Interpreting Announcement Effects using Market Microstructure: An Examination of Convertible Bond Calls*

Ken L. Bechmann[a]	Asger Lunde[b]	Allan A. Zebedee[c]
Department of Finance	Department of Marketing, Informatics and Statistics	Department of Finance
Copenhagen Business School	Aarhus School of Business	College of Business Adm. San Diego State University

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[a] Solbjerg Plads 3, DK-2000 Frederiksberg, Denmark
Phone: +45 38152953 Fax: +45 38153600 e-mail: kb.fi@cbs.dk

[b] Fuglsangs Allé 4, DK-8210, Aarhus V, Denmark
Phone: +45 89486360 Fax: +45 86153792 e-mail: alunde@asb.dk

[c] 5500 Campanile Drive, San Diego, CA 92182-8236, USA
Phone: +1 (619) 594-6844 Fax: +1 (619) 594-3272 e-mail: allan.zebedee@sdsu.edu

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Convertible bond calls typically lead to significant stock market reactions. Current explanations for these price changes are divided between information and price pressure theories. While empirical work to date has documented the negative effects of in-the-money calls (or conversion forcing calls) and the positive effects for out-of-the-money calls, it has proven difficult to empirically distinguish information effects from price pressure effects. This paper takes a detailed look at the announcement effects of convertible bond calls using a unique dataset of in- and out-of-the-money calls in the U.S. from the period 1993 to 2004. By augmenting this dataset, with transaction data, it is possible to measure the speed of price adjustment. Results of this analysis show it takes several hours before the stock price has been adjusted for in-the-money call announcements where as out-of-the-money calls almost immediately adjust to the new equilibrium price. The slow stock market reaction to in-the-money calls is associated with a prolonged trade order imbalance consistent with the explanation that price pressures are the main reason for negative announcement effects. In contrast, the immediate stock market reaction to out-of-the-money calls is not found to be associated with trade imbalances and is consistent with the information theories presented in the literature.

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1. Introduction

Numerous studies have found evidence of a stock market reaction to the call announcement of convertible bonds. In particular, it is well-documented that in-the-money calls – calls where conversion into equity is profitable – are linked with a negative equity market reaction. Similarly, a few studies of out-of-the-money calls – calls where conversion into equity is not profitable and therefore the convertible bonds are redeemed with cash – have provided evidence of a positive stock price reaction. Two opposing explanations have been suggested in the literature for these price reactions. The first is an *information effect*. Management by calling these convertible bonds is revealing information to the market about the future prospects of the firm. In the case of in-the-money calls, this information signal is negative and hence the negative equity price reaction. Management chooses to exercise its call option to force an early conversion of the debt due to negative information about the firm's future. If it does not force conversion of the debt it runs the risk that the conversion option will fall out-of-the-money and they will have to pay off the debt at its terminal value. In contrast out-of-the-money calls result in a positive information signal and in turn a positive price reaction. Management exercises its call option in order to refund the bonds prior to the conversion option getting in-the-money to avoid dilution to the existing shareholders. The call signals positive information about the firm's prospects.

The second explanation is a *price pressure effect* caused by convertible bond holders taking an off setting equity position to eliminate the equity price exposure. For in-the-money calls this effect will result in downward price pressure on the stock price as convertible bond arbitrageurs short their underlying equity position from the resulting call immediately following the announcement in order to eliminate equity price exposure. For out-of-the-money calls this explanation is expected to be negligible since there is assumed no existing equity exposure.[1] Distinguishing the information effect from the price pressure effect is difficult since both move in the same direction.

This paper takes a closer look at convertible bond calls by examining a large and unique dataset in effort to distinguish between these two effects. In addition to including both types of calls (in- and out-of-the-money), our dataset includes the exact time of the call announcement as well as equity transaction information. This high-frequency dataset makes it possible to examine the speed of stock market reaction to the call announcement which in turn allows us to model the possibility of separate information and price pressure effects.

[1] While convertible bond holders could enter into a short position while the bond is out-of-the-money and therefore have to cover following the announcement we find the likelihood of such a situation to be minimal.

In this study, we demonstrate that the stock market reaction of in-the-money and out-of-the-money calls is different. Our results suggest that the stock market reaction to out-of-the-money calls is more immediate (faster) than that of in-the-money calls. The slower stock market reaction to in-the-money calls supports the explanation that price-pressure effects are driving the stock market reaction.

This paper makes two main contributions to the existing literature. To begin, by including both *in-* and *out-of-the-money calls* in our dataset, we are able to study both the negative and positive market reactions to call announcements in the days and hours surrounding the event. The second contribution is by using *high frequency intraday data with time stamps of the announcement* we are able to distinguish information and price pressure effects of announcements. The results illustrate how the intraday data is helpful in identifying differences in the stock market reaction to different types of announcements, and in this way, the paper adds to the suggestions found in, for example, Barclay and Litzenberger (1988). These results are not only relevant to the convertible bond market but can be further applied to the growing literature on price pressure effects of other announcements such as mergers (see, Mitchell, Pulvino and Stafford, 2004) or index revisions (see, Elliot and Warr, 2003). We suggest simple ways by which evidence from traditional event studies can be improved, which especially is relevant in cases where price pressure might be an issue.

The rest of the paper is organized as follows. Section 2 briefly describes details on convertible bond calls and surveys the related literature. Section 3 describes the methodology and the data used in this paper. Section 4 presents the empirical results for the announcement effect in three parts. First, using information on the exact announcement time, a traditional event study with daily returns is used to calculate the announcement effect. Second, the announcement effect is studied with intraday returns at 30-minute intervals, and finally, trading volume is examined over the same 30-minute intervals. Section 5 concludes the paper.

2. Convertible bond calls

A convertible bond holder has an option to convert his or her bond into new common stock in the firm. The option to convert is an American style option that matures at the same time as the bond. Besides the conversion option, the majority of convertible bonds also give the issuing firm a call option, making it possible to redeem the bonds prematurely. The firm redeems the bonds by sending a notice of redemption (the call announcement) to each bondholder, in which the firm

offers to buy each bond for the call payment. The call payment (or the effective call price) is the sum of the interest accrued since the last interest payment and the call price specified in the bond indenture. The announcement of the call starts the conversion period (or notice period) in which each bondholder still has the option to convert into stock. The notice of redemption states the deadline for conversion as well as the call date (redemption date) when unconverted bonds are redeemed and the corresponding call payments are made.

In-the-money (or conversion forcing) calls are calls where the conversion value, i.e., the value of the shares to be received upon conversion, is higher than the call payment at the time of the call. Therefore, if a bondholder had to choose whether or not to convert on the day of the announcement, it would be optimal to convert into stock. For out-of-the-money calls, the conversion value is less than the call payment, and hence it would be optimal to accept the call payment. The following describes the existing evidence on these two different types of calls, both to be examined in the empirical section.

In-the-money calls

The negative announcement effect of in-the-money calls were first documented by Mikkelson (1981). To explain the negative announcement effect, Harris and Raviv (1985) provide a signaling model where the call represents bad news about the calling firm's prospects. By calling the convertible bonds management forces conversion into the overpriced equity. Managers with positive private information would not find it optimal to force a call and instead choose to delay the call keeping the conversion option alive. Ofer and Natarajan (1987) and Datta, Iskandar-Datta and Raman (2003) find negative long-run abnormal returns and use this as evidence for the bad-news explanation or information hypothesis.[2]

On the other hand, Mazzeo and Moore (1992) find a recovery of stock prices during the conversion period and argue that the announcement effect is due to price pressure caused by investors wanting to sell the new shares received upon conversion. However, a problem with this explanation is that the bonds are generally not converted at the time of the call announcement because of the American type conversion option. Therefore, the new shares are not issued until later, and since the bondholders in general do not hold any of the underlying stocks, Mazzeo and

[2] Campbell, Ederington and Vankudre (1991) and Cowan, Nayar and Singh (1990) argue that the results in Ofer and Natarajan (1987) is due to a bias in the normal returns used in the event study caused by the use of a pre-event estimation period. Datta, Iskandar-Datta and Raman (2003) are examining the long-run abnormal returns using a matched control firm approach. However, interestingly enough they also find positive short-run returns.

Moore (1992) are missing an explanation as to how the later increase in the supply of shares is actually translated into price pressure at the time of the call announcement.

The missing explanation is provided by Bechmann (2004), who suggests and provides evidence that the price pressure is caused by short selling. Two types of investors have an incentive to hedge their equity exposure by short selling at the time of the call. First, the convertible hedge desks of investment banks will try to lock in arbitrage profits by buying the called convertible bond and short selling the underlying stock. Short selling is used to hedge the equity risk of the convertible bond because the option to convert is not exercised immediately. Second, a possible underwriter of the call also short sells in order to hedge the equity risk associated with the call. The short selling of stock by these two types of investors, at least in part, causes the short-run price pressure because the price must fall in order to induce investors to absorb the increased supply of shares in accordance with the cost of liquidity.

Out-of-the-money calls

To our knowledge, Cowan, Nayar and Singh (1993) is the only published paper examining out-of-the-money calls using a dataset of just 26 observations.[3] They document a positive and significant announcement effect and explain the announcement effect as being primarily due to good news revealed by the call. Cowan, Nayar and Singh (1993) suggest the following reasons for an out-of-the-money call being good news.[4] First, the call shows that the firm has access to or has been able to raise enough cash to redeem the bonds. The Free Cash Flow theory of Jensen (1986) would strengthen this in the cases where the firm in this way pays out free cash. Second, the firm may call the debt in order to get rid of some restrictive covenants attached to the bond issue which has been suggested as the reason for why firms call non-convertible debt (see Vu, 1986).[5] Third, the call may be good news when the firm is simply financing the call using for example a new convertible bond issue, issued at lower costs.

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[3] Out-of-the-money calls are also studied in a working paper, Bechmann (2001), but the results there are just illustrating the differences in the announcement effect of in-the-money and out-of-the-money calls using a standard event study. Therefore, the main results from Bechmann (2001) are also contained in the present paper.

[4] It is also worth to note that arguments could also be given that would suggest a negative announcement effect for out-of-the-money calls. First, by calling the bond, the firm might lose the tax shield attached to the bond. Second, the call comes too early relative to the optimal call policy derived in for example Brennan and Schwartz (1977) and Ingersoll (1977). If, at the time of the call, the call payment paid to the bond holders is above the price of the convertible bond, the call will transfer wealth to the bondholders. Finally, as argued by Ross (1977), Jensen (1986), and others, debt can in general have a positive effect on firm value.

[5] On October 15, 1996, Burnham Pacific called a $25.7 million convertible bond issue. In a press release, the company stated that "the call allows the company greater flexibility in financing future growth as certain covenants in the convertible bonds restrict the company from taking full advantage of debt markets".

Finally, based on asymmetric information, it is possible that the call announcement reveals good news about the firm to the stock market. This will for example be the case if the management of the firm has positive private information about the firm and this causes the management to call the bonds. One reason for a management with positive information to call the convertible bonds is that the management this way avoids the dilution of the shares outstanding that will follow from a later conversion of the bonds into new shares.[6] Another reason could be that the management wants to avoid calling as soon as the bonds become in-the-money because the call in this case could be taken as bad-news as argued for in-the-money calls.

3. Methodology and dataset

3.1 Methodology

standard event-study methodology

In order to examine the effect of the call announcement using a standard event study, the stock returns are adjusted for the general market movements. However, market adjusted returns can be calculated in several different ways.[7] In addition, if an estimation period is required in order to derive the parameters used to calculate the normal returns, this will also raise the question of which estimation period to use. As shown in Cowan, Nayar and Singh (1990) and Campbell, Ederington and Vankudre (1991), the estimated parameters in the market model will depend on whether the estimation period is before or after the call announcement.[8] Furthermore, because daily expected returns are close to zero, the way the adjusted returns are calculated does in general not matter when examining stock returns over only very short time horizons (see, for example, Fama, 1997). So when examining the announcement effect (here, at the most, over two days), we use a simple market adjustment of returns, where the adjusted stock return, $AR_{i,t}$, for stock i at day t is calculated as $AR_{i,t}=R_{i,t}-R_{m,t}$. Here $R_{i,t}$ denotes the return on stock i during day t while $R_{m,t}$ denotes the return on a market index during day t. In the following, S&P500 has been designated as the market index.

[6] In several of the out-of-the-money calls, 'the avoid-dilution argument' is given as the reason for the call. For example, on November 5, 1997 BancTec Inc. made an out-of-the-money convertible bond call. In the call announcement, the firm said "the call will be funded with internal capital and existing lines of credit and should allow the company to avoid dilution of 1.5 million shares", which should be compared to the 21.1 million shares outstanding.

[7] Different methods are described in, for example, Fama et al. (1969), Dimson and Marsh (1986), Agrawal, Jaffe and Mandelker (1992), and Campbell, Lo and MacKinlay (1997).

[8] The use of an estimation period before the call creates a downward bias in the stock returns after the call. This is the reason why the findings in Ofer and Natarajan (1987) are biased downwards as mentioned earlier.

As is standard for event studies, we align returns in event time such that the announcement of the call happens at day t=0. The announcement effect for firm i is then traditionally calculated as the sum of the adjusted return for day 0 and day 1, i.e. $CAR_{i,ANN}=CAR_{i,0:1}=AR_{i,0}+AR_{i,1}$. The standard reason for including both the return for day 0 and day 1 is that the lack of the exact announcement time makes it possible that the announcement of the call happens late in day 0 such that the stock market effect only will be seen at day 1.[9] However, since we have information on the announcement time, we are able to examine the announcement effect more closely on a daily basis. Therefore, we will work with what is called the adjusted announcement date which is day where the effect of the announcement is expected to be seen, i.e. the announcement day for announcements made before the market opens and during market hours but the following day for announcements made after the market is closed.

In order to examine the announcement effect we will perform several tests. First, a standard Z-test is used to test if there is a significant announcement effect for the two types of calls. Second, a sign test as described in Campbell, Lo and MacKinlay (1997, p. 172) is used to test if the announcement effect is significant based on a nonparametric test.

intra-day event-study methodology

In order to examine the announcement effect in further detail using intraday data, we take two different approaches. First, we divide the event window into half hour intervals and based on quoted prices close as possible to the end of these periods, the returns over these short periods are calculated. This makes it possible to closely consider the speed which the stock market reacts to the announcement. Half hour intervals are much longer than the one minute intervals used, for example, by Busse and Green (2002) to examine the speed of the stock market reaction to financial news reported by *CNBC*. However, as the following will show, we can document our main findings using half hour intervals, and hence, in order to reduce the problem of non-trading, we have chosen to use half hour intervals. Half hour intervals are also used by, for example, Patell and Wolfson (1984).

The second approach is to examine trading volume in half hour intervals around the announcement time. The trading volume provides clues about the price pressure on the stock.

[9] For event studies of announcements found in, for example, *The Wall Street Journal*, days –1 and 0 are used as event day with day 0 being the date where the announcement appears in *The Wall Street Journal*.

Furthermore by augmenting the analysis with signed volume data we are able to examine the extent to which short sales are influencing the equity market reaction.

3.2 The dataset of convertible bond calls

The dataset consists of calls of convertible bonds in the period January 1993-December 2004. A range of different newswires, search engines, and lists of calls have been used to identify the dataset. From this initial set of calls, those fulfilling the following selection criteria were selected:

1. The announcement *date* and *time* could be identified from the newswires.[10]
2. Information about the firm's stock is available in the CRSP and TAQ databases (the underlying shares are traded on NYSE, AMEX, or NASDAQ).
3. Sufficient details regarding the called convertible bond could be identified from various bond guides, from the call announcement itself or from *Bloomberg*.
4. The call announcement is not contaminated by other news events in the sense that there are no other articles about the calling firm in *The Wall Street Journal* from one day before the announcement date to one day after. Similarly, we also require that the calling firm is not involved in a merger or acquisition at the time of the call.
5. The convertible bond is only convertible into common stock of the calling firm.
6. The stock price is above $5 at the time of the call.

Criteria 1 to 5 are similar to the criteria used in other event studies of convertible bond calls, see for example Cowan, Nayar and Singh (1993), Bechmann (2004), and Datta, Iskandar-Datta and Raman (2003). Criteria 6 is consistent with market microstructure studies.

These selection criteria lead to a sample of 452 calls with 296 being in-the-money calls and 156 being out-of-the-money calls. The calls are distributed over time as illustrated in Table 1, which shows that the observations in number as well as in type are fairly equally distributed over the sample period. Only 2002 and 2003 stands out with relatively more out-of-the-money calls which probably can be explained by the decrease in stock prices (preventing in-the-money calls) and a decrease in interest rates (motivating refinancing using out-of-the-money calls).

[10] The announcement time is the first time at which the news can be found in any of the newswires. However, the news might be expected to have been released from the firm some minutes earlier.

As mentioned, this paper takes a closer look at the stock market reaction around the call announcement by augmenting the analysis with the exact time of the announcement. Furthermore, we use the time of the announcement to divide the two types of calls into three subgroups. Group I consists of observations where the announcement is made before the market opens, Group II of observations with an announcement made during market hours, and Group III of observations where the announcement is made after the market has closed.

The distribution of the announcement times during the day is seen in Figure 1. Figure 1 reveals that a large fraction of both types of calls is announced outside stock market hours. For out-of-the-money calls, 33% belongs to Group I where the announcement is made before 9:30 AM and 26% belongs to Group III where the announcement is made after 4:00 PM. For in-the-money calls the numbers are 30% and 32% respectively meaning that for both types of calls more than half of the announcements are made outside opening hours. The distribution of the announcement time for the two types of calls is quite similar even though there might be a small preference for in-the-money calls to be made after the market has closed and for out-of-the-money calls instead to be made before the market opens.

Summary statistics

Summary statistics for the dataset are given in Table 2. Some important observations follow from Table 2. First, both types of calls are generally quite large in the sense that conversion of the called convertible bonds would, on average, increase the number of shares outstanding with 9-11% with in-the-money calls generally being a little larger than out-of-the-money calls. Similarly, the total call payment corresponds to 8-13% of the total value of equity with out-of-the money calls now being the largest. The daily turnover reveals that firms making in-the-money calls are generally more heavily traded – a difference that is significant at the 1%-level. The distribution of the observations across the different stock exchanges indicates that firms listed on NYSE constitute a smaller fraction of in-the-money calls compared to out-of-the-money calls. The opposite holds for firms listed on NASDAQ. Apart from these differences, the two types of calls are similar with respect to the length of the conversion period and the number of years left to maturity. Furthermore, the summary statistics indicate that so-called clean-up calls exist in the sample. Clean-up calls are calls with the purpose of redeeming a small issue in order to avoid servicing a small amount of outstanding debt. These calls typically only lead to a small increase in the number of shares outstanding and can have a conversion option deep in-the-money. All in all the descriptive statistics are quite similar to descriptive statistics reported in other studies of convertible

bond calls. Finally, summary statistics by group are presented in the appendix as evidence of the homogeneity of the groups with different announcement times.

4. The announcement effect

In this section, we present the empirical results on the announcement effect. In subsection 4.1 the announcement effect is examined using daily data whereas subsection 4.2 uses intraday data to examine the announcement effect in greater detail and subsection 4.3 examines trading volume.

4.1 Results based on daily stock returns

We started out by examining the announcement effect as calculated in exiting event studies of convertible bond calls. There the announcement effect is normally calculated as the sum of the return on the day of the announcement and the following day without using the time of the announcement to specify the exact day where the stock market reaction is expected.

In results available upon request, we document a negative announcement effect of in-the-money calls and a positive announcement effect of out-of-the-money calls. More precisely, the average (median) announcement effect is –1.76 (–1.22) for in-the-money calls and 1.99 (1.64) for out-of-the-money calls and the announcement effects are significant at the 1%-level based on a standard parametric test and a non-parametric sign test. These results confirm the existing evidence on the stock market reaction to convertible bond calls.

Table 3 presents the daily stock returns and market adjusted returns closely around the announcement date where the announcement date has been adjusted to reflect the time of the announcement. First, it should be noted that we have also looked at the returns for more days before and after the announcement. However, there the stock returns are generally insignificant based on both the Z-test for the average return and the non-parametric test for the fraction of negative stock returns. Therefore, Table 3 only presents the stock returns closely around the announcement date.

Secondly, it follows from Table 3 that the timestamp is indeed relevant and useful in identifying the day with the stock market reaction to the announcement. As should be expected, the stock market reaction is seen on the adjusted announcement date. Only on this day is the stock market

reaction significant. However, for in-the-money calls, the fraction of negative effects suggests a (small) stock market reaction on the day after the announcement date. Another thing which is worth to note is that even though the announcement effect generally is slightly smaller when considering market adjusted returns, the difference between Panels A and B in Table 3 is quite small. This is consistent with Section 3 arguing that the market adjustment is not crucial when studying announcement effects over such very short time intervals. Finally, a comparison reveals that the one-day announcement effects from Table 3 are very similar to the two-day announcement effects discussed earlier. Different tests for the whole sample and on group levels provide no evidence for significant differences in the one-day and two-day announcement effects.[11]

All in all, the results so far suggest that it is relevant to include the announcement time in a study of an announcement effect. In particular, the announcement time can help identifying the exact trading day where the stock market should be expected. This has at least two advantages. First, by narrowing the event window the power of the statistical tests of the announcement effect will be improved. Secondly, by looking at one-day returns, we obtained a first impression of the speed of the stock market reaction. The next subsection uses intraday stock prices together with the announcement time to examine the stock price reaction in further detail.

4.2 Results based on intraday stock price data

In order to examine the speed of the stock market reaction, we examine the stock returns over half hour intervals around the time of the announcement. Table 4 presents the mean returns in half hour intervals relative to the announcement. These mean returns are relatively noisy, however, there is a clear announcement effect even at these finer intervals. For out-of-the-money calls, there is a significant announcement effect in the first two intervals immediately following the announcement whereas the returns in the following periods are much smaller and generally insignificant. Similarly, the fractions of positive returns are highly significant in event period 0 and 1 but insignificant in the following hours. For in-the-money calls, the returns for periods 0, 1, 2, and 4 are all highly significant and relatively large in size. Furthermore, the mean returns and fraction of negative returns suggest that the negative stock price reaction continues in the following periods.

[11] Consistent with the findings in Berkman and Truong (2005) in the case of earnings announcement, we also find a large gain in the precision by which the announcement effect is estimated. For example, the standard deviation of the announcement effect decreased from 3.94% for the two-day announcement effect to 3.19% for the one-day announcement effect.

In addition, it is seen that for the first 14 half hour returns following the announcement, 13 are negative for in-the-money calls whereas only nine are positive for out-of-the-money calls. Similarly, for in-the-money calls it takes seven hours after the announcement (interval 14) before the fraction of positive is larger than the fraction of negative effects. For out-of-the-money calls the fraction of negative effects are larger than the fraction of positive effects already after 1.5 hours (interval 3).

Figure 2 provides graphical depiction of the average cumulative returns for both types of calls in a period from 15 half hour intervals before the announcement to 28 half hour interval after the announcement. This corresponds to a period from one trading day before to two trading days after the announcement. Several interesting observations follow from Figure 2. First, there is clearly again a negative reaction to in-the-money calls and a positive reaction to out-of-the-money calls, and the reaction is seen to be caused by the announcement. However, there is some evidence of a pre-announcement reaction in a period before the announcement as the average cumulative returns starts drifting downwards for in-the-money calls and upwards for out-of-the-money calls.[12] Secondly, announcements of out-of-the-money calls immediately lead to a strong stock market reaction and most of the announcement effect is seen as a stock price increase in the event period 0, i.e. the period ending shortly after the announcement time. Furthermore, from half an hour after the announcement and onwards, there is only weak evidence of a positive drift in the average cumulative returns.

The stock market reaction to an in-the-money call is not nearly as immediate. For example, the stock price reaction in event period 0 and 1 is quite small and the average cumulative returns continue to be drifting downwards until six or seven hours after the announcement, i.e. a whole trading day after the announcement. Thereby, Figure 2 suggests that the stock market reaction to in-the-money calls is slower than for out-of-the-money calls.

In order to test the speed stock market reaction, Table 5 examines the cumulative returns over selected intervals. Specifically the intervals include the five half hour intervals prior to the announcement (-5:-1), the two intervals immediately following the announcement (0:1), the next five intervals (2:6), the remainder of a trading day (7:14) and another trading data after the announcement (15:28). The stock market reaction for out-of-the-money calls is isolated in the

[12] It should also be mentioned that such "leakage" is also found by, for example, Masulis and Shivakumar (2002) for announcements of seasoned equity offerings and by Patell and Wolfson (1984) for dividend and earnings announcements.

period immediately following the announcement whereas the reaction for in-the-money calls is spread over a period of time lasting seven hours following the announcement.

As a robustness check, we have also examined the returns in the half hour intervals for the groups with different announcement times. Results from examining these three different groups are shown and discussed in the appendix. These results show that the main conclusions from above remain the same. Across the three different groups, the stock market reaction to in-the-money calls is slower than the stock market reaction to out-of-the-money calls. It is especially worth to note that even for the in-the-money calls announced in the evening is the stock market slow in the sense that the average over-night announcement effect is only –0.54% whereas the average stock market reaction during the rest of the following day is –1.40%.

All in all the results from the intraday study provide strong evidence that the stock market reaction to out-of-the-money calls is quite immediate and precise, whereas the reaction to an in-the-money call is slow lasting up to seven hours following the announcement. Given an information explanation for the announcement effect of convertible bond calls, it is quite difficult to explain why the market reaction to in-the-money calls should be so slow compared to out-of-the-money calls. Of course, one explanation could be that the response to negative news generally is generally slower than to positive news. However, the reaction time found here is far from the reaction time documented in case of other announcements of negative information. For example, Busse and Green (2002) find that the response to negative information reported by CNBC is lasting 15 minutes. Similar results in the case of dividends, earnings announcements, and analysts' revisions do not provide evidence of longer response times.[13]

Furthermore there are a number of reasons to believe in-the-money calls should have reacted faster than out-of-the-money calls. First, in-the-money calls are more common than out-of-the-money calls. Secondly, the impression from conversations with managers of convertible bond funds and hedge desks as well as from much of the literature on convertible bonds is that quite often in-the-money calls are anticipated.[14] Third, as mentioned in the descriptive statistics, NYSE firms are relatively more common among out-of-the-money calls than (62%) than among in-the-money calls (54%). This also point in the direction of a faster reaction for in-the-money calls as Masulis and Shivakumar (2002) have documented that the price adjustment is slower on NYSE compared to

[13] See, for example, Patell and Wolfson (1985), Jennings and Starks (1985), Barclay and Litzenberger (1988), and Juergens (2000).

[14] For example, Calamos (1998, p. 202) states that "In most cases the marketplace has anticipated the call" when writing about in-the-money calls. Similarly, the pattern in short selling before the call and its role in explaining the announcement effect as documented in Bechmann (2004) also suggest that in-the-money calls can be predicted to a certain degree.

Nasdaq. Finally, as also discussed in connection with Table 2, firms making in-the-money calls are actually more liquid than firms making out-of-the-money calls. Therefore, the evidence suggests that a large fraction of the in-the-money calls is caused by price pressure in the period following the announcement as discussed in section 2. The next subsection examines if additional evidence can be found by considering trading volume around the announcement.

However, before doing so, we end this section by taking a closer look at the in-the-money announcements. If hedging induced price pressures are the reason for the negative announcement effect, several characteristics of the convertible bond are expected to be relevant in explaining this announcement effect. Bechmann (2004) discusses several such characteristics and illustrates the importance of these in explaining the announcement effect. Examples of such characteristics are the size of the call measured by the number of new shares to be issued relative to the number of shares outstanding and the extent to which the conversion option is in-the-money. We will not repeat this analysis here but just mention that we find similar evidence in our dataset. In particular, there is a significantly negative relationship between the size of the call measured as described above and the announcement effect meaning that a larger call leads to a more negative stock market reaction.

Instead of repeating such analyses here, we examine a new relationship between the convertible bond and the announcement effect. If the price pressures are caused by hedging in connection with convertible bond arbitrage as discussed in section 2, not only the size of the convertible bond relative to the calling firm should be relevant, but also the absolute size of the convertible bond should be expected to be relevant. First, if the amount called is very small, it is likely a clean up call in order to get rid of "sleeping investors" (see, for example, Dunn and Eades, 1989). Secondly, a certain amount of debt should be outstanding in order for an arbitrage strategy to be feasible and attractive.

Figure 3 clearly shows that the announcement effect is larger and the stock market reaction slower for the large calls compared to small calls and again, these results are confirmed by unreported results from a study of small versus large calls in a table similar to Table 4. Quite interesting, a similar difference can not be found when looking at out-of-the-money calls in the sense that the size and speed of the stock market reaction is not related to the absolute size of the called convertible bond.

4.3 Trading volume

The analysis of the stock market announcement effect shows a differential speed of adjustment to a new equilibrium price following the announcement of a convertible bond call. Specifically, the out-of-the-money calls are associated with an immediate positive price reaction while in-the-money calls are associated with a more drawn out negative price reaction. We interpret these differences in the speed of the price reaction as evidence of price pressure for in-the-money calls. In other words, the negative price reaction of in-the-money calls is the result of price pressures caused by net sellers of the stock and not purely an information effect. With the availability of microstructure data this is of course a testable hypothesis. In this sub-section, we examine the trading volume around the announcement time.

Table 6 presents the standardized daily trading volume around the call announcement. The table shows that there is a large and significant increase in trading volume on the day of the announcement and partly also the following one to two days. From Panel A it follows that the increase on the announcement day is more pronounced for out-of-the-money calls than for in-the-money calls. In particular, the average trading volume on the announcement day is more than twice the normal daily trading volume for out-of-the-money calls but only 1.56 times the normal daily trading volume for in-the-money calls. Similarly, Panel B shows that for out-of-the-money calls more than 70% of the calls lead to higher trading volume on the announcement day than the trading volume two day prior. For in-the-money calls this number is only 59%.

Finally, Panels A and B both suggest that there generally is more trading for in-the-money calls in the period before the announcement. For example, Panel A shows that on day –2 and –1, the average standardized trading volume is significantly larger than one. Thereby, the results in Table 6 suggest that the market is less surprised by in-the-money calls compared to out-of-the-money calls. This is consistent with the assertion that in-the-money calls are often anticipated by the market.

Similar to our analysis of the returns data, the microstructure data allows us to take a close look at influx of trading volume around the announcement time. Table 7 shows the relative trading volume in half hour intervals around the announcement time. The trading volume is standardized for each firm by taking the ratio of the observed volume over the average half hour trading volume in the period from 180 days before to 180 days after the announcement.

Table 7 shows a significant increase in trading volume around the announcement of both types of calls. However, the increase in trading volume seems a more pronounced for out-of-the-money

calls. This is consistent with the more immediate stock price reaction documented in subsection 4.2 but can also be related to differences in general liquidity of the underlying stocks. For example, as shown in the descriptive statistics in Table 2, firms making in-the-money calls are generally more heavily traded. Furthermore, there is a similar difference in the general level of trading around the announcement. In particular, the average (median) total turnover for in-the-money calls is 6.0% (3.1%) for the period from one day before to one day after the announcement, which should be compared to 3.6% (2.1%) for out-of-the-money calls.

Volume by itself does not constitute price pressure. To examine the price pressure explanation for the announcement effects, we look at order flow imbalances over half hour intervals. Order flow imbalances are estimated by taking the ratio of net signed volume and total volume over each interval. If order flow is equal to zero over an interval it means on aggregate buyer-initiated trades exactly offsets aggregate seller-initiated trades or in other words order flow is balanced. On the other hand, positive order flow is an indicator of net purchases and negative order flow is an indicator of net sells. Therefore, positive price pressure is associated with positive order flow, while negative price pressure is associated with negative order flow. Table 8 examines the potential order flow imbalances over select intervals relative to the announcement time for in-the-money and out-of-the-money convertible bond calls. The data indicate both in-the-money and out-of-the-money calls are associated with net buying pressure. Given the downward price movement documented above for in-the-money calls this is a surprising result. It suggests net buying pressure is associated with negative returns. However the measure of net buying pressure is potentially biased by the existence of short sellers. Due to restrictions on when a short sale may be executed, the Lee and Ready algorithm used to sign the volume is unable to distinguish short sales from buyer-initiated trades. This result therefore suggests the net order imbalance for in-the-money calls is due to short sellers placing price pressure on the underlying equity.

5. Conclusions

This paper contains a detailed study of the stock market reaction closely around the announcement of convertible bond calls using daily as well as intraday stock market data. Consistent with earlier findings, the results show that the announcement effect is negative for in-the-money calls and positive for out-of-the-money calls. Furthermore, this paper, by augmenting the standard event study methodology with the exact time of the announcement together with transaction or intradaily data, is able to provide new and important insights on these announcement effects. In particular, the stock market reaction to an out-of-the-money call is quickly incorporated into stock prices, whereas it takes several hours before the stock price has been fully adjusted for an in-the-money call. These results are robust to different announcement times including announcements made prior to the market opening, during market hours, and following the market closing. This slow stock market reaction to in-the-money calls is interpreted as price pressure and the examination of intraday trading data supports these conclusions by providing additional evidence in favor of the price pressure explanation. In particular, in-the-money calls are associated with order flow imbalances as traders sell stock in the hours following the announcement. No such order imbalance exists for out-of-the-money calls.

The paper contains two main contributions to the existing literature. First, by examining both types of calls and documenting important differences in the speed of the stock market reaction and the order flow imbalances, the results help to resolve the dichotomy regarding the equity market announcement effect for convertible bond calls. For in-the-money calls, our results indicate that most of the announcement is due to price pressure following the call announcement rather than asymmetric information.

The second contribution is methodological. By showing that market microstructure data can be combined with detailed announcement data, our understanding of the announcement effect can be greatly enhanced. In our case, we are able to distinguish separate asymmetric information and price pressure effects of announcements. These results clearly illustrate how the intraday data is helpful in identifying differences in the stock market reaction to different types of announcements, and in this way, the paper adds to the suggestions found in, for example, Barclay and Litzenberger (1988). These results are not only relevant to the convertible bond market but can be further applied to the growing literature on price pressure effects of other announcements such as mergers (see, Mitchell, Pulvino and Stafford, 2004) or index revisions (see, Elliot and Warr, 2003).

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Figure 1: *The distribution of the announcement time during the day for the sample of in-the-money (ITM) and out-of-the-money (OTM) calls.*

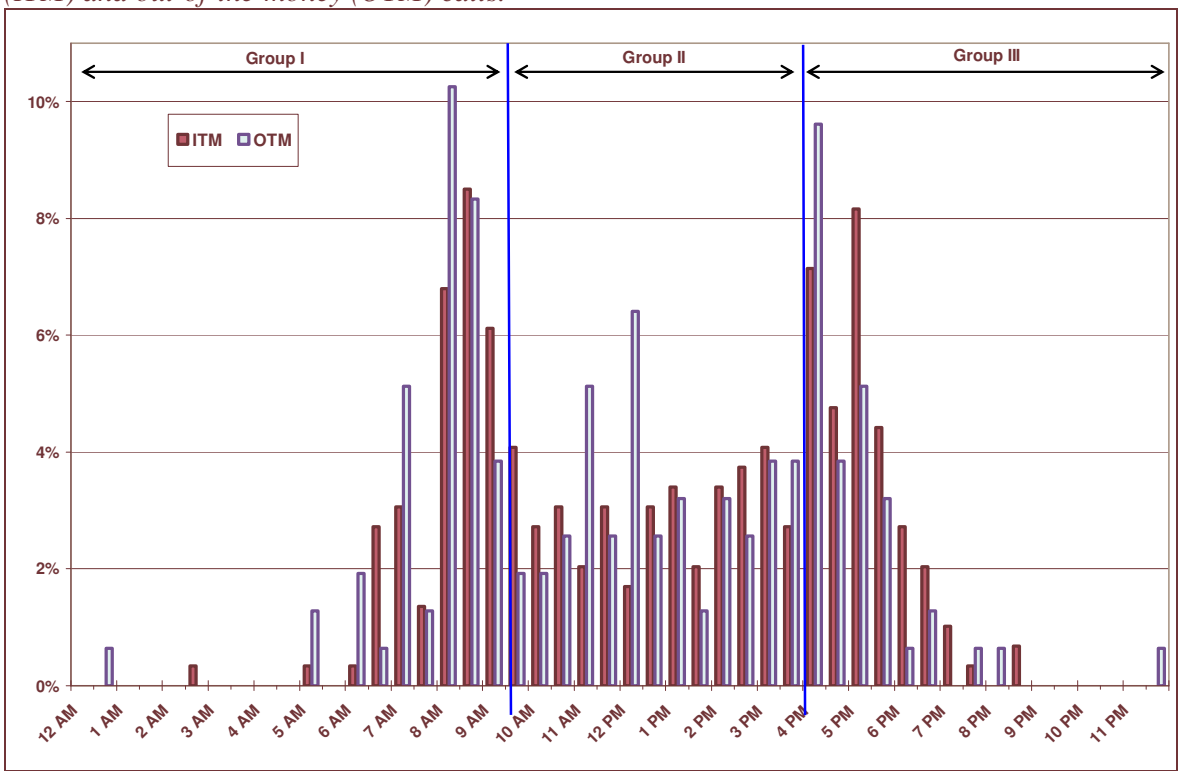

Figure 2: *The time pattern in average cumulative returns in half hour intervals around the announcement time. The returns are calculated based on trade prices as close as possible to the end of each half hour period. The announcement is made between event time –1 and 0 in the sense that the price of the first trade strictly following the announcement time is used as the time 0 price. ITM is the in-the-money calls and OTM is the out-of-the-money calls.*

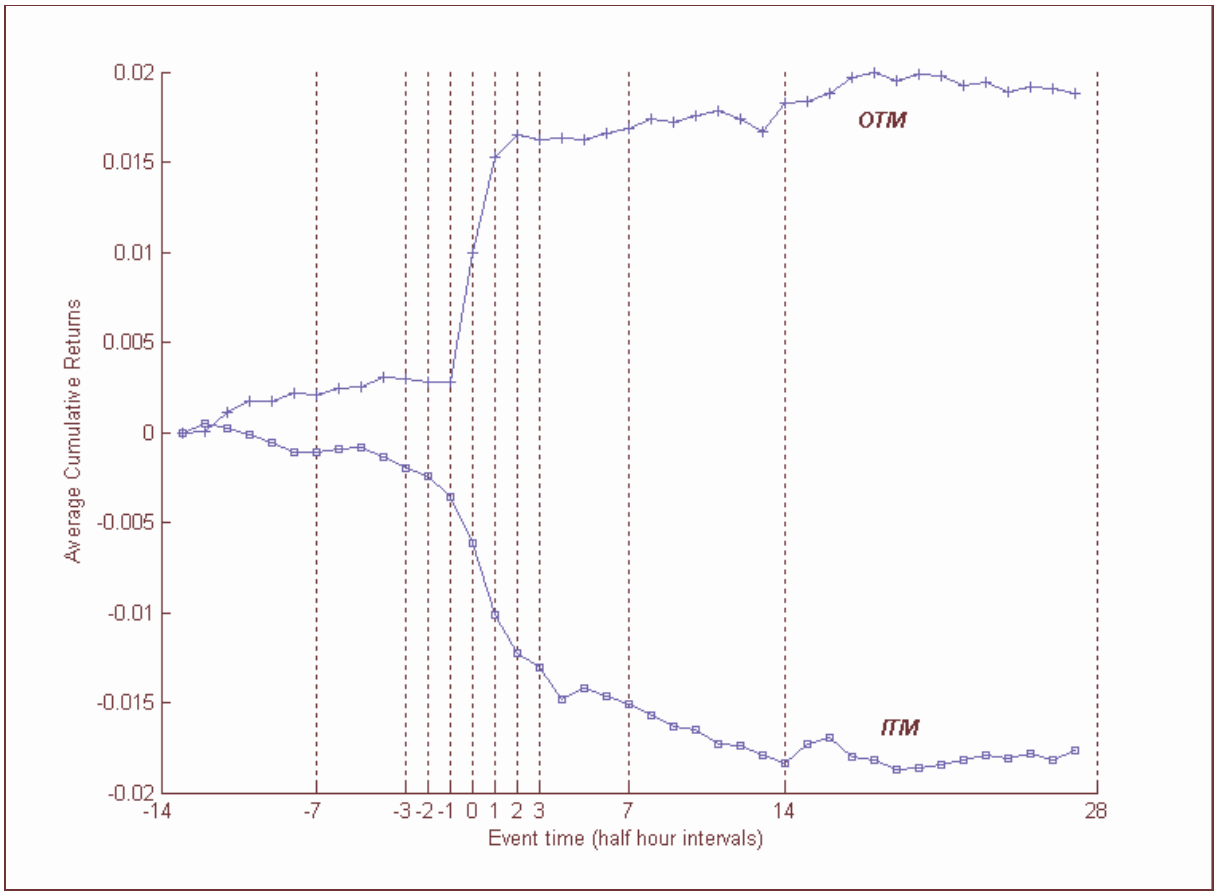

Figure 3: *The time pattern in average cumulative returns in half hour intervals around the announcement time for the different sizes of in-the-money calls. Large calls are calls of more than $55 million in face value and Small calls are calls of less than $55 millions. The returns are calculated based on trade prices as close as possible to the end of each half hour period. The announcement is made between event time –1 and 0 in the sense that the price of the first trade following the announcement time is used as the time 0 price. The average cumulative returns have been calculated using event time –1 as starting point.*

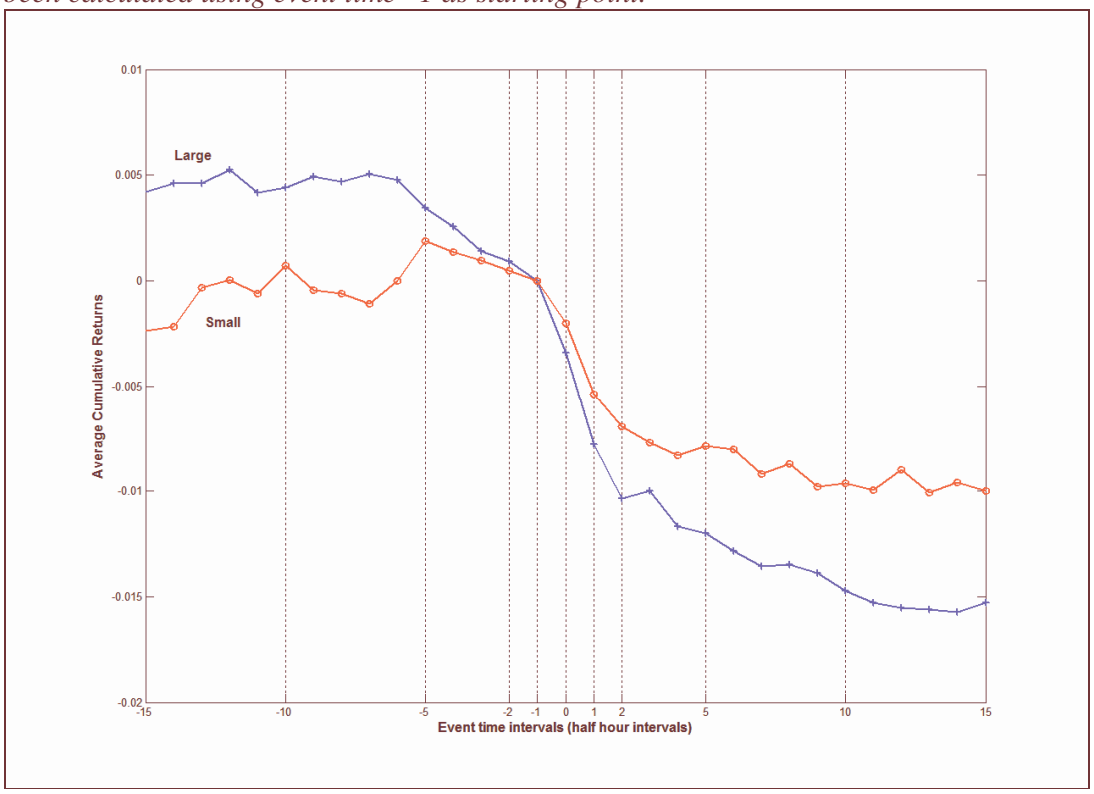

Table 1: *Distribution across years of the sample of convertible bond calls for in-the-money (ITM) and out-of-the-money (OTM) calls. 'Percent ITM' is the percent of all calls that are in-the-money.*

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
ITM	39	25	23	50	26	22	22	21	22	9	11	26	296
OTM	8	9	11	14	21	7	5	2	3	12	42	22	156
Total	47	34	34	64	47	29	27	23	25	21	53	48	452
Percent ITM	83%	74%	68%	78%	55%	76%	81%	91%	88%	43%	21%	54%	65%

Table 2: *Descriptive statistics for the convertible bond calls in the period 1993-2004. The increase in the number of shares (millions) is defined as the total number of new shares that would be issued upon a full conversion of the bonds called. The increase in number of shares (%) is obtained by dividing the increase in number of shares (millions) by the number of shares outstanding before the call. Daily turnover is calculated as the number of shares traded during a day divided by the number of shares outstanding and is based on the period from 180 days before to 180 days after the announcement. The size of a called issue is the face value of debt outstanding before the call. The total call payment/Value of equity is the total amount of money that should be paid in order to redeem the bonds for cash divided by the total value of equity before the call. The conversion value/call payment measures the extent to which the conversion option is in-the-money. The conversion value and value of equity are calculated based on the stock price two days prior to the announcement of the call. The length of the conversion period is the number of calendar days from the announcement of the call until the end of the conversion period. The number of years to maturity is the number of years from the time of the call until the maturity of the bond. The fraction is the distribution of the calls across the different stock exchanges.*

Panel A: In-the-money calls.

	Mean	Median	Minimum	Maximum
Increase in number of shares (millions)	4.83	3.30	0.06	40.63
Increase in number of shares (%)	11.4%	8.8%	0.1%	65.2%
Value of equity ($ millions)	3698	992	17	127770
Daily turnover (%)	1.67%	0.91%	0.00%	13.65%
Size of called issue ($ millions)	111.55	58.60	0.84	1020.36
Total call payment/Value of equity (%)	7.89%	6.24%	0.03%	51.71%
Conversion value/call payment	1.64	1.38	1.00	10.04
Length of conversion period (calender days)	33	32	6	135
Number of years to maturity	7.83	6	0	28
Stock exchange	NYSE	AMEX	NASDAQ	
Fraction	54%	7%	39%	

Panel B: Out-of-the-money calls.

	Mean	Median	Minimum	Maximum
Increase in number of shares (millions)	4.80	2.99	0.10	45.20
Increase in number of shares (%)	9.5%	5.8%	0.0%	44.7%
Value of equity ($ millions)	3839	1177	12	145840
Daily turnover (%)	0.99%	0.63%	0.00%	12.70%
Size of called issue ($ millions)	172.54	101.75	5.00	1200.00
Total call payment/Value of equity (%)	13.22%	8.66%	0.03%	67.12%
Conversion value/call payment	0.69	0.77	0.05	1.00
Length of conversion period (calender days)	34	31	9	150
Number of years to maturity	6.71	5	0	24
Stock exchange	NYSE	AMEX	NASDAQ	
Fraction	62%	6%	32%	

Table 3: *The daily stock returns closely around the call announcement and two different tests for significance of the stock returns – a standard Z-test and a non-parametric sign-test.* *** *denotes significance at the 1% level,* ** *at the 5% level, and* * *at the 10% level. The stock returns are calculated based on closing prices. AD is the adjusted announcement date, i.e. the date on which the stock market reaction is expected. More precisely, it is the announcement date for calls announced before the market opens (Group I) and for calls announced during market hours (Group II) but the following day for calls announced after the market has closed (Group III). ITM refers to in-the-money calls and OTM to out-of-the-money calls.*

Panel A: *Announcement effects calculated based on raw returns.*

	ITM			OTM		
	AD-1	**AD**	**AD+1**	**AD-1**	**AD**	**AD+1**
Average	-0.03%	-1.83% ***	0.08%	0.12%	1.93% ***	0.07%
Median	0.00%	-1.33%	0.00%	0.00%	1.57%	0.00%
% Negative	48%	78% ***	54%	52%	21% ***	52%

Panel B: *Announcement effects calculated based on market adjusted returns.*

	ITM			OTM		
	AD-1	**AD**	**AD+1**	**AD-1**	**AD**	**AD+1**
Average	-0.02%	-1.71% ***	0.01%	0.14%	1.82% ***	0.08%
Median	0.00%	-1.37%	-0.09%	0.02%	1.31%	-0.01%
% Negative	51%	77% ***	56% **	50%	22% ***	52%

Table 4: *The returns in half hour intervals relative to the announcement time. The returns are calculated based on quoted prices as close as possible to the end of each half hour period. The announcement is made in event interval 0 in the sense that the price of the first trade strictly following the announcement time is used as the time 0 price. The lover part presents returns over different time periods relative to the announcement time. The test for significance of the return in the individual event periods is a standard t-test whereas a sign test is used to tests if the fraction of positive returns is different from the fraction of negative returns.* *** *denotes significance at the 1% level,* ** *at the 5% level, and* * *at the 10% level. ITM is the in-the-money calls and OTM is the out-of-the-money calls.*

Event Interval (half hour)	ITM Mean return	ITM Returns<0 relative to Non-zero returns	ITM Cumulative return	OTM Mean return	OTM Returns<0 relative to Non-zero returns	OTM Cumulative return
-5	0.01%	46%	0.01%	0.01%	47%	0.01%
-4	-0.05%	55%	-0.04%	0.06%	50%	0.07%
-3	-0.06% *	52%	-0.10%	-0.01%	45%	0.06%
-2	-0.04%	53%	-0.15%	-0.02%	49%	0.03%
-1	-0.12% *	59% ***	-0.27%	0.00%	48%	0.03%
0	-0.25% **	60% ***	-0.52%	0.72% ***	33% ***	0.75%
1	-0.41% ***	69% ***	-0.93%	0.53% ***	31% ***	1.28%
2	-0.21% ***	60% ***	-1.13%	0.13%	47%	1.41%
3	-0.08% *	52%	-1.21%	-0.03%	55%	1.38%
4	-0.18% ***	60% ***	-1.39%	0.01%	51%	1.39%
5	0.06%	54%	-1.33%	0.00%	52%	1.38%
6	-0.05%	54%	-1.37%	0.04%	46%	1.42%
7	-0.05%	54%	-1.42%	0.02%	45%	1.44%
8	-0.06% *	56% **	-1.48%	0.05%	48%	1.49%
9	-0.06% **	52%	-1.54%	-0.01%	53%	1.48%
10	-0.02%	54%	-1.56%	0.03%	50%	1.51%
11	-0.08% **	56% **	-1.64%	0.03%	53%	1.54%
12	-0.01%	51%	-1.65%	-0.04%	56%	1.50%
13	-0.05%	52%	-1.70%	-0.08% **	59% **	1.42%
14	-0.04%	48%	-1.74%	0.16% **	42% **	1.59%
15	0.10%	46%	-1.64%	0.00%	44%	1.59%
16	0.04%	53%	-1.61%	0.05%	50%	1.64%
17	-0.10% **	54%	-1.71%	0.09% *	44% *	1.72%
18	-0.02%	56% *	-1.72%	0.03%	50%	1.75%
19	-0.05%	52%	-1.78%	-0.04%	46%	1.71%
20	0.01%	56% *	-1.77%	0.03%	45%	1.74%
21	0.02%	48%	-1.75%	-0.01%	57% *	1.73%
22	0.02%	47%	-1.73%	-0.05%	54%	1.68%
23	0.03%	48%	-1.70%	0.01%	51%	1.70%
24	-0.01%	51%	-1.72%	-0.05%	56% *	1.65%
25	0.03%	50%	-1.69%	0.02%	49%	1.67%

Table 5: *The returns over select intervals relative to the announcement time. The test for significance of the return in the individual event periods is a standard t-test whereas a sign test is used to tests if the fraction of positive returns is different from the fraction of negative returns.* *** *denotes significance at the 1% level,* ** *at the 5% level, and* * *at the 10% level. ITM is the in-the-money calls and OTM is the out-of-the-money calls.*

Event Interval (half hour)	ITM		OTM	
	Mean return	Returns<0 relative to Non-zero returns	Mean return	Returns<0 relative to Non-zero returns
-5:-1	-0.28% **	56% **	0.06%	46%
0:1	-0.66% ***	70% ***	1.26% ***	22% ***
2:6	-0.45% ***	61% ***	0.16%	48%
7:14	-0.37% ***	62% ***	0.16%	50%
15:28	0.12%	46% *	0.01%	55%

Table 6: *Daily standardized trading volume around the call announcement. The standardized daily trading volume. ITM refers to in-the-money calls and OTM to out-of-the-money calls.*

Panel A: Standardized by the average daily trading volume in the period from 180 days before to 180 days after the announcement

	OTM					*ITM*				
Adjusted event day	**-2**	**-1**	**0**	**1**	**2**	**-2**	**-1**	**0**	**1**	**2**
Average	0.93	0.94	2.05 ***	1.58 ***	1.18 **	1.14 **	1.21 ***	1.56 ***	1.46 ***	1.19 ***
Median	0.81	0.81	1.29	0.99	0.93	0.94	0.93	1.12	1.05	0.91
% larger than 1	38% ***	37% ***	59% ***	50%	41% **	46% *	44% **	55% **	53%	44% **

Panel B: Standardized by the number of outstanding shares

	OTM					*ITM*				
Adjusted event day	**-2**	**-1**	**0**	**1**	**2**	**-2**	**-1**	**0**	**1**	**2**
Average	1.12%	0.94%	1.61%	1.57%	1.13%	1.92%	2.01%	2.20%	2.19%	1.77%
Median	0.54%	0.58%	0.94%	0.70%	0.61%	0.86%	0.86%	1.18%	1.03%	1.00%
% larger than day -2		45% *	71% ***	61% ***	52%		52%	59% ***	55% **	49%

Table 7: *The relative trading volume in half hour intervals relative to the announcement time. The announcement is made in event interval 0 but in order to have consistent length of the periods event period 0 and 1 are considered together. Relative volume for each firm is calculated as the trading volume in the interval divided by average half hour trading volume in the period from 180 days before to 180 days after the announcement. The test for if the mean relative volume is larger than one in the individual event periods is a standard one-sided t-test.* *** *denotes significance at the 1% level,* ** *at the 5% level, and* * *at the 10% level. ITM is the in-the-money calls and OTM is the out-of-the-money calls.*

	ITM					OTM				
	Mean	Test for >1	Median	>1	<1	Mean	Test for >1	Median	>1	<1
-5	0.83		0.34	22%	78%	0.92		0.53	26%	74%
-4	0.89		0.35	22%	78%	1.19		0.52	22%	78%
-3	0.99		0.37	23%	77%	1.16		0.56	29%	71%
-2	0.98		0.37	22%	78%	0.98		0.69	31%	69%
-1	0.97		0.48	30%	70%	1.55	**	0.94	49%	51%
0	2.30	***	0.97	49%	51%	5.50	***	1.46	63%	37%
1	1.77	***	0.80	42%	58%	3.84	***	1.48	62%	38%
2	1.30	**	0.60	36%	64%	2.86	***	1.20	56%	44%
3	1.31		0.45	30%	70%	2.29	***	0.71	42%	58%
4	1.24		0.46	28%	72%	1.58	***	0.78	42%	58%
5	1.02		0.40	26%	74%	1.61	**	0.67	37%	63%
6	0.84		0.32	21%	79%	1.45	**	0.73	37%	63%
7	0.95		0.37	24%	76%	1.29	*	0.58	35%	65%
8	0.64		0.31	18%	82%	1.21		0.51	30%	70%
9	0.79		0.31	22%	78%	1.20		0.64	31%	69%
10	0.96		0.40	27%	73%	1.25	*	0.71	35%	65%
11	1.25		0.48	29%	71%	1.43	**	0.77	41%	59%
12	1.21	**	0.60	35%	65%	1.90	***	1.08	52%	48%
13	1.17	*	0.56	34%	66%	1.54	***	0.80	43%	57%
14	1.15		0.51	30%	70%	1.29	*	0.64	35%	65%
15	1.03		0.46	25%	75%	1.17		0.70	38%	62%
16	0.89		0.47	26%	74%	1.01		0.59	31%	69%
17	0.94		0.40	21%	79%	1.01		0.57	29%	71%
18	0.76		0.30	21%	79%	1.10		0.52	30%	70%
19	0.86		0.30	19%	81%	1.29		0.48	19%	81%
20	0.89		0.26	18%	82%	0.95		0.46	22%	78%
21	0.63		0.26	16%	84%	0.95		0.41	28%	72%
22	0.72		0.36	18%	82%	1.14		0.55	32%	68%
23	0.89		0.36	21%	79%	0.97		0.55	31%	69%
24	0.80		0.39	21%	79%	0.94		0.57	29%	71%
25	1.04		0.50	31%	69%	1.67	***	0.95	47%	53%

Table 8: *The order flow imbalance over select intervals relative to the announcement time. The announcement is made in event interval 0 in the sense that the price of the first trade following the announcement time is used as the time 0 price. The net order flow is then aggregated over the multiple intervals and divided by the aggregated volume over the same multiple intervals. For example, 0-1 represents intervals 0 and 1. The test for significance of the aggregated order flow across intervals is a standard t-test.* *** *denotes significance at the 1% level,* ** *at the 5% level, and* * *at the 10% level. ITM is the in-the-money calls and OTM is the out-of-the-money calls.*

Event Interval (half hour)	ITM Mean	OTM Mean
-5:-1	0.0382	0.0451
0:1	-0.0080	0.1642 ***
2:6	0.0824 ***	0.0592 *
7:14	0.0790 ***	0.0528 *
15:28	0.0495 **	0.0477 *

Appendix

In this appendix we use the time of the announcement to divide the two types of calls into three subgroups. Group I consists of observations where the announcement is made before the market opens, Group II of observations with an announcement made during market hours, and Group III of observations where the announcement is made after the market has closed. Results from examining these three different groups are presented below. These results not only provide interesting insight into the timing of announcement but also serve as a robustness check to the analyses presented above. Table A-1 presents the summary statistics for each of the subgroups.

Traditional two-day event window

We start by presenting results on the announcement effect as calculated in standard event studies. The announcement effect is calculated as the sum of the return on the day of the announcement and the following day. In addition to presenting the aggregate results we also present the results by time of day. Group I represents observations with a time stamp before the market opens, Group II represents observations with a time stamp during market hours, and Group III contains observations where the announcement is released after the market closes. Table A-2 presents information on the announcement effect for the whole sample and for these three groups.

Table A-2 confirms the existing evidence of a negative announcement effect of in-the-money calls and a positive announcement effect of out-of-the-money calls. Furthermore, the average announcement effect is generally significantly different from 0 at the 1%-level. Similarly, there are significantly more negative announcement effects for in-the-money calls and positive announcement effects for out-of-the-money calls.

Similar evidence is also found for the calls divided into three groups depending on the time of the announcement. However, one interesting observation is that there is evidence of a larger announcement effect in absolute terms for Group III for in-the-money as well as out-of-the-money calls. For example, for in-the-money calls, the average (median) market adjusted announcement effect is –2.24% (–1.40%) for Group III but only around –1.2% (–1.1%) for the other two groups. For out-of-the-money calls, the same numbers for Group III are 2.06% (1.92%) and these should be compared to 1.81% (1.16%) for Group II which is having the second highest average announcement effect. Finally, it is worth to note that even though the announcement effect generally is slightly smaller when considering market adjusted returns, the difference between Panels A and B in Table

A-2 is quite small. This is consistent with section 3 arguing that the market adjustment is not crucial when studying announcement effects over very short intervals.

Intraday Returns

Figures A-1 and A-2 present the intraday price reaction to the call announcement for the three groups of in- and out-of-the-money calls respectively. Overall, Figures A-1 and A-2 show that the stock price reactions are quite similar across the three different groups and similar to the overall pattern in Figure 2. However, there are also a few differences that deserve to be mentioned.[15] First, the pre-announcement reaction indicated by Figure 2 is seen to exist primarily for Group II, i.e. for the announcements made during the day. However, by examining the pre-event period more closely as in Table 4, we find that the returns are not significant. Therefore, it might be the case that we for a few observations haven't been able to identify the first announcement time, that the calls might be predicted during the day, or simply that the news might have been leaked to the market. The pre-event stock market reaction can also explain why Group II of the in-the-money calls seem to be reacting more quickly to the announcement as suggested by Figure A-2.

Secondly, for both types of calls it seem like the stock market reaction to Group III is somewhat slower than for the two other groups. However, it is still the case that Group III of in-the-money calls is much slower than the Group III with out-of-the-money calls. In particular for in-the-money calls the negative drift continues until around 5-6 hours after the announcement meaning the whole day following the announcement. For out-of-the-money calls the announcement effect is fully incorporated after 1 hour. We have no certain answer as to why the stock market reaction to Group III seems to take a little more time than the others even though they are announced in the evening. One reason might be that they are associated with a larger announcement effect as discussed earlier and also seen from Figures A-1 and A-2. Another and possible related reason is if firms believing that their announcement will be a surprise or will be difficult to interpret for the stock market and for this reason actually time their announcement to take place in the evening. All in all the results from the intraday study provide strong evidence that the stock market reaction to out-of-the-money calls is immediate and precise, whereas the reaction to an in-the-money call is slow lasting several hours following the announcement.

[15] These differences are confirmed by unreported tables similar to Table 4 but on group levels.

Appendix Tables and Figures

Table A-1: *Descriptive statistics for the convertible bond calls in the period 1993-2004 by Group.*

Panel A.

ITM-Group I	Mean	Median	Minimum	Maximum
Increase in number of shares (millions)	4.30	2.75	0.12	26.90
Increase in number of shares (%)	9.8%	8.1%	0.1%	34.0%
Value of equity ($ millions)	5257	1255	23	127770
Daily turnover (%)	1.58%	0.89%	0.12%	7.49%
Size of called issue ($ millions)	94.78	55.25	1.80	755.00
Total call payment/Value of equity (%)	6.08%	4.89%	0.05%	43.55%
Conversion value/call payment	1.72	1.41	1.00	6.05
Length of conversion period (calender days)	36	32	15	104
Number of years to maturity	7.43	6	0	27
Stock exchange	NYSE	AMEX	NASDAQ	
Fraction	58%	7%	35%	

ITM-Group II	Mean	Median	Minimum	Maximum
Increase in number of shares (millions)	3.76	2.69	0.06	20.65
Increase in number of shares (%)	11.4%	8.9%	0.0%	41.9%
Value of equity ($ millions)	7708	1086	23	684330
Daily turnover (%)	1.32%	0.79%	0.04%	8.78%
Size of called issue ($ millions)	90.80	52.60	0.84	800.00
Total call payment/Value of equity (%)	7.20%	5.36%	0.02%	31.99%
Conversion value/call payment	1.65	1.37	1.00	5.41
Length of conversion period (calender days)	33	32	6	135
Number of years to maturity	8.37	7	0	22
Stock exchange	NYSE	AMEX	NASDAQ	
Fraction	58%	6%	35%	

ITM-Group III	Mean	Median	Minimum	Maximum
Increase in number of shares (millions)	6.57	4.34	0.05	47.91
Increase in number of shares (%)	11.3%	8.5%	0.0%	48.0%
Value of equity ($ millions)	6970	1392	22	141810
Daily turnover (%)	1.61%	1.07%	0.00%	7.84%
Size of called issue ($ millions)	147.05	75.00	0.50	1104.00
Total call payment/Value of equity (%)	6.75%	5.12%	0.00%	25.92%
Conversion value/call payment	1.62	1.37	1.00	6.00
Length of conversion period (calender days)	31	31	9	56
Number of years to maturity	7.18	6	0	28
Stock exchange	NYSE	AMEX	NASDAQ	
Fraction	65%	4%	31%	

Panel B.

OTM-Group I	Mean	Median	Minimum	Maximum
Increase in number of shares (millions)	4.73	2.56	0.11	20.01
Increase in number of shares (%)	6.2%	3.8%	0.1%	31.0%
Value of equity ($ millions)	4235	3267	80	28778
Daily turnover (%)	1.18%	1.14%	0.03%	4.66%
Size of called issue ($ millions)	141.77	108.00	4.90	488.00
Total call payment/Value of equity (%)	7.76%	5.42%	0.08%	29.06%
Conversion value/call payment	0.66	0.74	0.04	1.00
Length of conversion period (calender days)	33	30	14	183
Number of years to maturity	4.94	4	0	18
Stock exchange	NYSE	AMEX	NASDAQ	
Fraction	61%	0%	39%	

OTM-Group II	Mean	Median	Minimum	Maximum
Increase in number of shares (millions)	4.21	2.44	0.03	22.56
Increase in number of shares (%)	10.2%	6.0%	0.0%	44.7%
Daily turnover (%)	0.72%	0.42%	0.00%	3.43%
Value of equity ($ millions)	5285	1052	10	145840
Size of called issue ($ millions)	157.28	66.18	1.50	1200.00
Total call payment/Value of equity (%)	12.41%	7.98%	0.03%	55.11%
Conversion value/call payment	0.69	0.82	0.10	1.00
Length of conversion period (calender days)	33	31	9	101
Number of years to maturity	7.99	6	0	24
Stock exchange	NYSE	AMEX	NASDAQ	
Fraction	69%	8%	23%	

OTM-Group III	Mean	Median	Minimum	Maximum
Increase in number of shares (millions)	4.66	3.18	0.16	22.01
Increase in number of shares (%)	9.3%	5.5%	0.3%	40.4%
Daily turnover (%)	0.94%	0.60%	0.05%	6.48%
Value of equity ($ millions)	4526	1218	45	36299
Size of called issue ($ millions)	173.79	112.50	1.60	1000.00
Total call payment/Value of equity (%)	12.77%	7.62%	0.71%	81.25%
Conversion value/call payment	0.67	0.76	0.10	0.99
Length of conversion period (calender days)	33	31	9	63
Number of years to maturity	5.61	4	0	18
Stock exchange	NYSE	AMEX	NASDAQ	
Fraction	61%	8%	32%	

Table A-2: *The two-day announcement effect and two different tests for significance of the announcement effect – a standard t-test and a non-parametric sign-test.* *** *denotes significance at the 1% level,* ** *at the 5% level, and* * *at the 10% level. ITM refers to in-the-money calls and OTM to out-of-the-money calls. Group I refers to calls announced before opening of the market, Group II to calls announced during market hours, and Group III to calls announced after the market is closed.*

***Panel A**: Announcement effect calculated based on raw returns.*

	ITM				OTM			
	All	***Group I***	***Group II***	***Group III***	***All***	***Group I***	***Group II***	***Group III***
Average	-1.58% ***	-1.46% ***	-1.15% ***	-2.29% ***	1.83% ***	1.58% ***	1.88% ***	2.06% ***
Median	-1.23%	-1.36%	-1.01%	-1.27%	1.54%	1.93%	1.50%	1.44%
Min	-24.57%	-19.60%	-13.49%	-24.57%	-11.48%	-5.04%	-4.17%	-11.48%
Max	11.66%	11.66%	8.07%	6.94%	15.20%	11.70%	12.01%	15.20%
Neg : Pos	207 : 111 ***	54 : 28 ***	90 : 49 ***	63 : 34 ***	48 : 125 ***	15 : 36 ***	23 : 58 ***	10 : 31 ***
% Negative	65%	66%	65%	65%	28%	29%	29%	23%

***Panel B**: Announcement effect calculated based on market adjusted returns.*

	ITM				OTM			
	All	***Group I***	***Group II***	***Group III***	***All***	***Group I***	***Group II***	***Group III***
Average	-1.52% ***	-1.30% **	-1.15% ***	-2.24% ***	1.76% ***	1.44% ***	1.81% ***	2.06% ***
Median	-1.14%	-1.16%	-1.04%	-1.40%	1.22%	0.89%	1.16%	1.92%
Min	-24.45%	-17.76%	-13.87%	-24.45%	-10.76%	-4.52%	-5.09%	-10.76%
Max	14.53%	14.53%	7.53%	6.65%	15.98%	11.91%	12.01%	15.98%
Neg : Pos	221 : 97 ***	53 : 29 ***	103 : 36 ***	65 : 32 ***	54 : 119 ***	17 : 34 ***	25 : 56 ***	12 : 29 ***
% Negative	69%	65%	74%	67%	31%	35%	30%	26%

Figure A-1: *The time pattern in average cumulative returns in half hour intervals around the announcement time for the different groups of in-the-money calls. The returns are calculated based on trade prices as close as possible to the end of each half hour period. The announcement is made between event time –1 and 0 in the sense that the price of the first trade following the announcement time is used as the time 0 price. Group I refers to calls announced before opening of the market, Group II to calls announced during market hours, and Group III to calls announced after the market is closed. The average cumulative returns have been calculated using event time –1 as starting point.*

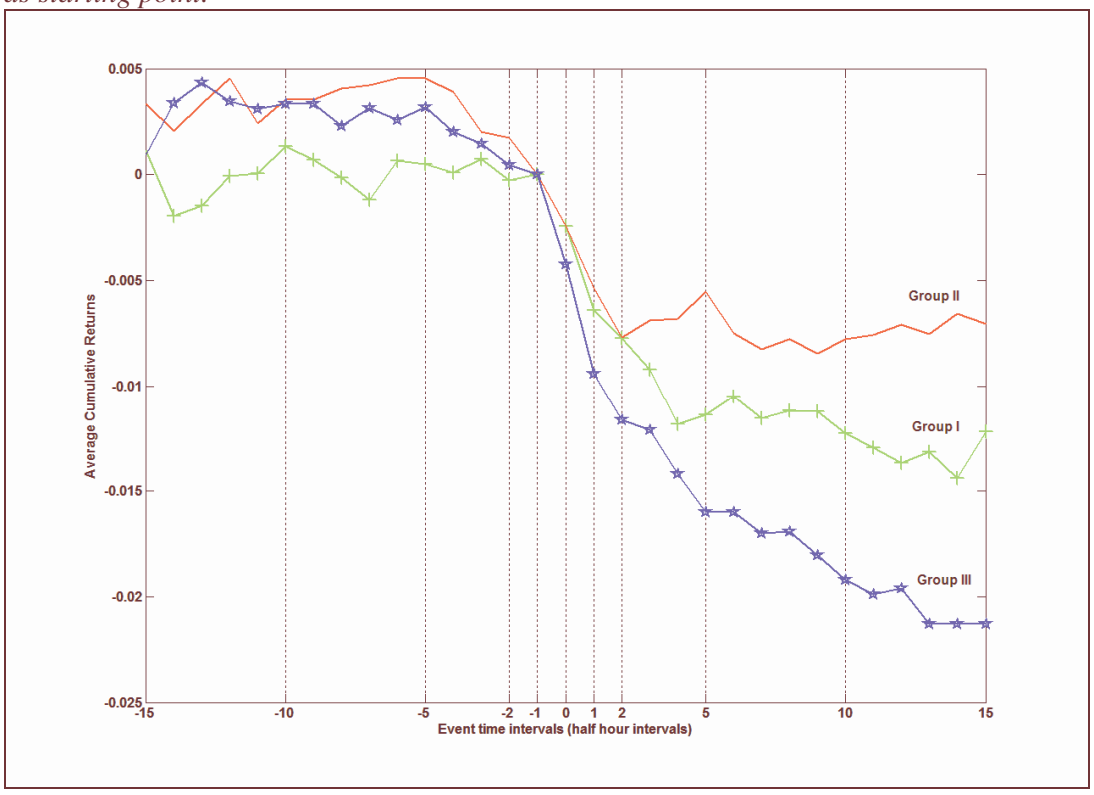

Figure A-2: *The time pattern in average cumulative returns in half hour intervals around the announcement time for the different groups of out-of-the-money calls. The returns are calculated based on trade prices as close as possible to the end of each half hour period. The announcement is made between event time –1 and 0 in the sense that the price of the first trade following the announcement time is used as the time 0 price. Group I refers to calls announced before opening of the market, Group II to calls announced during market hours, and Group III to calls announced after the market is closed. The average cumulative returns have been calculated using event time –1 as starting point.*