Issue Announcement as a Determinant of Convertible Bond Issuers' Systematic Risk at the Time of Financial Crisis – Some Observations from the US Market

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Abstract

The objective of the article is to determine the impact of the public announcement of an issue on the level of systematic risk measured by means of the beta coefficient (β). The conducted research allows observing that the public announcement of a scheduled issue of convertible bonds affects the level of systematic risk. Differences between beta coefficients for each of the studied periods before and after announcing are lower than zero, which indicates a drop in the systematic risk level in the period after announcing a decision to issue convertible bonds. Diversification of specific values of beta coefficients is lower for observations after an issue announcement than before that, which indicates a stabilising effect of the announcement on the value of the beta coefficient.

Key words

Systematic risk, convertible bond, announcement effect, capital market

JEL Classification: G32

1. Introduction

An issue of convertible bonds can be a valuable source of financing when it is difficult to acquire capital. Adding an option to convert bonds into the issuer's shares allows, in certain circumstances, to decrease interest on the issued debt. The bonds' predetermined conversion rate also results in a fixed price of the shares. The instrument can be extremely useful when it is difficult for a company to issue shares, e.g. at a time of exchange slump or when a standard rate of interest on similar bonds is too high. In both the cases, potential financial problems of the issuer are not hard to spot. Therefore, it does not come as a surprise that a majority of theoretical studies perceive an issue of convertible bonds as a symptom of the issuer's increasing investment risk.

This article studies behaviours of shareholders in companies that issue convertible bonds. The objective of the study is to determine the impact of the public announcement of an issue on the level of systematic risk measured by means of the beta coefficient (β). In order to more precisely determine the impact of announcing an intention to issue convertible bonds on the volatility of market pricing of issuers' shares, changes in rates of return on issuers' companies' shares were also examined in the periods before and after announcing their decisions to issue convertible bonds.

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2. Literature and previous research overview

The announcement effect for convertible bonds has been the subject of several studies. The consequence of the convertible bonds issuance may be associated with a substantial negative reaction of the share price. Those findings are related to 'signaling' theory introduced by Ross [19] and Leland and Pyle [11] and developed by Myers and Majluf [16] model based on asymmetric information of the firm's value. Myers and Majluf pointed that may issue different kind of securities instead of straight debt or straight equity according to managers' expectations of undertaken project valuation. If a bad state of the world is expected the firms tend to issue shares. When a good state may occur the debt issuance should take place. If the project would have a profitable impact on the firm's value, the managers would be interested in sharing the profits with new, possible investors and therefore they would tend to use internal sources or by debt. However, if the project may increase the risk of the firm or decrease the firm's value, the manager will tend to share this with new shareholders and will issue shares. Myers and Majluf explain the profit per share in a prosperous economy will be higher if the firm issues debt instead of shares. It is caused by the tax shield obtained by the debt securities and the dilution effect accompanying when shares are issued. This risk sharing phenomenon associated with shares issues explains why the announcement of share issuing generally follows after decrease of firms' market price.

Myers and Majluf developed a theory of the firm's financing choices hierarchy (the pecking order theory). According to their proposals company should choose capital sources as follows: retained profit, issue of standard debt, followed by risky debt, then the issue of equity capital. Managers should follow this hierarchy of capital sources to minimize the value transfer of during consecutive issues from the older shareholders toward the new ones. When the company announces an equity issue it may cause a negative market reaction because it may be perceived as an overvaluation of the share on the market. Convertible bonds are noticed as a deferred equity issue and then associated with a negative signal of overvaluation and may cause the negative announcement effect.

On the other hand convertible bond issue may lead to particular costs reduction. In the "backdoor equity" theory Stein [20] showed that convertible bond issue may raise new capital in case of costs of issue failure are high and the information asymmetry is such that a share issue directly is not favorable. The higher ability to reduce of interest rate for convertible bond (relative to straight debt issue) the more attractive conditions of new capital raising. Stein separated companies into three groups: good, medium and bad. He claimed that type of issued securities depends on nature of the issuer. The bad firm would not issue convertible bonds because of possible debt repayment problems and limit future debt issues. The good are less interested in issuing convertible bonds due to other solutions like straight debt or equity issuance. Convertible bonds are more suitable for medium companies. These firms usually want to raise the equity and send positive signals to the market. Medium firms can correctly use convertible bonds to gain main advantages of these securities in good states. In case of negative earnings they are not able to get an optimal level of debt. Such situation compromises future issues of debt or equity. Stein argued that medium firms differentiate themselves from bad ones by issuing convertible bonds. Therefore convertible bonds issue may be associated with a substantial positive reaction of the share price.

What is interesting, Masulis [13] found that investors may react favorably when companies announce new debt issues. It has been substantiated as an effect of positive abnormal returns associated with increasing firm's leverage. Higher level of debt can be also taken as a signal of management confidence in the firm's results and good health.

As we can see the "backdoor equity" and "pecking order" theories justify completely different market reaction for the announcement of convertible bonds issue. A natural implication of arguments above is that the risk structure of firms issuing convertible bonds

changes. According to theoretical justifications for convertible bonds issues, some main findings of empirical studies testing the reactions of investors to the announcement of convertible bonds issues and changes in the systematic risk of firms issuing convertible bonds will be presented.

Dann and Mikkelson [4] presented that convertible bonds issue leaded to share price decline, but in a smaller range than the decline associated with the issuance of straight equity. They also found that the abnormal returns were less negative when the issued convertible bonds significantly increased the leverage of the issuer in comparison to those that had a small impact on company's leverage. Mikkelson and Partch [15] found that the negative announcement effect does not depend on offerings characteristics and the credit rating of convertible bond issues.

Mehta and Khan [14] examined 166 public announcements of issue of convertible bonds. They found negative returns for shareholders during a 3 day period. What is interesting they proved relations between abnormal returns and ratings of the issued convertibles. They found that investment grade rated securities had higher negative returns (−2.061%), whereas lower rated speculative grade convertible bond issues had smaller negative returns (−1.258%).

Lee and Loughran [10] analyzed the announcement effect of 986 US operating company convertible bond issues during 1975-1990. They found statistically significant negative abnormal returns. They proved a deep decline of the issuers' operating results following the offering. Abhyankar and Dunning [1] analyzed the announcement effect of 118 convertible debt issues in the UK. They also found significant negative returns, however they proved lower returns when funds raised by the issuers used for refinancing existing debt and higher returns when convertibles were used for capital expenditure.

In another research Davidson, Glascock and Schwartz [5] showed that the shorter the expected time to become convertible debt at-the-money, the more negative the abnormal returns on the issuer's share. According to their finding there was abnormal return -1.4% from the announcement day and the issue day. Ammann, M., Fehr, M. and Seiz, R. [2] in their empirical analysis of convertible and exchangeable bonds announcement and issuance effects for the Swiss and German markets found significantly negative average abnormal returns of about –1.5% on the announcement day. They showed that the market reaction was more noticeable when previous market returns had been negative. Thus, the issue of convertible bonds during falling markets may be interpreted by investors as a signal of financial distress. Chang *et al*. [3] investigated the announcement effect in a three-year period following the issue of convertible bonds in Taiwan. They found an average negative abnormal return between −16% to −26%.

Most of the studies show negative announcement effects of convertible bond issues. Such reaction is explained by the referred dilution and possible reduction of ownership concentration for actual shareholder. Sometimes the announcement can be treated as a negative signal sent by the issuer to the market.

Loncarski, I., ter Horst, J. and Veld, C., [12] analyzed the announcement effect of convertible debt issues on the Canadian market in the period from 1990 to 2003. They found a significant negative reaction associated with the announcement date of convertible bond offerings. However they supported finding of Abhyankar and Dunning [1] and showed a significant positive announcement effect when the proceeds from the convertible bond issuing were used for general and capital expenditure.

Kim [8] presented that conversion ratio might determine the signals sent by convertible debt issues to shareholders. They reactions to the new issues may be positive or negative. It mainly depends on expectations that the convertible bond may be become at-the-money. Kim showed that the convertible bond issue might determine a positive signal to the market when the conversion ratio is high therefore the time to become at-the-money is high as well.

Several Non-US studies show positive announcement effects of convertible bond issues. Kang et al. [7] investigated the announcement effect of 83 Japanese corporation convertible bonds from 1977 to the end of 1989. They proved a 0.5 percent abnormal return for their whole sample. They hypothesized that a positive announcement effect appeared because of banks insuring the principal and coupon payments to prevent bankruptcy in Japan. It should be added that today's banking regulations is quite different than compared sampled period.

Roon and Veld [18] investigated the announcement effects of convertible bonds and warrant-bond offerings on the Dutch market. They found a positive but insignificant abnormal return for the announcement of convertible bonds. It was explained by the fact that Dutch issuers often publicize these announcements with other, usually good news concerning the company.

Many studies documented negative (sometimes positive) returns for shareholders at the announcement time of convertible bonds issuance. A natural implication of the announcement effect is that the risk structure of firms issuing convertible bonds changes. Previous research has not considerably analyzed changes in systematic risk of companies issuing convertibles. We found that only Rai [17] examined changes in risk characteristics of a firm after issuing convertible bonds in the context of the beta change before and after the issuance of convertible bonds. He analyzed the sample of 149 US firms and found that mostly convertible bonds issuers' beta declined although for 40 per cent of firms growth of beta was observed. Although the magnitude of decline cannot fully explain negative abnormal returns observed in the paper, there is evidence that around the time of the convertible bonds issuance the beta of a firm changed.

Zeidlera, Mietznerb and Schiereck [21] also proved, using 1148 convertible bond issuers listed on the NYSE, AMEX and NASDAQ over the 1980–2002 period, changes in issuers' systematic risk. Their analysis shows an increase in systematic risk before the issuance and a deep decrease thereafter. They explained that real option included in the convertible are always riskier than the underlying assets. When the option is exercised after the issuance it naturally decreases the risk. By contrast Kleidt and Schiereck [9] using data consisted convertible debt issues from the beginning of 2000 by the end of 2002, showed a significant increase in systematic risk of equity after issuance of convertible debt. They argued that some issuers were rationed out of the market for seasoned equity due to investors' expectation and probability of conversion. This may determine the investor assessments of the cost of capital of an issuer. When the convertible bond issuance is treated as a signal of earnings decline it increases WACC of the issuer and depreciates its market valuation.

In addition, the results obtained by Elbadraoui, Lilti and M'Zali [6] do not suggest straight evidence of any significant change in convertible bond issuers' equity systematic risk. They used various methodologies of systematic risk calculation and did not reach consistent conclusion. They noticed both positive and risk changes according do asset and equity systematic risks.

3. Empirical results

3.1 Description of the Studied Sample

The object of research was a group of 220 companies listed on the NYSE, NASDAQ and NYSE-MKT markets. Companies that had announced issues of convertible bonds in the 2007-2010 period were analysed. Calculations used data published on the Bloomberg website. The study took into account announcements of all issues, thus enabling to analyse several issues carried out by the same issuer. In such a case, however, the condition was that dates of announcing specific issues had to be separated by a period of at least 24 months. That was determined by an adopted research method. The first issue announced in the studied period

and a subsequent one, occurring at least 24 months later, were taken into consideration. A total of 234 issues of convertible bonds announced in the 2007-2010 period were analysed.

The study analysed changes in market prices of convertible bond issuers' shares in the periods before and after announcing issue decisions. Prices at 252 exchange sessions before the dates of announcing issue decisions and 252 exchange sessions after the dates of the announcements were analysed. Calculations took into account closing prices of shares, without considering dividends and theoretical values of pre-emptive rights. If there were no quotations of a company at a given session, the latest known market price at earlier sessions was used. Fortunately, such situations occurred sporadically. In order to determine beta coefficients for specific companies, the S&P 500 index was assumed as a market benchmark. Values of the index at the close of quotations for specific analysed sessions were used.

3.2 Examination of Convertible Bond Issuers' Systematic Risk

The study first analysed the level of systematic risk, measured by the beta (β) coefficient, characteristic of companies issuing convertible bonds. Then a change in the risk level (beta coefficients) was assessed in the period after announcing a decision to issue convertible bonds. The analysis was performed for three variants of research period lengths. Beta coefficients were estimated for all convertible bond issuers for all 234 issues:

- in the period of 252 sessions before the day of announcing a decision to issue and in the period of 252 sessions following that date,
- in the period of 126 sessions before the day of announcing a decision to issue and in the period of 126 sessions following that date,
- in the period of 63 sessions before the day of announcing a decision to issue and in the period of 63 sessions following that date.

That produced 234 beta coefficients before an issue and 234 beta coefficients after an issue for each analysed period. Beta coefficients characteristic of each issuer were computed applying the method of least squares (MLS).

$$r_{it} = \alpha_i + \beta_i \times r_{mt} + e_i$$

Where r_{it} is the rate of return of the common share of the ith firm on day *t;* r_{mt} is the rate of return of the market index on day *t;* e_i is a random variable; β_i measures the sensitivity of r_{it} to the market index.

The analysis took into account daily rates of return for relevant shares and daily rates of return for the S&P 500 index corresponding to them. Daily rates of return on the shares and index were determined based on closing prices. For instance, for the period of 252 sessions, two beta coefficients were calculated for each company employing the MLS. Daily rates of return on a company's shares and the index, occurring in the course of 252 sessions before the date of announcing an issue and 252 sessions following the date of the announcement, were considered. The procedure was similar for each issuer for the two other variants of the study, i.e. for 126 and 63 sessions respectively.

Then a change in beta coefficients ($\Delta\beta_i$) was analysed for each issuer of convertible bonds, determining the difference between coefficient values before (βpre_i) and after an issue ($\beta post_i$).

$$\Delta\beta_i = \beta\mathrm{post}_i - \beta\mathrm{pre}_i$$

Levels of changes in beta coefficients were analysed for the three variants, i.e. for the periods of 252, 126 and 63 sessions. A difference significantly statistically different from zero would indicate a change in the level of systematic risk of a convertible bond issuer before and after the date of announcing an issue. The study tested a hypothesis proposing that ***as a result***

of announcing an issue of convertible bonds, a change occurs in the level of systematic risk of an issuer, measured by the beta coefficient in a studied period. That meant that a hypothesis suggesting that: $\Delta\beta_i = 0$ should be rejected. In the case of each analysed research period, the following characteristics of convertible bond issuers' beta coefficients were received.

Table 1: Characteristics of beta coefficients for the period of 252 sessions

	mean	median	standard deviation	min	max
βpre	1,330	1,275	0,503	0,18	2,68
βpost	1,253	1,165	0,484	0,09	2,86
$\Delta\beta$	-0,078	-0,050	0,455	-1,49	1,50

Table 2: Characteristics of beta coefficients for the period of 126 sessions

	mean	median	standard deviation	min	max
βpre	1,325	1,250	0,553	-0,29	3,44
βpost	1,195	1,140	0,543	-0,30	3,08
$\Delta\beta$	-0,130	-0,120	0,458	-2,14	1,46

Table 3: Characteristics of beta coefficients for the period of 63 sessions

	mean	median	standard deviation	min	max
βpre	1,296	1,180	0,623	-0,91	3,12
βpost	1,190	1,125	0,567	0,00	2,93
$\Delta\beta$	-0,105	-0,040	0,559	-1,63	1,65

Received results enable to draw the following conclusions:
- there is considerable diversification of specific values of beta coefficients (the median value differs significantly from the value of arithmetic mean, the value of standard deviation is high),
- diversification of specific values of beta coefficients decreases along with the increasing length of the analysed period, which is confirmed by the presence of high-value extreme observations,
- diversification of specific values of beta coefficients is lower for observations after an issue announcement than before that, which indicates a stabilising effect of the announcement on the beta coefficient value,
- differences between beta coefficients for each of the studied variants are lower than zero, which indicates a drop in the systematic risk level in the period after announcing a decision to issue convertible bonds.

The next step in the study was to analyse differences in the levels of observed beta coefficients before and after the date of announcing a decision to issue convertible bonds. To that end, a t-test of paired data was performed. The tested hypothesis proposed that the difference between pre and post beta coefficients equals zero ($\Delta\beta_i = \beta\text{post}_i - \beta\text{pre}_i = 0$).

Table 4: Statistics describing differences between pre and post beta coefficients in analyzed periods

Δβ period	mean	t-statistic	significance	share of negative differences	share of positive differences
$\Delta\beta(252)$	-0,078	-2,606	**	0,5324	0,4615
$\Delta\beta(126)$	-0,130	-4,354	*	0,6154	0,3803
$\Delta\beta(63)$	-0,105	-2,886	*	0,5385	0,4402

* significance at α=1%
** significance at α=5%

The carried out analysis allows to reject the hypothesis, which means that the studied beta coefficient differences are statistically significant. In all the periods of observation, negative differences occurred more frequently, which confirms the earlier observed drop in the systematic risk level in the period after announcing a decision to issue convertible bonds.

Moreover, for the three analysed periods, a 95% confidence interval was set for the difference between convertible bond issuers' beta coefficient levels in the period before the date of announcing a decision to issue and in the period after that announcement.

$$\Delta\beta(252)=[-0{,}136;\ -0{,}019]$$
$$\Delta\beta(126)=[-0{,}189;\ -0{,}072]$$
$$\Delta\beta(63)=[-0{,}177;\ -0{,}034]$$

It is worth emphasising that all boundary values of beta coefficient differences within the assumed confidence interval have negative values. It is another argument suggesting that, in the studied period, convertible bond issuers' systematic risk decreases after the announcement of a decision to issue convertible bonds. That means a decrease in the relative volatility of the issuers' share prices.

3.3 Examination of Rates of Return on Shares of Convertible Bond Issuers

In order to more precisely determine the impact of announcing an intention to issue convertible bonds on the volatility of market pricing of issuers' shares, changes in rates of return on issuers' companies' shares were also examined in the periods before and after announcing decisions to issue convertible bonds. Also in that case, three periods were analysed, i.e. 252, 126 and 63 sessions. Rates of return for a given studied period were determined for specific issuers. In order to emphasise the issue of systematic risk, rates of return surplus to the S&P 500 index were analysed instead of standard rates of return. For instance, two rates of return were calculated for each issuer for the period of 252 sessions. The first of those informed about the rate of return achieved above the S&P 500 index for the period of 252 sessions before the date of announcing an issue, while the other provided that information for the period of 252 sessions after the announcement. Calculations took into account closing prices at the first and last session in a given period. Due to extremely high diversification of rate of return values in the observed periods, mean rates of return were recalculated after excluding five highest and lowest surplus rates of return from the data set.

Table 5: Characteristics of rates of return for the period of 252 sessions

	mean	median	standard deviation	mean without extreme values*
Rpre	0.1827	0.0293	0.7600	0.1249
Rpost	0.1003	-0.0131	0.5917	0.0578

Table 6: Characteristics of rates of return for the period of 126 sessions

	mean	median	standard deviation	mean without extreme values*
Rpre	0,2133	0,0327	1,1599	0,1010
Rpost	0,0237	-0,0315	0,3546	0,0101

Table 7: Characteristics of rates of return for the period of 63 sessions

	mean	median	standard deviation	mean without extreme values*
Rpre	0,0860	0,0213	0,3587	0,0650
Rpost	0,0063	-0,0041	0,2455	-0,0017

* calculation of the mean rate of return excluded five highest and lowest surplus rates of return.

Received results enable to notice again great diversification of surplus rates of return. Median values differ significantly from arithmetic mean values. Also, high values of standard deviations can be observed, being higher for *Rpre* in all the studied periods. That confirms the earlier observations suggesting that the announcement of an intention to issue convertible bonds stabilises the issuer's quotations. It is also worth stressing that the observed mean surplus rates of return were positive in the period before the issue announcement. That is also confirmed by the calculated medians. Mean *Rpost* values are always lower than *Rpre* ones, and, in the case of the median, they become negative. That proves that, before the announcement of an issue, the studied companies could be characterised by high volatility of market pricing and exhibit rates of return higher than the market mean. Prize stabilisation following the public announcement of an intention to issue convertible bonds resulted in a decrease in the above-average rate of return and worsening of results as compared with the market.

When analysing differences in the levels of the observed surplus rates of return before and after the date of announcing a decision to issue convertible bonds, a hypothesis concerning the difference between means in two populations was tested. The tested hypothesis proposed that the difference between pre and post mean rates of return equals zero ($\bar{R}pre - \bar{R}post = 0$). The examination was aimed at determining the statistical significance of the analysed surplus rates of return in the studied periods. Parametric tests were applied – it was assumed that distributions of a difference between means in two populations were close to the normal distribution. The significance test was performed by means of the Z-statistic expressed by the following formula:

$$Z = \frac{\overline{R_{pre}} - \overline{R_{post}}}{\sqrt{\frac{S^2_{R_{pre}}}{n_{R_{pre}}} + \frac{S^2_{R_{post}}}{n_{R_{post}}}}}$$

where: $\overline{R_{pre}}$ - mean value of the surplus rate of return before an issue announcement

$\overline{R_{post}}$ - mean value of the surplus rate of return after an issue announcement

$S^2_{R_{pre}}$- variance of the surplus rate of return before an issue announcement

$S^2_{R_{post}}$- variance of the surplus rate of return after an issue announcement

$n_{R_{pre}}$ and $n_{R_{post}}$ - numbers of the observed surplus rates of return in the periods before and after an issue announcement.

Table 8. Statistics describing differences between pre and post mean surplus rates of return

Period	Z-statistic	significance
252 sessions	1.309	
126 sessions	2.391	**
63 sessions	2.802	*

* indicates significance at α=1%

** indicates significance at α=5%

Received results indicate that statistical relationships are not very strong. Differences between pre and post surplus rates of return for the longest studied period proved to be statistically insignificant. The period of 126 sessions is significant but at a 5% significance level. The strongest statistical relationships were received for the shortest of the studied periods. Despite such diverse results, one can hazard a proposition that the profitability of companies decreases after they announce issues. Another problem is high diversification of the population, which was proved earlier.

4. Conclusions

The conducted research allows observing that the public announcement of a scheduled issue of convertible bonds affects the level of systematic risk. Differences between beta coefficients for each of the studied periods are lower than zero, which indicates a drop in the systematic risk level in the period after announcing a decision to issue convertible bonds. Diversification of specific values of beta coefficients is lower for observations after an issue announcement than before that, which indicates a stabilising effect of the announcement on the value of the beta coefficient.

When examining rates of return in the periods before and after announcing an issue of convertible bonds, it was observed that mean surplus rates of return are positive in the period before the issue announcement. That indicates that, before the announcement of an issue, the studied companies could be characterised by high volatility of market pricing and exhibit rates of return higher than the market mean. The profitability of companies decreases after they announce issues.

In the performed study, it is easily noticeable that specific values of beta coefficients are highly diversified. That diversification decreases along with the increasing length of the analysed period, which is confirmed by the presence of high-value extreme observations. The studied rates of return before and after announcing an intention to issue convertible bonds are characterised by significant diversification too. It should be kept in mind, however, that the study was conducted during the first phase of the global financial crisis. That period was characterised by high volatility of prices in the share market. Research carried out by authors of this article but not presented in it suggests that it is the increased volatility of the market that is among key factors destabilising the statistical picture of the studied issue.

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