Dgibbs,* in which case the sample size is 183.

Panel A: Dependent Variable CAR2

Intercept	-0.00349 (-0.99) [0.3225]	-0.00272 (-0.99) [0.3213]	-0.0031 -(1.1800) [0.2407]	-0.0020 -(0.8000) [0.4274]	0.000331 (0.03) [0.9763]	-0.00018 (-0.07) [0.9444]	0.006619 (0.77) [0.4419]	-0.00391 (-0.33) [0.7424]	-0.00953 (-0.70) [0.4854]	-0.0173 -(1.2300) [0.2186]	-0.0098 -(0.8100) [0.4207]
Gibbs	0.852317 (0.76) [0.4492]							1.141716 (1.00) [0.3192]			
DGibbs		4.15407 (1.51) [0.1335]							7.031494 (2.22) [0.0280]		
ilq			0.1322 (0.8700) [0.3830]							0.2446 (1.3000) [0.1950]	
Dilq				0.5771 (1.2300) [0.2198]							0.9171 (2.0500) [0.0419]
lsize					-0.00019 (-0.12) [0.9013]			0.002655 (1.37) [0.1733]	0.003558 (1.57) [0.1177]	0.0040 (2.1000) [0.0370]	0.0036 (1.6500) [0.1017]
CARB4						-0.02385 (-0.80) [0.4251]		-0.03298 (-1.12) [0.2623]	-0.06576 (-2.45) [0.0154]	-0.0473 -(1.7800) [0.0761]	-0.0623 -(2.3900) [0.0180]
lnumber							-0.00299 (-0.99) [0.3239]	-0.00678 (-1.66) [0.0988]	-0.00654 (-1.59) [0.1129]	-0.0049 -(1.2500) [0.2141]	-0.0061 -(1.4800) [0.1409]
Adj R-Square	-0.0023	0.0027	0.0008	0.0033	-0.0044	-0.0001	0.0009	0.0023	0.0306	0.0180	0.0284

Table 7: Cross-sectional Regression Results for the Event Announcement Window Abnormal Returns

Panel B: Dependent Variable BHAR2

Intercept	-0.00165 (-0.67) [0.5012]	-0.00201 (-1.00) [0.3201]	-0.0022 -(1.0300) [0.3034]	-0.0026 -(1.3100) [0.1924]	-0.00952 (-1.08) [0.2814]	-0.00112 (-0.64) [0.5206]	0.002595 (0.37) [0.7092]	-0.01263 (-1.31) [0.1931]	-0.01564 (-1.41) [0.1606	-0.0125 -(0.8200) [0.4110]	-0.0120 -(1.0000) [0.3196]
Gibbs	0.087587 (0.12) [0.9073]							0.520191 (0.69) [0.4924]			
DGibbs		1.045965 (0.52) [0.6006]							3.65171 (1.51) [0.1317]		
ilq			0.0017 (0.0200) [0.9880]							0.1151 (0.5700) [0.5724]	
Dilq				0.1491 (0.4200) [0.6771]							0.4647 (1.2600) [0.2101]
lsize					0.001228 (1.00) [0.3160]			0.004224 (2.73) [0.0068]	0.004108 (2.39) [0.0180]	0.0034 (1.6000) [0.1128]	0.0035 (1.8000) [0.0734]
BHARB4						-0.02472 (-0.70) [0.4847]		-0.02987 (-0.88) [0.3787]	-0.06762 (-2.27) [0.0245]	-0.0731 -(2.3600) [0.0193]	-0.0743 -(2.3700) [0.0189]
lnumber							-0.00158 (-0.62) [0.5358]	-0.00717 (-2.17) [0.0310]	-0.00549 (-1.60) [0.1122]	-0.0045 -(1.0700) [0.2881]	-0.0050 -(1.2100) [0.2301]
Adj R-Square	-0.0043	-0.0046	-0.0056	-0.0045	0.0011	0	-0.0017	0.0187	0.0318	0.0255	0.0296

Table 8: Cross-sectional Regression Results for the Event Announcement Window Abnormal Returns

This table provides the coefficient estimates from a OLS regression in which in Panel A the dependent variable is *CAR3,* the cumulative abnormal return based upon the market model from t = -1 to 1 against a set of independent variables, and in Panel B, the dependent variable is *BHAR3*, the buy-and-hold abnormal return from (-1,1). The set of independent variables: *Gibbs* is Gibbs sampler estimate of trading costs, *lsize* is the logarithm of the firm's equity market capitalization, *CARB4* is the cumulative abnormal return for (-21, -2) based upon the market model, *BHARB4* is the buy-and-hold abnormal return for (-21,-2), *lnumber* is the logarithm of one plus the number of analysts following the firm, and *DGibbs* is the product of *DILUTION* and *Gibbs*. The coefficient is followed by White t-statistic in parenthesis and the approximate p-value in brackets. The sample size for all regressions is 235 with the exception of those regressions that include *Dgibbs,* in which case the sample size is 183.

Panel A: Dependent Variable is CAR3.

Intercept	-0.00437 (-0.78) [0.4368]	-0.00437 (-1.18) [0.2399]	-0.0064 -(2.0000) [0.0463]	-0.0043 -(1.3100) [0.1921]	-0.00514 (-0.36) [0.7182]	0.00314 (-1.01) [0.3120]	0.004757 (0.44) [0.6628]	-0.00506 (-0.32) [0.7481]	-0.00393 (-0.24) [0.8102]	-0.0171 -(0.9600) [0.3403]	0.0001 (0.0000) [0.9961]
Gibbs	0.008217 (0.00) [0.9965]							0.432235 (0.23) [0.8175]			
DGibbs		-0.70831 (-0.14) [0.8878							1.375998 (0.26) [0.7955]		
ilq			0.0905 (0.4900) [0.6279]							0.1681 (0.6900) [0.4905]	
Dilq				-0.1967 -(0.3400) [0.7346]							-0.1016 -(0.1900) [0.8484]
lsize					0.000119 (0.06) [0.9511]			0.003722 (1.44) [0.1501]	0.00305 (1.03) [0.3063]	0.0045 (1.8400) [0.0671]	0.0025 (0.9100) [0.3634]
CARB4						-0.0394 (-1.01) [0.3158]		-0.04789 (-1.26) [0.2080]	-0.0716 (-2.14) [0.0340]	-0.0563 -(1.7100) [0.0882]	-0.0689 -(2.0700) [0.0398]
lnumber							-0.00362 (-0.96) [0.3363]	-0.00947 (-1.85) [0.0662]	-0.00792 (-1.53) [0.1284]	-0.0075 -(1.4900) [0.1383]	-0.0078 -(1.5000) [0.1344]
Adj R-2	-0.0045	-0.0054	-0.0029	-0.0049	-0.0044	0.0033	0.0006	0.0054	0.0136	0.0123	0.0133

Table 8: Cross-sectional Regression Results for the Event Announcement Window Abnormal Returns

Panel B: Dependent Variable is BHAR3

Intercept	-0.00239 (-0.68) [0.4963]	-0.00348 (-1.37) [0.1734]	-0.0044 -(1.7100) [0.0887	-0.0041 -(1.7300) [0.0853]	-0.01049 (-0.98) [0.3304]	-0.00389 (-1.86) [0.0635]	0.004884 (0.60) [0.5516]	-0.01002 (-0.81) [0.4180]	-0.01013 (-0.69) [0.4881]	-0.0200 -(0.9500) [0.3432]	-0.0061 -(0.3900) [0.6964]
Gibbs	-0.53194 (-0.48) [0.6328]							-0.28247 (-0.25) [0.8046]			
DGibbs		-1.29851 (-0.49) [0.6248]							0.181225 (0.06) [0.9561]		
ilq			-0.0393 -(0.2600) [0.7953							0.1827 (0.6800) [0.4967]	
Dilq				-0.3206 -(0.9000) [0.3686]							-0.0421 -(0.1000) [0.9167]
lsize					0.00098 (0.66) [0.5091]			0.005059 (2.52) [0.0124]	0.004248 (1.81) [0.0727]	0.0049 (1.6000) [0.1123]	0.0033 (1.2800) [0.2016]
BHARB4						-0.01029 (-0.22) [0.8263]		-0.01382 (-0.31) [0.7572]	-0.05149 (-1.29) [0.2000]	-0.0642 -(1.5200) [0.1295]	-0.0614 -(1.4300) [0.1552]
lnumber							-0.00354 (-1.20) [0.2305]	-0.01056 (-2.63) [0.0091]	-0.00852 (-2.02) [0.0447]	-0.0069 -(1.3400) [0.1810]	-0.0076 -(1.4700) [0.1450]
Adj R-Square	-0.0033	-0.0046	-0.0049	-0.0021	-0.002	-0.0038	0.0044	0.022	0.0151	0.0154	0.0089

Table 9: Cross-sectional Regression Results for the Post-event Announcement Window Abnormal Returns

This table provides the coefficient estimates from a OLS regression in which in Panel A the dependent variable is *POSTCAR,* the cumulative abnormal return based upon the market model from t = 2 to 21 against a set of independent variables, and in Panel B, the dependent variable is *POSTBHAR*, the buy-and-hold abnormal return from (2,21). The set of independent variables: *Gibbs* is Gibbs sampler estimate of trading costs, *lsize* is the logarithm of the firm's equity market capitalization, *CARB4* is the cumulative abnormal return for (-21, -2) based upon the market model, *BHARB4* is the buy-and-hold abnormal return for (-21,-2), *lnumber* is the logarithm of one plus the number of analysts following the firm, and *DGibbs* is the product of *DILUTION* and *Gibbs*. The coefficient is followed by White t-statistic in parenthesis and the approximate p-value| in brackets. The sample size for all regressions is 235 with the exception of those regressions that include *Dgibbs,* in which case the sample size is 183.

Panel A: Dependent Variable is POSTCAR

Intercept	0.001012 (0.08) [0.9325]	0.005826 (0.72) [0.4740]	0.008169 (1.0400) [0.2981]	0.011683 (1.4700) [0.1441]	0.110142 (3.58) [0.0004]	0.007468 (1.15) [0.2509]	0.080097 (3.74) [0.0002]	0.096433 (2.74) [0.0066]	0.041433 (1.37) [0.1728]	0.103077 (2.4000) [0.017]	0.048554 (1.4900) [0.1383]
Gibbs	4.525093 (1.08) [0.2822]							-0.29698 (-0.07) [0.9408]			
DGibbs		26.9037 (2.93) [0.0039]							13.3084 (1.53) [0.1270]		
ilq			0.658164 (1.7300) [0.0851]							-0.31924 -(0.6800) [0.4961]	
Dilq				3.105912 (2.2200) [0.0278]							1.206069 (0.9100) [0.3629]
lsize					-0.01438 (-3.26) [0.0013]			-0.0099 (-1.38) [0.1686]	0.003046 (0.44) [0.6616]	-0.00826 -(1.0500) [0.293]	0.002167 (0.3000) [0.7628]
CARB4						0.237472 (3.46) [0.0006]		0.211991 (3.00) [0.0031]	0.292792 (4.11) [<.0001]	0.272225 (3.9400) [0.0001]	0.303044 (4.4600) [<.0001]
lnumber							-0.02598 (-3.35) [0.0010]	-0.00858 (-0.70) [0.4855]	-0.0224 (-1.59) [0.1130]	-0.01416 -(1.0200) [0.3078]	-0.02159 -(1.5200) [0.1293]
Adj R-2	0.0032	0.034	0.0093	0.0239	0.0493	0.049	0.045	0.0838	0.1221	0.0868	0.1178

Table 9: Cross-sectional Regression Results for the Post-event Announcement Window Abnormal Returns

Panel B: Dependent Variable is POSTBHAR

Intercept	-0.00216 (-0.27) [0.7887]	0.006301 (1.00) [0.3186]	0.0143 (2.2200) [0.0274]	0.0119 (1.9400) [0.0541]	0.068581 (2.88) [0.0044]	0.009914 (1.89) [0.0603]	0.060149 (3.02) [0.0028]	0.055292 (2.02) [0.0444]	0.027657 (1.11) [0.2673]	0.0572 (1.2700) [0.2076]	0.0315 (1.0500) [0.2946]
Gibbs	3.955584 (1.45) [0.1472]							2.354511 (0.90) [0.3704]			
DGibbs		12.78731 (1.85) [0.0655]							10.39127 (1.59) [0.1126]		
ilq			0.0337 (0.1200) [0.9083]							-0.1808 -(0.3300) [0.7424]	
Dilq				1.1016 (1.0100) [0.3125]							0.7424 (0.6300) [0.5308]
lsize					-0.00887 (-2.64) [0.0088]			-0.00135 (-0.25) [0.8047]	0.007071 (1.26) [0.2085]	0.0059 (0.9100) [0.3628]	-0.0254 -(0.3100) [0.7604]
BHARB4						-0.00903 (-0.10) [0.9238]		-0.02125 (-0.22) [0.8238]	-0.0416 (-0.54) [0.5882]	-0.0185 -(0.2200) [0.8246]	0.0091 (1.5100) [0.1340]
lnumber							-0.02005 (-2.89) [0.0043]	-0.0173 (-1.61) [0.1092]	-0.02647 (-2.06) [0.0412]	-0.0310 -(2.0800) [0.0393]	-0.0305 -(2.1200) [0.0359]
Adj R-Square	0.0037	0.0105	-0.0056	0.0016	0.024	-0.0042	0.0375	0.0285	0.0417	0.0367	0.0380

Figure 1: Abnormal Returns around announcements of calls of Convertible Bonds

The Figure reports the abnormal returns for various windows around announcements of calls of convertible bonds.