DEPARTMENT OF APPLIED ECONOMICS

RESEARCH REPORT

DETERMINANTS OF THE STOCKHOLDER REACTIONS TO CONVERTIBLE DEBT OFFERING ANNOUNCEMENTS: AN ANALYSIS OF THE WESTERN EUROPEAN MARKET

MARIE DUTORDOIR & LINDA VAN DE GUCHT

OR 0401

KATHOLIEKE
UNIVERSITEIT
LEUVEN

Determinants of the Stockholder Reactions to Convertible Debt Offering Announcements: an Analysis of the Western European Market

Marie Dutordoir *
Linda Van de Gucht °

Abstract

This paper examines the determinants of the stockholder reactions to convertible debt announcements made by Western European companies. We simultaneously test the impact of issuer characteristics, security design features, the stated uses of proceeds and the aggregate convertible debt issue volume. Our evidence suggests that the announcement returns are positively influenced by the maturity and conversion premium, and negatively influenced by the Eurobond feature, the level of post-conversion equity dilution and the aggregate convertible debt volume. We also document significant interaction effects between the issuer characteristics, the convertible debt design and the convertible debt market condition. First, we find that hot market convertibles are structured to be more 'debt-like' than non-hot market convertibles. Second, we show that the influence of the issuer characteristics depends on the convertible debt design: equity-like convertibles are perceived as instruments able to reduce adverse selection and financial distress costs, whereas debt-like convertibles are perceived as predominantly straight debt. Lastly, we demonstrate that issuer and security characteristics have much more power for explaining the investor reactions during non-hot markets than during hot markets.

* Corresponding author. Doctoral student, Department of Applied Economics, Katholieke Universiteit Leuven, Naamsestraat 69, 3000 Leuven, Belgium; tel.: +32-16.32.67.65; fax: +32-16.32.67.32; e-mail: marie.dutordoir@econ.kuleuven.ac.be

° Professor of Finance, Department of Applied Economics, Katholieke Universiteit Leuven, Naamsestraat 69, 3000 Leuven, Belgium; tel.: +32-16.32.67.36; fax: +32-16.32.67.32; e-mail: linda.vandegucht@econ.kuleuven.ac.be

1. Introduction

There is broad consensus in the empirical finance literature regarding the sign and the size of the convertible debt announcement effect. Most studies find that convertible debt announcements tend to be accompanied by negative abnormal stock returns that lie in-between the abnormal stock returns traditionally reported for straight debt and pure equity announcements.[1] By contrast, there is no systematic evidence thus far on the determinants of the convertible debt announcement effect. The literature provides three important theoretical models yielding predictions on these determinants, being the 'asset substitution' model of Green (1984), the 'risk uncertainty' model of Brennan and Kraus (1987) and the 'backdoor-equity' model of Stein (1992). In this paper, we examine the ability of these models to explain the stock price reactions to convertible debt offering announcements made by Western European companies. While prior empirical work focuses on firm-specific determinants of the convertible debt announcement returns, our study simultaneously examines the influence of the issuer characteristics, the security design, the officially stated uses of the offering proceeds and the aggregate convertible debt issue volume on the stockholder reactions. In this way, we obtain new insights on the variables driving the convertible debt announcement effect.

With respect to the security design characteristics, we find that the convertible debt maturity and conversion premium have a significantly positive impact on the investor reactions, whereas the Eurobond dummy (indicating convertibles issued on the Eurobond market) and the level of post-conversion equity dilution have a significantly negative impact. These results are in line with the predictions yielded by the convertible debt models of Green (1984), Brennan and Kraus (1987) and Stein (1992). We also show that the announcement returns are significantly negatively affected by the aggregate convertible debt issue volume. This finding may reflect investors' suspicion that hot market convertible debt offerings are inspired by opportunistic motives (e.g. the wish to take advantage of a temporary equity overvaluation) or by irrational market fads (i.e.

[1] See Abhyankar and Dunning (1999) and de Roon and Veld (1998) and for an overview of the convertible debt announcement returns recorded by existing studies.

'me-too issuance'). By contrast, our results on the impact of the stated uses of proceeds are mostly insignificant. Probably, this can be ascribed to the fact that the majority of the convertible debt issuers state more than one possible application of the offering proceeds, so that it is almost impossible to disentangle the influences of separate intended purposes of issue.

The main contribution of this paper is the documentation of significant interactions between the issuer characteristics, the security design features and the aggregate convertible debt volume. First, we demonstrate that there is a significant association between the convertible debt security design and the convertible debt market condition: hot market convertibles have a more debt-like security design than non-hot market convertibles. Second, we show that the influence of issuer characteristics on the announcement returns depends on the convertible debt security design: for relatively more equity-like convertibles, our results are in accordance with the convertible debt model of Stein (1992), whereas for relatively more debt-like convertibles, our results are similar to the ones that would be expected for straight debt offering announcements. The impact of the issuer characteristics also depends on the convertible debt market condition: during hot markets, stockholders are much more worried about firm overvaluation than during non-hot markets. Lastly, we discover that the issuer and security design characteristics have a lot more power for explaining the investor reactions during non-hot issue windows than during hot issue windows. According to Bayless and Chaplinsky (1996), who obtain an analogous finding in the context of equity offerings, this result may either be explained by lower information asymmetries or by stockholder herding behavior during hot market conditions. More specifically, it could be that stockholders resort to a collective (negative) evaluation of all convertible debt offering announcements made during hot issue periods, irrespective of the specific issuer and issue characteristics.

Our research extends the recent US-based paper of Lewis, Rogalski and Seward (2003), who also acknowledge the importance of security design and market condition variables for explaining the convertible debt announcement returns. Lewis et al. (2003) characterize the convertible debt security design by means of one measure, being the risk-

neutral probability of conversion.[2] They use this variable only for examining whether the influence of firm-specific variables on the investor reactions differs across relatively more equity-like and relatively more debt-like convertibles. By contrast, our study explicitly investigates the influence of several detailed security design aspects on the convertible debt announcement effect. Furthermore, Lewis et al. (2003) examine the influence of the aggregate *equity* issue volume on the announcement returns, and find that convertibles issued during hot issue windows are accompanied by more favorable stock price reactions. By contrast, we test the influence of the aggregate *convertible debt* issue volume, which leads to the new insights discussed above.

The remainder of this paper is structured as follows. In the next section, we review the theoretical models yielding the testable predictions for our study. Section 3 documents the sample and provides some descriptive statistics. In Section 4 and 5, we present our empirical results on the announcement returns and their determinants. Section 6 concludes the paper.

2. Investor reactions to announcements of convertible debt issuances

Due to the hybrid nature of convertibles, the investor reactions to the announcements of these securities can be studied from two different perspectives. According to Green (1984) and Brennan and Kraus (1987), convertible debt is an instrument to mitigate the costs associated with straight debt offerings. By contrast, Stein (1992) argues that convertible debt is an instrument to avoid the costs associated with pure equity offerings. This section briefly discusses each of these viewpoints, and lists their testable implications for the influence of issuer characteristics, security design features, the stated uses of the offering proceeds and the aggregate convertible debt issue volume on the convertible debt announcement returns.

[2] The risk-neutral probability of conversion is the likelihood that a convertible will be converted into equity over its lifetime, calculated under the Black-Scholes (1973) assumptions (cf. Section 3 for a more detailed definition of this variable).

2.1. Convertible debt as a substitute for straight debt

Green (1984) and Brennan and Kraus (1987) both present convertible debt as a solution to a capital market imperfection induced by straight debt, but differ with respect to the specific debt-related cost that they assume to be reduced by this hybrid security. According to Green (1984), convertibles are able to mitigate asset substitution costs that arise from the presence of risky debt. The reason is that, by altering the parameters of the convertible debt contract (i.e., the conversion ratio and the exercise price), stockholders can control the shape of their residual claim, and thus their own incentives to take risk. Following Brennan and Kraus (1987) in turn, convertible debt is able to reduce the adverse selection problem that occurs when management and investors do not share the same opinion on firm risk. The reason is that the impact of firm risk increases on the bond component of the convertible will be partly offset by the impact of firm risk increases on its equity component, so that its total value will be largely unaffected by changes in the company risk. Convertible debt investors will thus require a lower compensation premium for possible firm risk increases than straight debt investors, which reduces the adverse selection costs.

Green (1984) and Brennan and Kraus (1987) predict that stockholders should react more favorably upon convertible debt announcements made by firms with high potential for asset substitution and risk uncertainty, i.e. highly levered, high-risk companies.[3] These models also yield several testable hypotheses on the influence of the convertible debt security design on the announcement returns. First, the inclusion of a conversion option in straight debt with a long maturity should be associated with more positive investor reactions, since the conversion option reduces the potential for risk-increasing shifts in corporate investment policies associated with long maturities. Second, convertibles issued on the Eurobond market should be accompanied by more negative announcement returns. The reasoning behind this hypothesis is the following. According to Kim and Stulz

[3] The hypotheses derived in this section hinge on the assumption that the existing stockholders have to bear the entire asset substitution and risk uncertainty costs (in the form of a higher risk premium on the corporate debt). In Section 5 of this paper, we provide an overview of the different firm-specific variables that will be used for proxying these costs.

(1992), Eurobond convertible debt offerings may be uniquely confined to firms with a low risk level, because the covenants on Eurobond issues are very difficult to enforce. If the Eurobond feature indeed acts as an inverse proxy for firm risk, we expect a negative influence of this variable on the investor reactions, since asset substitution and risk uncertainty problems should be less severe for low risk firms. In addition, the Brennan and Kraus (1987) model predicts that the convertible debt announcement returns will be positively associated with the conversion premium and negatively associated with the degree of equity dilution at full conversion of the convertible debt.[4] With respect to the stated uses of the offering proceeds, Green (1984) and Brennan and Kraus (1987) imply that convertible debt issues intended to pay back short-term debt and convertible debt issues with vague stated uses of proceeds (such as 'general corporate purposes') should be accompanied by more favorable investor reactions. The reason is that such offerings create more opportunities for future firm risk increases, which makes the inclusion of a conversion option more appropriate. Finally, these models generate the prediction that the aggregate convertible debt issue volume should have a positive influence on the investor reactions. The rationale behind this hypothesis is the following. According to Bayless and Chaplinsky (1996), the economy-wide level of equity-related adverse selection problems may fluctuate over time. By extension, Lewis et al. (2003) argue that debt-related asset substitution and risk uncertainty costs could also have a time-varying component, e.g. due to temporal variations in the availability of profitable investment opportunities. If this assumption holds, we expect convertible debt offerings to cluster during periods when these debt-related problems are more severe, since that is when they are most appropriate (at least, according to Green (1984) and Brennan and Kraus (1987)). The aggregate convertible debt issue volume might thus act as a proxy for the economy-wide level of asset substitution and risk uncertainty costs, which implies that it should have a positive influence on the announcement returns.

---

[4] Brennan and Kraus (1987) obtain these two security design hypotheses by taking the first order derivatives of the firm type that investors infer from the issued security type with respect to the face value and the conversion ratio of the convertible debt. The conversion premium is linearly related to the face value of the convertible debt, since it is equal to the convertible debt face value divided by the conversion ratio. In turn, the post-conversion equity dilution is positively (although not linearly) related to the conversion ratio, since it is equal to the number of shares issued assuming full conversion of the convertibles divided by (1) the total number of shares outstanding at fiscal year-end before the offering announcement and (2) the number of shares issued assuming full conversion.

2.2. Convertible debt as a substitute for equity

According to Stein (1992), companies use convertibles as an indirect equity financing that mitigates the adverse selection problem described by Myers and Majluf (1984). The higher the firm's financial distress costs, the more credible is the convertible debt offering as a signal of optimism, since the firm will only be able to avoid bankruptcy through a conversion-forcing convertible bond call if its stock price is high enough. This 'backdoor-equity' rationale implies that firm-specific proxy variables for the level of adverse selection and financial distress costs should positively affect the convertible debt announcement returns.[5] In addition, it yields some testable hypotheses on the impact of specific call features on the investor reactions.[6] First, since forced conversion of the convertibles through a convertible bond call will only happen if the stock price is sufficiently high, managers that expect their stock price to increase more slowly will want to call the convertibles later. The length of the call protection period should thus have a negative influence on the convertible debt announcement returns. Second, since soft callable convertibles can only be called if the stock price exceeds a certain trigger value during a certain time period, the inclusion of a soft call feature signals that management expects the stock price to rise (at least) to this trigger level.[7] Hence, soft callable convertibles should be associated with more positive announcement returns than hard callable convertibles. Stein's (1992) model also implies that convertibles with vague intended uses of proceeds should induce more favorable investor reactions, since such offerings create more uncertainty about the actual intentions of the issuing firm (and hence, larger adverse selection costs). Finally, this model generates the prediction that the convertible debt announcement effect will be positively influenced by the aggregate convertible debt issue volume. The reason is that, if convertibles are indeed more

[5] Again, we assume that the adverse selection and financial distress costs are entirely borne by the existing shareholders. In Section 5, we present the firm-specific variables that will be used for proxying these costs.
[6] Since Stein (1992) a priori assumes that all convertibles are callable, this model yields no direct prediction about the influence of the call feature an sich.
[7] If the stock price does not reach this threshold level, the firm will be prohibited from calling the bond. In the setting of the Stein (1992) model, this implies that the firm will eventually go bankrupt due to a too high debt level.

appropriate for firms facing high adverse selection costs, we can expect them to group during periods when these problems are more severe. The aggregate convertible debt issue volume might thus act as a proxy for the economy-wide level of equity-related costs, which implies that it should have a positive impact on the stockholder reactions.

We conclude this theoretical overview with two important caveats with respect to the models of Green (1984), Brennan and Kraus (1987) and Stein (1992). First, we need to point out that these convertible debt rationales should not be considered as mutually exclusive explanations of convertible debt issuance, since companies can decide to issue convertibles in order to mitigate various combinations of debt- and equity-related costs (Lewis et al., 2003). Second, we should emphasize that the above-mentioned models are only valid for convertibles that have a substantial probability of actually being converted into equity.[8] If the conversion probability of the convertible debt is too low, investors will perceive this security rather as a form of straight debt than as an instrument able to reduce debt- and/or equity-related costs.

3. Sample selection and data description

3.1. Sample selection procedure

The sample of convertible debt issues used in this study was constructed as follows. First, we collected a list of all convertible debt offerings made by Western European companies during the period 1990-2002 from Bloomberg. This resulted in an initial dataset of 524 convertibles.

[8] Whereas Green (1984) and Brennan and Kraus (1987) explicitly mention that their models only pertain to 'appropriately designed' convertibles (in terms of conversion premium and conversion ratio), Stein (1992) makes no such statement. However, since the latter author claims that convertible debt is a form of delayed equity, he implicitly requires this security to have a considerable probability of actually being converted.

Subsequently, we applied the following criteria to select offerings for inclusion in our final sample:

- The offering must be made by an industrial company (not by a financial company or a regulated public utility);
- The offering must be convertible in the issuing firm's stock (this excludes exchangeable bonds);
- The issuing firm's accounting data for the fiscal year-end immediately prior to the announcement date must be available on Datastream;
- The issuing firm's daily stock price data for the full calendar year preceding the announcement date must be available on Datastream;
- Security design data must be available on Bloomberg;
- The offering announcement date must be available on Bloomberg;
- The offering announcement date should not include other confounding corporate event announcements (e.g. announcements of dividend payments or other security offerings).[9]

These requirements were met by 256 convertibles offered by 195 different firms.

3.2. Data description

As outlined in Section 1, our study examines the influence of firm and security design characteristics, of the officially stated uses of proceeds and of the convertible debt market condition on the convertible debt announcement returns. This paragraph provides some descriptive statistics on each of these explanatory variable categories. We start with an overview of the geographical dispersion of our sample firms.

[9] For identifying the confounding announcements, we used the Bloomberg Corporate Actions Calendar, the Financial Times World Press Monitor, and the company websites.

3.2.1. Descriptive statistics on the countries of domicile of the issuing firms

Table I shows that more than one-third of our sample offerings are issued by French companies. This finding is not surprising, since it is generally known that the European convertible debt market is dominated by French issuers.[10]

<<Insert Table I about here>>

3.2.2. Descriptive statistics on firm and security design characteristics

From rows (1) to (6) of Table II, we can derive that the convertible debt issuers in our sample are large firms with a high market to book ratio and volatile stock returns. The table also reveals that a convertible debt issuance tends to have a substantial impact on the issuing firm's financial structure. More specifically, row (8) shows that the average convertible debt offering represents 18% of the market value of the issuing firm's common equity, and row (9) indicates that the average convertible debt offering dilutes the issuing firm's common equity by 22% (upon full conversion).

<<Insert Table II about here>>

As can be seen from rows (14) and (15), the large majority of the convertibles in our sample have a soft or hard call feature.[11] Row (16) indicates that approximately one-third of our sample issues are Eurobonds. The remaining offerings are predominantly domestic: only three convertibles are issued on a foreign bond market (not reported). Finally, row (17) reveals that 7.81% or 20 of our 256 sample observations encompass a privately placed tranche. Only two of these offerings are entirely privately placed (not reported), which implies that we will not be able to analyze the impact of private versus public placement of convertible debt on the investor reactions.

---

[10] For instance, in the article 'Capital markets: equity and equity-linked' published in Corporate Finance (1999) we read the heading 'French drive convertibles market'.

[11] Our finding that most convertible bonds are callable is consistent with the findings reported by US-based papers (e.g. Lewis et al. (1998) and Long and Sefcik (1990)). Note that this provides evidence for the assumption of the Stein (1992) model that callability is a key characteristic of convertible debt (cf. supra).

Table II shows some striking differences with the figures reported by US-based studies. First, the mean (median) firm sizes (in terms of total assets) and the mean (median) offering sizes of our sample observations are much larger than the numbers that are usually recorded for US-based convertible debt samples, even if we take inflation into account.[12] This could be due to the fact that, in Europe, only the largest firms tend to be quoted. Second, the mean (median) maturity of the convertibles in our sample is much shorter than the mean (median) maturities reported for US convertibles.[13]

In addition to the readily-available security design measures reported in Table II, we also calculated the average risk-neutral conversion probability as a descriptive measure for the 'degree of equity-likeness' of our sample observations. The risk-neutral conversion probability can be defined as the likelihood that a convertible will be converted into equity over its lifetime, computed under the assumption of a risk-neutral world. In the Black-Scholes (1973) option pricing formula, this probability is represented by $N(d_2)$, where N is the cumulative probability under a standard normal distribution function and

$$d_2 = \frac{\ln(\frac{S}{X}) + (r - div - \frac{\sigma^2}{2})T}{\sigma\sqrt{T}} \quad (1)$$

In equation (1), S is the price of the underlying stock measured one week before the announcement date,[14] X is the conversion price, r is the continuously compounded yield on a 5-year German Treasury Bond measured on the announcement date,[15] div is the issuing firm's continuously compounded dividend yield for the fiscal year-end immediately preceding the announcement date, σ is the volatility per annum estimated from the continuously compounded equity return measured over the period 240 to 40

[12] For instance, Lewis et al. (1999) record a mean (median) firm size (in terms of total assets) of $ 1,025 mio ($ 288 mio) and a mean (median) offering size of $ 55 mio (35 mio) for their sample of US convertibles issued between 1977 and 1984.

[13] For instance, Nanda and Yun (1996) record a mean (median) maturity of 17.92 (16.95) years for their sample of convertibles issued by US firms between 1987 and 1992.

[14] The stock price is measured one week prior to the announcement date in order to abstract from the impact that the convertible debt announcement might have on the issuing firm's stock price.

[15] The German interest rate plays a leading role in the European economy, hence our choice for the yield on a German Treasury Bond. We retrieved this variable from Datastream.

trading days prior to the announcement date, and T is the initial convertible bond maturity (expressed in years). The risk-neutralized drift rate *r-div* is set to zero if *r-div* is negative. We find that the average (median) risk-neutral conversion probability of our sample offerings is 32.44 (29.85)%, which is substantially lower than the 50.30% average risk-neutral conversion probability reported for the US-based sample of Lewis et al. (1999).[16] This result is in line with our expectations, since it is generally acknowledged that European convertibles tend to be much more 'debt-like' in nature than their American counterparts.[17]

3.2.3. Descriptive statistics on the officially stated uses of proceeds

The stated uses of the issue proceeds can be obtained from the offering prospectus. For 105 offerings, we could retrieve this document from the KBC Financial Products Convertible Debt Database.[18] Since the large majority of convertible debt issuers mention multiple applications of the offering proceeds, it is hard to speak of 'the' intended purpose of a particular convertible. In line with Akhigbe, Easterwood and Pettit (1997), we consider the intended purpose that is listed first in the 'Use of proceeds' section of the offering prospectus as the most important purpose of issue. Column (1) of Table III shows the frequency distribution of the different first-mentioned uses of proceeds recorded for our sample offerings. For completeness, column (2) reports for each purpose of issue the total number (and percentage) of convertibles that mention this purpose *somewhere* in the 'Use of proceeds' section of their offering prospectus.

<<Insert Table III about here>>

[16] Lewis et al. (1999) report no median value for the risk-neutral conversion probability of their sample offerings.

[17] For instance, in the article '2001 ways to use convertibles' published in Corporate Finance (2001), we read: *'In the US, convertibles have been – and still are – an equity play. In Europe, a different attitude prevails. Convertibles are considered debt, both by the investors that buy them and the investment banks that market them.'* Our study provides formal evidence for this statement.

[18] As the KBC Financial Products Convertibles Debt Database only contains information on currently outstanding convertible debt, these 105 convertibles were mainly issued during the later years of our sample period.

From the table, we can derive that almost 50% of the convertible debt issuing firms list the refinancing of existing debt or the optimalisation of their financial structure (mostly in terms of maturity) first in the 'Use of proceeds' section of the offering prospectus. In turn, around 40% of the issuing companies mention the financing of internal or external growth as their primary purpose of issue. Most of the remaining convertibles are intended to finance 'general corporate purposes'.

3.2.4. Descriptive statistics on the convertible debt market condition

In order to identify the 'hot' convertible debt issue windows over our sample period, we follow the procedure developed by Bayless and Chaplinsky (1996) in the context of equity offerings. A first step in this procedure involves the computation of the aggregate monthly Western European convertible debt issue volumes from January 1990 until December 2002.[19] Subsequently, these aggregate monthly issue volumes are converted into real terms by means of the monthly European Consumer Price Index obtained from the IMF. High volume issue periods (hot markets) are then defined as at least three contiguous months where convertible debt issue volume exceeds the upper quartile of a three-month moving average of real convertible debt issue volume.[20]

<< Insert Table IV about here>>

Table IV specifies the calendar time intervals identified as hot issue windows. We see that these windows occur in the middle and at the end of the sample period. The table also reveals that, whereas the hot issue periods make up only 22% of the sample period,

[19] For our event study, we require the availability of pre-announcement stock price, balance sheet and security design information. Since there is no need for imposing such requirement for the calculation of the aggregate monthly convertible debt issue volumes, these aggregate volumes are based on a considerably larger convertible debt sample than the one used throughout our event study (i.e., 350 instead of 256 observations).

[20] Bayless and Chaplinsky (1996) further distinguish between 'cold' and 'normal' issue markets. Cold issue markets are defined as at least three contiguous months where convertible debt issue volume falls below the lower quartile of a three-month moving average of real convertible debt issue volume, whereas normal issue markets are periods when the convertible debt issue volume lies in-between the upper and lower moving average cutoffs. However, since this criterion qualifies only 14 of our sample convertibles as cold market offerings, we decided to group the cold and the normal market offerings into one 'non-hot' convertible debt category.

59% or $ 61.74 billion of a total $ 103.86 billion in convertible debt (expressed in constant 2002 dollars) is raised during these windows.

4. Empirical findings on the sign and size of the convertible debt announcement effect

4.1. Methodology

We calculated the abnormal announcement returns by means of the market model, with the market index proxied by the Datastream country benchmark index for the country of domicile of the issuing company.[21] In line with Dann and Mikkelson (1984) and Lewis et al. (1999, 2003), we estimated the market model regressions over the pre- and post-event estimation windows (-200,-61) and (61,200) measured relative to the announcement dates retrieved from Bloomberg. For assessing the statistical significance of the abnormal return estimates, we applied the widely-used test statistic developed by Pattel (1976).

4.2. Results

Table V provides an overview of the cumulative abnormal returns computed over several windows surrounding the announcement date. In line with prior studies, we find that convertible debt announcements have a significantly negative influence on the issuing firm's stock price. The average day-0 abnormal return is equal to -1.32% (Z = -7.56) and represents the largest daily prediction error in absolute value. Table V also reveals that the convertible debt offerings in our dataset tend to be announced after periods of significant positive abnormal stock returns. By contrast, over the post-announcement window (2,60), there is no significant abnormal stock price reaction.

<<Insert Table V about here>>

[21] The Datastream country benchmark indices are synthetic value-weighted market indices. They are computed analogously for all European countries, which makes them very suitable benchmarks for a cross-country analysis like ours.

4.3. Robustness checks

In order to check the validity of our findings on the sign and the size of the convertible debt announcement returns, we performed the following robustness checks:[22]

- We cross-checked the announcement dates of the convertibles in our sample by means of the press releases represented in the Financial Times World Press Monitor and on the company websites. For 26 observations, we found some indication of information leakage concerning the convertible debt offering prior to their announcement date retrieved from Bloomberg. However, since the exact terms of the offering were never released before the Bloomberg announcement date, this date is most appropriate for measuring the impact of specific security design features on the abnormal returns (i.e., one of the main purposes of our study). When these 26 offerings are removed from the sample, our results remain unaffected.
- Since it is well-known that daily stock returns tend to be highly non-normal, we cross-checked our conclusions drawn from the parametric Pattel (1976) Z-test by means of non-parametric sign and Wilcoxon signed rank tests. As can be seen from the last two columns of Table V supra, both these tests confirm our findings of a significantly negative convertible debt announcement effect and a significantly positive pre-announcement stock runup.
- As an (admittedly crude) check for the influence of thin trading on our results, we removed the 32 observations that have more than 30% of zero daily returns over the market model estimation window ((-200, -61), (61,200)) from our dataset. Since the findings obtained for the resulting subsample are qualitatively similar to the findings obtained for our full sample, we can conclude that our results are probably not largely affected by the occurrence of non-synchronous trading.
- Since up to 66.80% of the announcement date abnormal returns are negative (cf. Table V supra) and over 90% of these returns are between -6 and +6% (not reported), we can conclude that our results are not driven by the occurrence of a small number

[22] For brevity, we don't report the detailed results of our robustness tests here. These results are available upon request.

of outliers. It is also worth noting that the day-0 abnormal returns are negative throughout our different sample years and sample countries.[23]

5. Empirical findings on the determinants of the convertible debt announcement returns

This section presents an analysis of the influence of issuer characteristics, security design features, the officially stated uses of proceeds and the aggregate convertible debt volume on the abnormal announcement returns. First, we provide the test results obtained for our full convertible debt sample. Afterwards, we report split-sample regression results obtained for subsamples of debt-like versus equity-like convertibles and hot market versus non-hot market convertibles.

5.1. Full-sample test results

5.1.1. Influence of issuer characteristics

A. Measurement

As outlined in Section 2, the models of Green (1984), Brennan and Kraus (1987) and Stein (1992) imply that the convertible debt announcement effect should be positively influenced by issuer-related measures for the level of asset substitution costs, risk uncertainty costs and financial distress costs, respectively. In practice however, it is nearly impossible to find separate proxy variables for each of these debt-related costs. Instead, we will test Green's (1984), Brennan and Kraus' (1987) and Stein's (1992) common prediction that the investor reactions should be favorably affected by the level of debt-related problems by means of the following general debt cost proxies: the ratio of total debt to total assets, the ratio of intangible assets to total assets, the daily stock return volatility and the ratio of earnings before interest and taxes (ebit) to total assets. Firms are

[23] A Tukey test of the pairwise differences in the average abnormal returns realized across our different sample years and sample countries revealed no significant abnormal return differences.

assumed to face high debt-related costs when their financial leverage, proportion of intangibles and stock return volatility are high, and when their profitability is low.

As discussed in Section 2, the model of Stein (1992) can be distinguished from the two other models by the fact that it considers convertible debt an instrument for reducing equity-related adverse selection costs rather than an instrument for mitigating debt-related problems. The literature proposes several proxy variables for the level of adverse selection costs. Following Lucas and McDonald (1990), these costs will be higher for equity(-linked) offerings announced after a large stock price runup, since investors could interpret such pre-announcement stock runup as a sign of firm overvaluation. De Jong and Veld (2001) argue that the problem of perceived overvaluation will also be worse for firms with sufficient slack capital, because slack provides an alternative source for financing new projects. In turn, Krasker (1986) shows that equity-related adverse selection costs will be higher for security offerings with a larger issue size.[24] Hence, we use the pre-announcement stock price runup (measured over the window (-75,-1) relative to the announcement date), the amount of slack capital (calculated as the sum of cash and marketable securities divided by total assets) and the relative issue size (calculated as the issue size divided by the market value of equity) as measures for the level of equity-related costs in our empirical tests.[25]

We also include the following control variables that could act as proxies for both debt- and equity-related costs. In order to account for the issuing firm's growth opportunities at the moment of the announcement, we use the market to book ratio (calculated as the sum of total assets plus the market value of common equity minus the book value of common equity divided by the book value of total assets) and the growth in total sales (calculated as total sales at fiscal year-end immediately after the issue date minus total sales at fiscal

[24] More specifically, Krasker (1986) extends the Myers and Majluf (1984) model by assuming that insiders can choose the size of the security offering (which is equal to the size of the investment project). He demonstrates that the stock price decline due to the new offering's mispricing will increase with the relative issue size.

[25] Of course, strictly spoken, the relative issue size is not a firm-specific variable. However, since the amount issued is assumed to be exogenous in our analysis, we consider the relative issue size variable more similar to the (equally exogenous) firm characteristics than to the endogenously (i.e., by the management) determined security design features.

year-end immediately prior to the issue date divided by total sales at fiscal year-end immediately prior to the issue date). While the market to book ratio measures the profitability of the firm's growth opportunities, the growth in total sales measures the actual firm growth following the offering.[26] According to Green (1984), these two growth-related variables should have a negative influence on the convertible debt announcement returns, since asset substitution problems will be less severe for firms with many profitable investment opportunities. By contrast, Brennan and Kraus (1987) and Stein (1992) predict that the market to book ratio and the growth in total sales should have a positive influence on the investor reactions, as both uncertainty about firm risk and uncertainty about firm value should be larger for high-growth firms. In order to control for firm size, we include the natural logarithm of total assets. Brennan and Kraus (1987) and Stein (1992) both imply that this variable should have a negative influence on the investor reactions, since uncertainty about firm risk, asymmetric information about firm value and financial distress costs tend to be lower for larger companies.

B. Results

Table VI reports the parameter estimates of a regression with the day-0 abnormal return as dependent variable and the firm-specific proxies discussed in the previous paragraph as explanatory variables. Following common practice in the convertible debt-related literature, the abnormal return regression is estimated by means of the weighted least squares (WLS) technique, with as weight for each observation the inverse of the standard deviation of the corresponding market model residual.[27] The last column presents the expected signs of the different firm-specific variables.

<<Insert Table VI about here>>

[26] Under rational expectations, such ex-post growth measure should be a good proxy for the firm growth that was anticipated at the moment of the offering announcement (Pilotte, 1992).

[27] This holds for all of the abnormal return regressions conducted throughout this study. Note that, while the number of offerings used for determining the sign and the size of the abnormal returns is equal to 256, the number of offerings used in the regression analyses is substantially lower due to missing data fields for firm-specific and security design variables. When we restrict the calculation of the abnormal announcement returns to the 157 convertibles on which we have all the necessary issuer- and issue-related data for conducting the regression analyses, we obtain similar findings as the ones reported in Table V for our full sample of 256 observations.

In line with the predictions derived from Brennan and Kraus (1987) and Stein (1992), we find that the convertible debt announcement returns are significantly positively influenced by the issuing firm's growth opportunities, and significantly negatively influenced by the firm size. By contrast, all of the significant debt-related cost proxies (i.e., proportion of intangibles, stock return volatility and profitability) have signs opposite from those predicted by the models of Green (1984), Brennan and Kraus (1987) and Stein (1992). This may be attributable to the fact that the European convertibles in our sample tend to have a very small conversion probability (cf. supra, Section 3), so that investors perceive these securities rather as straight debt issues than as hybrid instruments able to reduce different debt-related costs. Despite the highly debt-like nature of our sample offerings however, we see that the pre-announcement stock price runup is estimated with a significantly negative regression coefficient. This finding does not support the hypothesis derived from Stein (1992). On the whole, we can thus conclude that our results on the impact of the issuer characteristics provide only very limited evidence for the convertible debt models of Green (1984), Brennan and Kraus (1987) and Stein (1992). In paragraph 5.2. infra, we will test the robustness of the findings reported here by splitting up our sample observations according to the size of their equity component and according to the convertible debt market condition in which they are issued.

5.1.2. Influence of security design characteristics

In columns (1) to (3) of Table VII, we report the parameter estimates of regression analyses with the day-0 abnormal return as dependent variable and the potential security-related investor reaction determinants identified in Section 2 as explanatory variables. The expected signs of these security design variables are listed in the last column.

<<Insert Table VII about here>>

Column (1) of Table VII shows that the Eurobond dummy, the maturity, the conversion premium and the post-conversion equity dilution all have a significant impact on the convertible debt announcement returns with the sign predicted by the models of Green

(1984) and Brennan and Kraus (1987). In column (2), we add a 'soft versus hard call' dummy equal to one for soft callable convertibles and equal to zero for hard callable convertibles (non-callable convertibles are not included in this regression). We see that the investor reactions associated with soft callable convertible debt offerings are not significantly more favorable than the investor reactions associated with hard callable offerings, which contrasts with the prediction derived from Stein (1992). Column (3) reveals that the length of the call protection period does not have a significant impact on the announcement returns either. It should however be noted that this last regression could only be estimated for 69 sample observations, i.e. the convertibles for which we could retrieve the length of the call protection period from the KBC Financial Products Convertible Debt Database (Bloomberg does not contain information on this variable).

5.1.3. Influence of the stated uses of proceeds

As outlined in Section 2, the models of Green (1984) and Brennan and Kraus (1987) imply that convertible debt offerings intended to repay short term debt should induce more positive investor reactions. Moreover, Green (1984), Brennan and Kraus (1984) and Stein (1992) yield the hypothesis that convertible debt offerings with less specific stated uses of proceeds should be accompanied by more favorable announcement effects. In order to identify convertible debt issues intended to pay back short term debt, we constructed a 'Refinance ST Debt' dummy equal to one for offerings that mention the repayment of short term debt first in their list of intended applications of the offering proceeds, and equal to zero otherwise. In order to discern offerings with vague stated uses of proceeds in turn, we constructed an 'Unspecified Use' dummy equal to one for convertibles that mention either the need for more flexibility or 'general corporate purposes' in their stated use of proceeds, and equal to zero otherwise. Subsequently, we performed t-tests and median tests on the differences in the abnormal returns across subsamples with different values on these dummies.[28]

[28] The median test is especially powerful for distributions that are asymmetric and fat-tailed, which is often the case for daily stock return data like ours.

<<Insert Table VIII about here>>

As can be seen from the first row of Table VIII, the t-test indicates that convertibles primarily intended to pay back short term debt are accompanied by significantly more positive investor reactions. This result supports the rationales of Green (1984) and Brennan and Kraus (1987), and is consistent with our earlier finding of a favorable influence of the convertible debt maturity on the announcement returns. However, it should be noted that the median test statistic does not confirm the significant influence of the 'Refinance ST Debt' dummy. Moreover, when we define this dummy in an alternative way (e.g., = 1 for offerings that mention the refinancing of short term debt *somewhere* in their list of intended uses of proceeds, and = 0 otherwise), even the t-test statistic has an insignificant value. The second row of Table VIII shows that, in contrast with the prediction derived from Green (1984), Brennan and Kraus (1987) and Stein (1992), convertible debt offerings with more vague stated uses of proceeds are associated with significantly more negative announcement returns. However, this result is again not confirmed by the median test, and is not robust to alternative specifications of the 'Unspecified Use' dummy. We also created dummies for the other stated uses of proceeds mentioned in Table III supra, as well as for the aggregate stated uses of proceeds - categories 'New financing', 'Refinance existing debt' and 'Other purposes'. Since none of these dummies has a significant influence on the investor reactions,[29] we can conclude that the officially stated uses of proceeds have a very limited power for explaining the announcement returns. This may be attributable to the fact that over 60% of the issuing firms cite more than one possible application of the issue proceeds, so that it is nearly impossible to disentangle the influences of separate intended uses on the announcement returns. Following Akhigbe et al. (1997), it could also be that the market interprets the stated uses of proceeds as irrelevant information, since these officially stated purposes often diverge from the actual intentions of the issuing firm.

[29] For parsimony, we don't report our univariate test results with respect to these other stated use of proceeds dummies here. These results are available upon request.

5.1.4. Influence of the convertible debt market condition

Table IX presents the t-test and median test statistics for the difference in the day-0 abnormal returns across convertibles issued during 'hot' and 'non-hot' issue markets (identified according to the criterion outlined in paragraph 3.2.4. supra). In contrast with the prediction derived from the models of Green (1984), Brennan and Kraus (1987) and Stein (1992), we see that the abnormal stock price reaction recorded for the hot window convertibles is significantly more negative than the abnormal stock price reaction recorded for the non-hot window convertibles. In the next paragraph, we will further examine the robustness of this finding.

<<Insert Table IX about here>>

5.1.5. Joint analysis of the influence of issuer characteristics, security design characteristics and the convertible debt market condition

In order to examine whether the combination of issuer characteristics, security design features and the aggregate convertible debt issue volume would change any of the findings reported in the previous paragraphs, we estimated an abnormal return regression that jointly includes these three explanatory variable categories. Table X presents the parameter estimates of this regression analysis.[30]

<<Include Table X about here>>

We see that our findings regarding the influence of the firm characteristics on the announcement returns are virtually unaffected by the inclusion of security design and market condition variables. By contrast, the parameter estimates of the security design features tend to become less significant after we control for firm-specific variables and for the aggregate convertible debt issue volume. This could be attributable to the fact that companies of a certain type (e.g. low risk firms) cluster into issuing convertibles of a

[30] Due to the limited availability and the poor statistical significance of the length of the call protection period and the stated use of proceeds dummies, we did not include these variables in the combined regression analysis.

certain type (e.g. Eurobonds), so that the security-related variables merely act as proxies for firm characteristics. In order to examine this possibility, we regressed the five security design features listed in Table X on the firm-specific variables represented in this table. We briefly report the main conclusions that can be drawn from these regression analyses here.[31] First, the logistic regression with the Eurobond dummy as dependent variable indicates that firm size has a highly significant positive impact on the probability that a convertible will be issued on the Eurobond market. By contrast, firm risk measures have no significant influence on this probability. The Eurobond dummy thus seems to act as a proxy for the size of the issuing company rather than as an inverse proxy for firm risk (i.e., our original hypothesis based on Kim and Stulz (1992)). Nevertheless, our finding of a negative impact of this security feature on the announcement returns still supports the models of Brennan and Kraus (1987) and Stein (1992), since these models both predict a negative impact of the firm size on the investor reactions. It is also worth mentioning that the regressions with the conversion premium and the level of post-conversion equity dilution as dependent variables show that the former security design characteristic is significantly positively influenced by the ratio of ebit to total assets, whereas the latter security design characteristic is significantly negatively influenced by this profitability measure. Since the ebit to total assets ratio could act as a proxy for firm quality, these findings provide evidence for Brennan and Kraus' (1987) conjecture that a high conversion premium indicates a high-quality firm type, and a high level of post-conversion equity dilution indicates a low-quality firm type (cf. supra, Section 2). Lastly, the regression analysis with the maturity as dependent variable reveals that none of the issuer characteristics has a significant influence on this security design feature. The significant regression coefficient of the maturity registered in Table X thus indicates that investors use this security design characteristic as an extra source of information above the information derived from firm-related accounting and stock price data, which is in line with the predictions derived from Green (1984) and Brennan and Kraus (1987).

Table X also shows that our finding of a significantly negative influence of the aggregate convertible debt volume on the announcement returns is robust to the inclusion of firm

[31] Our detailed regression results are available upon request.

and security design characteristics. Hence, this result can not merely be attributed to particular firm and/or security types clustering during particular market conditions. As an additional, more direct test for possible interactions between the convertible debt market condition and the convertible debt security design, we also performed a contingency table analysis of the association between a 'debt-like/equity-like' dummy and a 'hot/non-hot' dummy. Convertibles with a risk-neutral conversion probability lower than the sample average of 32.44% are labeled 'debt-like', whereas convertibles with a risk-neutral conversion probability higher than or equal to this value are labeled 'equity-like'.[32] The hot convertible debt offerings are identified according to the criterion outlined in paragraph 3.2.4. supra.

<<Insert Table XI about here>>

Table XI reveals that there is a highly significant (at less than 1%) interaction effect between the degree of equity-likeness of the convertibles and the market condition in which these hybrid instruments are issued. More specifically, 74.47% of the hot market offerings have a debt-like security design. Conversely, 73.33% of the equity-like offerings are issued during non-hot issue windows. In the light of this result, our finding of a significantly negative impact of the convertible debt market condition on the announcement returns becomes even more remarkable, since, based on the pecking order model of Myers and Majluf (1984), we would expect a more favorable investor reaction to relatively more debt-like convertibles.[33] We could thus conclude that we find a negative influence of the convertible debt market condition *despite* the differences in the convertible debt security design across hot and non-hot markets. Since we already

[32] The risk-neutral probability is calculated following equation (1) in paragraph 3.2.2. supra. We use this variable because it is a more comprehensive measure for the degree of equity-likeness of a convertible than features such as the maturity and the conversion premium, which capture only one aspect of the convertible debt security design.

[33] Since the rationales of Green (1984), Brennan and Kraus (1987) and Stein (1992) yield no direct prediction on the influence of the risk-neutral conversion probability on the convertible debt announcement returns, we did not discuss the impact of this security design variable in paragraph 5.1.2. Nevertheless, it is worth mentioning that the risk-neutral conversion probability has an insignificant influence on the announcement returns when it is considered separately, but a significantly negative impact when it is included with firm-specific variables and with the aggregate convertible debt volume in a WLS regression with the day-0 abnormal return as dependent variable.

showed that the negative impact of the convertible debt market condition cannot be attributed to differences in the issuer characteristics across hot and non-hot issue windows either (cf. supra, Table X), there should be another explanation for this surprising result. We suggest two alternative interpretations. First, it could be that the aggregate convertible debt volume acts as an *inverse* proxy for the economy-wide level of debt- and/or equity-related costs (i.e., the opposite from the hypothesis that we originally derived from the models of Green (1984), Brennan and Kraus (1987) and Stein (1992)). This interpretation is consistent with the fact that there is a positive correlation of +0.48 between a three-month moving average of the number of convertible debt issues and the number of straight debt issues, and a positive correlation of +0.35 between a three-month moving average of the number of convertible debt issues and the number of equity issues made by Western European companies over our sample period.[34] However, if convertibles are effectively more appropriate for firms facing severe debt- and equity-related costs (as argued by the above-cited models), it is rather strange that these securities would cluster during periods when these costs are low (and hence, the investor reactions to their announcements are more negative). An alternative, more plausible explanation for our finding of a negative influence of the aggregate convertible debt volume on the announcement returns is that stockholders suspect hot market offerings to be driven by opportunistic issuer motives (e.g taking advantage of a temporary equity overvaluation) or by irrational market fads, rather than by the wish to reduce debt- and/or equity-related costs.[35] As a consequence, these hot window convertibles are punished with more negative investor reactions than otherwise similar non-hot window issues.

On the whole, our full-sample regression results indicate that the inclusion of the convertible debt security design and the convertible debt market condition enhances our understanding of the convertible debt announcement effect. This can also be seen from the adjusted R^2 of the abnormal return regression, which increases from 29.80% (cf.

[34] The lists of Western European straight debt and equity issues were both retrieved from Bloomberg.
[35] Fads can be described as 'drastic and seemingly whimsical swings in mass behavior without obvious external stimulus' (Bikhchandani, Hirshleifer and Welsh, 1992).

supra, Table VI) to 36.75% (cf. supra, Table X) when security- and market condition-related explanatory variables are added to the firm-specific explanatory variables.[36]

5.2. Split-sample test results

5.2.1. 'Debt-like' versus 'equity-like' convertibles

In paragraph 5.1. supra, we showed that the regression parameters of the firm-specific variables are highly similar to the regression parameters that would be expected in the case of straight debt offering announcements, and suggested that this finding might be attributable to the highly 'debt-like' nature of European convertible debt issues. If this is actually the case, we should observe more evidence for the convertible debt rationales of Green (1984), Brennan and Kraus (1987) and Stein (1992) for those convertibles in our sample that have a relatively larger equity component. In order to test this conjecture, we again subdivided our sample issues into a debt-like and an equity-like subsample on the basis of their risk-neutral probability of conversion, with the average risk-neutral probability value of 32.44% as benchmark. Subsequently, we performed split-sample regression analyses with the day-0 abnormal return as dependent variable and the firm- and market condition-related proxies enumerated in Table X supra as explanatory variables. The results of this split-sample regression analysis are reported in Table XII.

<<Insert Table XII about here>>

Table XII reveals that especially the coefficients of the equity-related cost proxies are substantially different between the debt- and the equity-like convertibles. More specifically, while the pre-announcement stock price runup has a significantly negative influence on the investor reactions for the debt-like convertibles, it has an insignificant impact on the investor reactions for the equity-like convertibles. In addition, while the

[36] Since most other convertible debt-related event studies report adjusted R^2's lower than 10%, the explanatory power of our abnormal return regressions is exceptionally high. This might be attributable to the fact that the announcement dates used in our study are retrieved from an electronic database (Bloomberg), which makes them more accurate than the announcement dates based on published newspaper articles that are used in most other studies.

amount of slack capital has an insignificant parameter estimate for the debt-like offerings, it has significantly positive parameter estimate for the equity-like offerings. When we look at the debt-related cost proxies in turn, we see that the leverage ratio has an insignificant influence on the announcement returns for the debt-like offerings, but a highly significant positive influence for the equity-like offerings. Our results thus suggest that investors react more positively to equity-like convertibles issued by firms with high equity-related adverse selection costs and a high debt ratio, which provides evidence for the validity of the Stein (1992) model for this convertible debt category. By contrast, the regression estimates registered for the relatively more debt-like convertibles illustrate that investors do not consider these securities able to reduce adverse selection or financial distress costs. Hence, we obtain formal evidence for our conjecture that the 'backdoor-equity' model of Stein (1992) only holds for convertibles with a sufficiently high probability of conversion. Nevertheless, despite the substantial differences in the parameter estimates obtained for the debt-like and the equity-like convertibles, the regression coefficients of the proportion of intangible assets and the stock return volatility are significantly negative for the equity-like convertibles just as for the debt-like convertibles. Probably, the adverse impact of these debt-related cost proxies can be ascribed to the fact that even our 'equity-like' sample offerings tend to have a rather small equity component,[37] so that investors are still highly concerned about the potential asset substitution and risk uncertainty costs associated with these securities.

5.2.2. 'Hot market' versus 'non-hot market' convertibles

If the temporal fluctuations in the aggregate convertible debt issue volume capture changes in the amount of debt- and equity-related costs over time (as argued by Bayless and Chaplinsky (1996) and Lewis et al. (2003)), we should observe differences in the regression coefficients of firm- and security-specific debt- and equity-related cost proxies across hot and non-hot market offerings. In order to examine this conjecture, we estimated the regression reported in Table X separately for hot and non-hot convertible debt offerings, with the hot offerings identified according to the criterion outlined in

[37] As mentioned before, the average risk-neutral conversion probability (i.e., the cut-off value for classifying a convertible as 'equity-like') is only 32.44%.

paragraph 3.2.4. supra. The results of this split-sample regression analysis are reported in Table XIII.

<<Insert Table XIII about here>>

Table XIII shows that the adjusted R^2 of the hot market regression (i.e. 20.18%) is much lower than the adjusted R^2 of the non-hot market regression (i.e. 65.62%).[38] According to Bayless and Chaplinsky (1996), who obtain an analogous result in the context of equity offerings, this finding may be interpreted in two ways. On one hand, it could indicate that the level of information asymmetry for the economy as a whole is lower during hot issue markets, so that the stockholders don't need to rely on variables proxying different issuer and security design characteristics during such windows (since they know the true quality of the issuing firms). On the other hand, it could indicate that the stockholders resort to herding behavior during hot issue markets, to the extent that they suspend individual assessments of firm value (based on different proxy variables for issuer and issue characteristics) in favor of a collective (negative) assessment of all convertible debt offering announcements made during such periods.[39] When we look at the individual regression coefficients in turn, we see that the pre-announcement stock price runup and the amount of slack capital have a significantly negative influence for convertibles issued during hot markets, but an insignificant influence for convertibles issued during non-hot markets. The market to book ratio on the other hand is significantly positive for hot market offerings, but insignificant for non-hot market offerings. Since the pre-announcement stock price runup and the amount of slack capital could act as proxies for

[38] When we repeated the regression represented in Table XIII with only firm-specific variables on the right-hand side, we obtained adjusted R^2's of 12.67% for the hot market subsample and 61.22% for the non-hot market subsample. When we conducted the split-sample regression analysis with only security-related variables on the right-hand side in turn, we obtained adjusted R^2's of 8.99% for the hot market subsample and 19.56% for the non-hot market subsample. We can thus conclude that the lower explanatory power of the abnormal return regression during hot issue windows is caused by a lower significance of both firm-specific and security design characteristics.

[39] Bikhchandani et al. (1992) provide the following description for the herding behavior of individuals during 'informational cascades' (i.e., a more general term for market fads): 'An informational cascade occurs when it is optimal for an individual, having observed the actions of those ahead of him, to follow the behavior of the preceding individual without regard to his own information.' This could explain why stockholders react negatively upon *any* convertible announced during hot market windows, irrespective of its security design and of the characteristics of the issuing firm.

firm overvaluation (de Jong and Veld, 2001) and the market to book ratio could act as a proxy for the firm's true need for financing, these findings might indicate investor concern about opportunistic issuer motives behind hot window offerings.

5.3. Robustness checks

In order to check the validity of our findings on the determinants of the convertible debt announcement returns, we performed several robustness checks. For parsimony, we only briefly report the outcomes of these tests here:[40]

- Our findings are not biased due to outliers, since they remain virtually unaffected when we remove the influential observations (identified through the 'dfbeta', 'dffits' and 'Cook's distance' criteria) from our sample. Our results also remain unaltered when we winsorize our data at 1%, thus excluding the lowest and highest percentile of each variable.
- Our results are not biased by multicollinearity or heteroscedasticity problems. Of course, the latter conclusion is not surprising, since we use the weighted least squares technique for estimating our regressions.
- Our results remain qualitatively the same when we remove the most thinly traded stocks (identified according to the criterion outlined in paragraph 4.3.) from our sample.
- Our findings regarding the impact of firm-specific debt- and equity-related costs on the announcement returns are insensitive to the proxy variables used for measuring these costs (e.g. beta instead of stock return volatility as a measure of firm risk).
- Our findings obtained by means of split-sample regressions for equity-like versus debt-like and hot versus non-hot convertible debt offerings are robust to the specific criterion used for partitioning our sample observations (e.g. the median risk-neutral conversion probability instead of the average risk-neutral conversion probability;

[40] A more elaborate description of our different robustness checks is available upon request.

nominal convertible debt issue volumes instead of real convertible debt issue volumes, etc.).

- According to Abhyankar and Dunning (1999), it might be better to study the convertible debt announcement effect over the event window (0,1) instead of over the announcement date only, in order to account for stock price transactions occurring after the stock market closure on the announcement date. However, when we use the abnormal returns realized over this two-day event window as dependent variable, our abnormal return regression results become statistically less significant. This might indicate that the announcements of our sample offerings were made early during the trading day, so that the stockholders' reaction to these announcements occurred on the actual announcement date.

6. Conclusion

In this paper, we examine the stockholder reactions to convertible debt offering announcements made by Western European companies. In line with previous studies, we find that these announcements are accompanied by a significantly negative abnormal stock return in the order of –1.32%. Subsequently, we test the ability of the convertible debt models of Green (1984), Brennan and Kraus (1987) and Stein (1992) to explain the cross-sectional variation in the convertible debt announcement effect. While prior empirical work focuses on firm-specific abnormal return determinants, our study simultaneously examines the influence of the security design, the officially stated uses of the offering proceeds and the aggregate convertible debt issue volume on the stockholder reactions. In this way, we obtain new insights on the variables driving the convertible debt announcement effect.

With respect to the convertible debt security design, we find that the maturity and the conversion premium have a positive influence on the stockholder reactions, whereas the Eurobond feature and the level of post-conversion equity dilution have a negative influence. These findings all support the predictions derived from the models of Green

(1984), Brennan and Kraus (1987) and Stein (1992). We also discover that hot market convertibles induce more negative announcement effects than non-hot market convertibles. This finding may reflect investors' suspicion that hot market convertibles are inspired by opportunistic or irrational issuer motives rather than by the wish to reduce debt- and/or equity-related costs. In addition, we document significant interaction effects between the issuer characteristics, the convertible debt security design and the convertible debt market condition. First, we show that the influence of the issuer characteristics on the announcement returns depends on the degree of equity-likeness of the convertible debt: convertibles with an 'equity-like' security design are perceived as instruments able to reduce adverse selection and financial distress costs, whereas convertibles with a 'debt-like' security design are perceived as predominantly straight debt. We also find that the influence of the issuer characteristics depends on the market condition in which the convertibles are issued: during hot markets, stockholders react much more negatively upon variables proxying firm overvaluation than during non-hot markets. Furthermore, we demonstrate that the convertible debt issuer and security design characteristics have a lot more power for explaining the stockholder reactions during non-hot windows than during hot windows. This result might indicate that stockholders resort to irrational herding behavior during hot issue periods (i.e., the 'information cascade' herding theory of Bikhchandani et al. (1992)). Lastly, we find that there is a significant association between the convertible debt security design and the convertible debt market condition. More particularly, the large majority of the equity-like convertibles are issued during non-hot markets (or, conversely, the large majority of the hot market convertibles have a debt-like security design). Together, these interaction effects suggest that convertible debt offerings can broadly be subdivided into two categories. A first category consists of convertibles issued by firms that would otherwise have issued equity, but resort to a convertible debt offering in order to mitigate equity-related adverse selection costs (i.e., the rationale of Stein (1992)). These offerings have an equity-like security design, and are mainly offered during non-hot issue windows. A second group consists of convertibles issued by firms that would otherwise have issue straight debt, but resort to a convertible debt offering in order to take advantage of a temporary equity overvaluation or in order to be part of a convertible debt hype. These convertibles are offered during hot markets, and

tend to have a debt-like security design. This interpretation is consistent with our finding that hot market convertibles induce more negative announcement returns than non-hot market convertibles. Additional research should further examine its validity, for instance through a logistic regression analysis that compares the variables driving the decision to issue convertible debt to the variables driving the decision to issue straight debt and equity.

References

Abhyankar A. & Dunning A. (1999). Wealth effects of convertible bond and convertible preference share issues: an empirical analysis of the UK market. Journal of Banking and Finance 23, pp. 1043-1065.

Akhigbe A., Easterwood J. & Pettit R. (1997). Wealth effect of corporate debt issues: the impact of issuer motivations. Financial Management 26, pp. 32-47.

Bayless M. & Chaplinsky S. (1996). Is there a window of opportunity for seasoned equity issuance? Journal of Finance 51, pp. 253-278.

Bikhchandani S., Hirshleifer D. & Welsh I. (1992). A theory of fads, fashion, custom, and cultural change as informational cascades. Journal of Political Economy 100, p. 992-1026.

Black F. & Scholes M. (1973). The pricing of options and corporate liabilities. Journal of Political Economy 81, pp. 637-659.

Brennan M. & Kraus A. (1987). Efficient financing under asymmetric information. Journal of Finance 42, pp. 1225-1243.

Corporate Finance (1999). 'Capital markets: equity and equity-linked'. Issue 173, pp. 50-52

Corporate Finance (2001). '2001 ways to use convertibles'. Issue 195, pp. 24-25.

Dann L. & Mikkelson W. (1984). Convertible debt issuance, capital structure change and financing-related information. Journal of Financial Economics 13, pp. 157-186.

De Jong A. & Veld C. (2001). An empirical analysis of incremental capital structure decisions under managerial entrenchment. Journal of Banking and Finance 25, pp. 1857-1895.

De Roon F. & Veld C. (1998). Announcement effects of convertible bond loans and warrant-bond loans: an empirical analysis for the Dutch market. Journal of Banking and Finance 22, pp. 1481-1506.

Green R. (1984). Investment incentives, debt, and warrants. Journal of Financial Economics 13, pp. 115-136.

Kim Y. & Stulz R. (1992). Is there a global market for convertible bonds? Journal of Business 65, pp. 75-91.

Krasker W. (1986). Stock price movements in response to stock issues under asymmetric information. Journal of Finance 41, pp. 93-105.

Lewis C., Rogalski R. & Seward J. (1998). Agency problems, information asymmetries, and convertible debt security design. Journal of Financial Intermediation 7, pp. 32-59.

Lewis C., Rogalski R. & Seward J. (1999). Is convertible debt a substitute for straight debt or for common equity? Financial Management 28, pp. 5-27.

Lewis C., Rogalski R. & Seward J. (2003). Industry conditions, growth opportunities and market reactions to convertible debt financing decisions. Journal of Banking and Finance 27, pp. 153-181.

Long M. & Sefcik S. (1990). Participation financing: a comparison of the characteristics of convertible debt and straight bonds issued in conjunction with warrants. Financial Management 19, pp. 23-34.

Lucas D. & McDonald R. (1990). Equity issues and stock price dynamics. Journal of Finance 45, pp. 1019-1043.

Myers S. & Majluf N. (1984). Corporate financing and investment decisions when firms have information that investors do not have. Journal of Financial Economics 13, pp. 187-221.

Nanda V. & Yun Y. (1996). Financial Innovation and investor wealth: a study of the poison put in convertible bonds. Journal of Corporate Finance 3, pp. 1-22.

Pattel J. (1976). Corporate forecasts of earnings per share and stock price behavior: an empirical test. Journal of Accounting Research 14, pp. 246-276.

Pilotte E. (1992). Growth Opportunities and the stock price response to new financing. Journal of Business 65, pp. 371-394.

Stein J. (1992). Convertible bonds as backdoor-equity financing. Journal of Financial Economics 32, pp. 3-21.

Table I

Geographical Distribution of a Sample of 256 Convertible Debt Offerings made by Western European Companies over the Period 1990-2002

Country of domicile of issuing firm	Number of offerings	Percentage of total
France	98	38.28%
United Kingdom	37	14.45%
The Netherlands	32	12.50%
Switzerland	20	7.81%
Germany	18	7.03%
Sweden	12	4.69%
Norway	9	3.52%
Finland	7	2.73%
Italy	7	2.73%
Austria	4	1.50%
Belgium	4	1.56%
Spain	4	1.56%
Denmark	3	1.17%
Greece	1	0.39%
Total	256	100%

Table II

Descriptive Firm and Security Characteristics of a Sample of 256 Convertible Debt Offerings made by Western European Companies over the Period 1990-2002

All accounting variables are measured at fiscal year-end prior to the announcement date, unless otherwise indicated. Total assets are expressed in constant 2002 dollars. Debt ratio is total debt divided by total assets. Market to book ratio is (total assets + market value of common equity measured one week prior to the announcement date - book value of common equity)/total assets. Slack denotes the sum of cash and marketable securities divided by total assets. Profitability denotes the earnings before interest and taxes divided by total assets. Stock return volatility is the standard deviation of the continuously compounded daily stock return estimated over the window (-240,-40) relative to the announcement date. Issue size denotes the offering proceeds expressed in constant 2002 dollars. Issue size/market value of equity is the issue size divided by the market value of common equity measured one week prior to the announcement date. Post-conversion equity dilution is the number of shares issued assuming full conversion of the convertibles divided by (1) the total number of shares outstanding at fiscal year-end before the offering announcement and (2) the number of shares issued assuming full conversion. Maturity denotes the initial maturity of the offering. Conversion premium is the conversion price divided by the stock price measured one week prior to the announcement date. Proportion of privately placed offerings denotes the percentage of sample observations of which at least one tranche is privately placed. All other variables are self-descriptive.

Descriptive measure	Mean	Median
Firm characteristics		
(1) Total assets ($ mio)	7,285	1,539
(2) Debt ratio	0.28	0.25
(3) Market to book ratio	2.03	1.35
(4) Slack	0.12	0.09
(5) Profitability	0.06	0.07
(6) Stock return volatility	2.70%	2.43%
Security characteristics		
(7) Issue size ($ mio)	343.47	164.44
(8) Issue size/market value of equity	0.18	0.12
(9) Post-conversion equity dilution	0.22	0.19
(10) Coupon	5.98%	6.00%
(11) Maturity (years)	6.86	5.40
(12) Conversion premium	1.18	1.18
(13) Length of call protection period (years)	2.87	3.00
(14) Proportion of soft callable offerings	52.65%	
(15) Proportion of hard callable offerings	28.79%	
(16) Proportion of Eurobonds	35.40%	
(17) Proportion of privately placed offerings	7.81%	

Table III

Overview of Officially Stated Purposes of Issue for Convertible Debt Offerings made by Western European Companies over the Period 1990-2002

The sample consists of a subset of 105 convertible debt offerings for which the offering prospectus could be retrieved from the KBC Financial Products Convertible Debt Database. Column (1) provides the number (and percentage) of offerings for which the intended use of proceeds is listed *first* in the 'Use of proceeds'-section of the offering prospectus. Column (2) lists the number (and percentage) of offerings for which the intended use of proceeds is mentioned *somewhere* in the 'Use of proceeds'-section of the offering prospectus.

Stated purpose of issue	(1)	(2)
New financing	*44 (41.90%)*	*78 (74.28%)*
(1) Internal growth (capital expenditure, R&D, innovation)	16 (15.24%)	25 (23.81%)
(2) External growth	21 (20.00%)	62 (59.04%)
(3) Growth (not further specified)	6 (5.71%)	11 (10.48%)
(4) Working capital	1 (0.95%)	3 (2.86%)
Refinance existing debt	*51 (48.57%)*	69 (65.71%)
(5) Refinance bank debt	6 (5.71%)	10 (9.52%)
(6) Refinance short term debt	21 (20.00%)	27 (25.71%)
(7) Refinance debt (not further specified)	15 (14.29%)	23 (21.90%)
(8) Optimize financial structure	9 (8.57%)	20 (19.05%)
Other purposes	*10 (9.52%)*	45 (2.86%)
(9) Avoid liquidity crisis	1 (0.95%)	3 (2.86%)
(10) Take advantage of favorable interest rates	0 (0.00%)	14 (13.33%)
(11) Prevent excessive equity dilution	0 (0.00%)	5 (4.76%)
(12) Enhance flexibility	0 (0.00%)	9 (8.57%)
(13) General corporate purposes	9 (8.57%)	23 (5.25%)

Table IV

Calendar Time Intervals Classified as Hot Issue Windows

Hot issue windows are at least three contiguous months where the aggregate real convertible debt issue volume exceeds the upper quartile of a three-month moving average of aggregate real convertible debt issue volume. Real issue volume is the aggregate Western European convertible debt issue volume raised over the calendar time interval specified in the first column, converted into constant 2002 dollars by means of the European Consumer Price Index. The percentages represented in the second and the third column are expressed relative to the total number of sample months (i.e. 156) and the total real convertible debt volume raised over the sample period (i.e. $103.86 billion), respectively.

Hot issue windows	Duration (in months)	Real issue volume (in $ mio)
March 1995 – May 1995	3	5,336.56
May 1998 – July 1998	3	3,531.62
Nov. 1998 – Feb. 1999	4	6,796.65
Sept. 1999- Nov. 1999	3	5,889.40
Feb. 2000 – July 2000	6	9,320.85
Oct. 2000 – Dec. 2000	3	5,020.91
April 2001 – July 2001	4	3,658.25
Oct. 2001 – June 2002	9	22,188.94
Total (%)	35 (22.43%)	61,742.59 (59.45%)

Table V

Daily Abnormal Stock Returns around Convertible Debt Offering Announcements

The sample includes 256 convertible debt offerings made by Western European companies between 1990 and 2002. Abnormal returns are calculated by means of the market model, with the market index proxied by the Datastream country benchmark index for the issuing firm's country of domicile. The market model regressions are estimated over the windows (-200,-61) and (61,200) relative to the announcement dates retrieved from Bloomberg. All equity returns are continuously compounded and based on stock prices expressed in the local currency of the issuing firm's country of domicile.

Interval in relation to announcement day (day 0)	Average (median) cumulative announcement return (%)	Z-statistic	Percentage negative announcement returns (%)	Sign test statistic	Wilcoxon signed rank test statistic
1. Pre-announcement period window					
(-60,-2)	4.06 (3.73)	3.04***	40.63	24***	3,761***
2. Announcement period windows					
(-1,0)	-1.20 (-0.96)	-4.25***	63.67	-35***	-6,041***
0	-1.32 (-0.95)	-7.56***	66.80	-43***	-7,663***
(0,1)	-1.44 (-1.11)	-5.48***	64.06	-36***	-6,521***
(-1,1)	-1.32 (-1.01)	-3.58***	60.94	-28***	-5,322***
3. Post-announcement period window					
(2,60)	0.00 (0.00)	-0.32	50.78	-2	-500

* Significant at the 0.10 level
** Significant at the 0.05 level
*** Significant at the 0.01 level

Table VI

Parameter Estimates of a Regression of the Abnormal Stock Returns Realized at Convertible Debt Offering Announcements on Firm-Specific Variables

The dependent variable is the abnormal stock return realized on the convertible debt announcement date. All independent variables are measured at fiscal year-end prior to the announcement date, unless otherwise indicated. Debt ratio is total debt divided by total assets. Proportion of intangibles is intangible assets divided by total assets. Stock return volatility denotes the standard deviation of the daily stock returns estimated over the window (-240, -40) relative to the announcement date. Profitability is earnings before interest and taxes divided by total assets. Stock price runup is the cumulative stock return realized over the window (-75,-1) relative to the announcement date. Slack denotes the sum of cash and marketable securities divided by total assets. Issue size/market value of equity is the issue size divided by the market value of common equity measured one week prior to the announcement date. Market to book ratio is (total assets + market value of common equity measured one week prior to the announcement date - book value of common equity)/total assets. Growth in total sales is (total sales at fiscal year-end immediately after the issue date - total sales at fiscal year-end immediately prior to the issue date)/total sales at fiscal year-end immediately prior to the issue date. Firm size is the natural logarithm of total assets. The regression is estimated using weighted least squares, where the weight is the standard deviation of the market model residuals. 'G', 'B&K' and 'S' denote the models of Green (1984), Brennan and Kraus (1987) and Stein (1992), respectively.

Independent variable	Parameter estimate (t-statistic)	Expected sign (model)
Intercept	0.071**	
	(2.10)	
Firm-specific proxies for debt-related costs		
Debt ratio	0.016	+ (G, B&K, S)
	(0.94)	
Proportion of intangibles	-0.068***	+ (G, B&K, S)
	(-4.37)	
Stock return volatility	-0.989***	+ (G, B&K, S)
	(-3.78)	
Profitability	0.053*	- (G, B&K, S)
	(1.98)	
Firm-specific proxies for equity-related costs		
Stock price runup	-0.820**	+ (S)
	(-2.33)	
Slack	-0.021	+ (S)
	(-0.93)	
Issue size/market value of equity	-0.009	+ (S)
	(-0.37)	
Firm-specific control variables		
Market to book ratio	0.002**	- (G)/+ (B&K, S)
	(2.27)	
Growth in total sales	0.002***	- (G)/+ (B&K, S)
	(3.53)	
Firm size	-0.003**	- (B&K, S)
	(-1.99)	
Adjusted R^2	29.80%	
N	189	

* Significant at the 0.10 level
** Significant at the 0.05 level
*** Significant at the 0.01 level

Table VII

Parameter Estimates of a Regression of the Abnormal Stock Returns Realized at Convertible Debt Offering Announcements on Security Design Variables

The dependent variable is the abnormal stock return realized on the convertible debt announcement date. Eurobond dummy is equal to one for Eurobond offerings, and equal to zero for non-Eurobond (i.e., domestic or foreign) offerings. Maturity denotes the initial maturity of the offering. Conversion premium is the conversion price divided by the stock price measured one week prior to the announcement date. Post-conversion equity dilution is the number of shares issued assuming full conversion of the convertibles divided by (1) the total number of shares outstanding at fiscal year-end before the offering announcement and (2) the number of shares issued assuming full conversion. Soft versus hard call dummy is equal to one for soft callable convertibles, and equal to zero for hard callable convertibles. The length of the call protection period is measured relative to the offering's initial maturity. Regressions are estimated using weighted least squares, where the weight is the standard deviation of the market model residuals. 'G', 'B&K' and 'S' denote the models of Green (1984), Brennan and Kraus (1987) and Stein (1992), respectively.

Independent variable	Parameter estimate (t-statistic)			Expected sign (model)
	(1)	(2)	(3)	
Intercept	-0.050***	-0.083***	0.017	
	(-3.22)	(-3.24)	(0.46)	
Eurobond dummy	-0.014**	-0.013*	-0.005	- (G, B&K)
	(-2.19)	(-1.78)	(-0.60)	
Maturity	0.001**	0.002***	-0.002	+ (G, B&K)
	(2.02)	(2.81)	(-0.70)	
Conversion premium	0.029**	0.041**	-0.015	+ (B&K)
	(2.34)	(2.40)	(-0.51)	
Post-conversion equity dilution	-0.023**	-0.018	-0.042***	- (B&K)
	(-2.28)	(-1.29)	(-2.51)	
Soft versus hard call dummy	-	0.012	-	+ (S)
		(1.16)		
Length call protection period	-	-	0.000	- (S)
			(0.05)	
Adjusted R^2	8.81%	13.04%	3.38%	
N	189	124	69	

* Significant at the 0.10 level
** Significant at the 0.05 level
*** Significant at the 0.01 level

Table VIII

Univariate Analysis of Influence of Officially Stated Purposes of Issue on the Abnormal Stock Returns Realized at Convertible Debt Offering Announcements

The sample consists of a subset of 105 convertible debt offerings for which the offering prospectus could be retrieved from the KBC Financial Products Convertible Debt Database. The dependent variable is the abnormal stock return realized on the convertible debt announcement date. 'Refinance ST Debt' dummy is equal to one for offerings that mention the repayment of short term debt first in the list of intended applications of the offering proceeds. 'Unspecified Use' dummy is equal to one for offerings that mention the need for more flexibility or 'general corporate purposes' in the list of intended applications of the offering proceeds. N_1 and N_0 denote the number of observations in the subsamples with values 1 and 0 for the stated use of proceeds dummies, respectively. $N = N_1 + N_0$. AAR_1 and AAR_0 denote the average day-0 abnormal returns realized in the subsamples with values 1 and 0 for the stated use of proceeds dummies, respectively. The differences between the AAR_1's and AAR_0's are inserted in parentheses. 'G', 'B&K' and 'S' denote the models of Green (1984), Brennan and Kraus (1987) and Stein (1992), respectively.

Stated use of proceeds dummy	N	Average day-0 abnormal returns (difference)	t-test statistic	Median test statistic	Expected sign (model)
Refinance ST Debt	$N_1 = 21$	$AAR_1 = -0.010$			
	$N_0 = 84$	$AAR_0 = -0.023$	1.80*	1.21	+ (G, B&K)
	$N = 105$	(0.013)			
Unspecified use	$N_1 = 30$	$AAR_1 = -0.031$			
	$N_0 = 75$	$AAR_0 = -0.017$	-1.71*	-1.28	+ (G, B&K, S)
	$N = 105$	(-0.014)			

* Significant at the 0.10 level
** Significant at the 0.05 level
*** Significant at the 0.01 level

Table IX

Univariate Analysis of Influence of the Convertible Debt Market Condition on the Abnormal Stock Returns Realized at Convertible Debt Offering Announcements

Hot issue dummy is equal to one for convertibles issued during hot markets, i.e. at least three contiguous months where the aggregate real convertible debt issue volume exceeds the upper quartile of a three-month moving average of aggregate real convertible debt issue volume. N_1 and N_0 denote the number of observations in the subsamples with values 1 and 0 for the hot issue dummy, respectively. $N = N_1 + N_0$. AAR_1 and AAR_0 denote the average day-0 abnormal returns realized in the subsamples with values 1 and 0 for the hot issue dummy, respectively. The difference between AAR_1 and AAR_0 is inserted in parentheses. 'G', 'B&K' and 'S' denote the models of Green (1984), Brennan and Kraus (1987) and Stein (1992), respectively.

	N	Average day-0 abnormal returns (difference)	t-test statistic	Median test statistic	Expected sign (model)
'Hot issue' dummy	$N_1 = 110$ $N_0 = 146$ $N = 256$	$AAR_1 = -0.019$ $AAR_0 = -0.009$ (-0.009)	-2.16^{**}	-3.02^{***}	+ (G, B&K, S)

* Significant at the 0.10 level
** Significant at the 0.05 level
*** Significant at the 0.01 level

Table X

Parameter Estimates of a Regression of the Abnormal Stock Returns Realized at Convertible Debt Offering Announcements on Firm-Specific, Security Design and Convertible Debt Market Condition Variables

The dependent variable is the abnormal stock return realized on the convertible debt announcement date. All firm-specific independent variables are measured at fiscal year-end prior to the announcement date, unless otherwise indicated. Debt ratio is total debt divided by total assets. Proportion of intangibles is intangible assets divided by total assets. Stock return volatility denotes the standard deviation of the daily stock returns estimated over the window (-240, -40) relative to the announcement date. Profitability is earnings before interest and taxes divided by total assets. Stock price runup is the cumulative stock return realized over the window (-75,-1) relative to the announcement date. Slack denotes the sum of cash and marketable securities divided by total assets. Issue size/market value of equity is the issue size divided by the market value of common equity measured one week prior to the announcement date. Market to book ratio is (total assets + market value of common equity measured one week prior to the announcement date - the book value of common equity)/total assets. Growth in total sales is (total sales at fiscal year-end immediately after the issue date - total sales at fiscal year-end immediately prior to the issue date) /total sales at fiscal year-end immediately prior to the issue date. Firm size is the natural logarithm of total assets. Eurobond dummy is equal to one for Eurobond offerings, and equal to zero for non-Eurobond (i.e., domestic or foreign) offerings. Maturity denotes the initial maturity of the offering. Conversion premium is the conversion price divided by the stock price measured one week prior to the announcement date. Post-conversion equity dilution is the number of shares issued assuming full conversion of the convertibles divided by (1) the total number of shares outstanding at fiscal year-end before the offering announcement and (2) the number of shares issued assuming full conversion. Aggregate convertible debt volume is a three-month moving average of real convertible debt issue volume, centered round the issue month. The regression is estimated using weighted least squares, where the weight is the standard deviation of the market model residuals. 'G', 'B&K', and 'S' denote the models of Green (1984), Brennan and Kraus (1987) and Stein (1992), respectively.

Independent variable	Parameter estimate (t-statistic)	Expected sign (model)
Intercept	0.070* (1.86)	
Firm-specific variables		
Debt ratio	0.003 (0.18)	+ (G, B&K, S)
Proportion of intangibles	-0.056*** (-3.27)	+ (G, B&K, S)
Stock return volatility	-0.958*** (-3.16)	+ (G, B&K, S)
Profitability	0.043 (1.38)	- (G, B&K, S)
Stock price runup	-0.030*** (-3.13)	+ (S)
Slack	-0.028 (-1.19)	+ (S)
Issue size/market value of equity	-0.006 (-0.23)	+ (S)
Market to book ratio	0.003*** (3.36)	- (G)/ + (B&K, S)
Growth in total sales	0.002*** (3.33)	- (G)/ + (B&K, S)
Firm size	-0.002 (-1.52)	- (B&K, S)
Security design variables		
Eurobond dummy	-0.002 (-0.35)	- (G, B&K)
Maturity	0.001 (2.19)**	+ (G, B&K)
Conversion premium	-0.007 (-0.57)	+ (B&K)
Post-conversion equity dilution	-0.041 (-3.61)***	- (B&K)
Convertible debt market condition		
Aggregate convertible debt volume	-0.000* (-1.73)	+ (G, B&K, S)
Adjusted R^2	157	
N	36.75%	

* Significant at the 0.10 level
** Significant at the 0.05 level
*** Significant at the 0.01 level

Table XI

Contingency Table Analysis of Association between Convertible Debt Security Design and Convertible Debt Market Condition

Hot offerings are convertibles issued during hot markets, i.e. at least three contiguous months where the aggregate real convertible debt issue volume exceeds the upper quartile of a three-month moving average of aggregate real convertible debt issue volume. All other convertibles are labeled 'non-hot'. 'Debt-like' convertibles have a risk-neutral conversion probability lower than the sample average of 32.44%; 'equity-like' convertibles have a risk-neutral conversion probability higher than or equal to the sample average of 32.44%. N is the number of convertibles in each cell. Deviation is the difference between the actual cell frequency (= N) and the cell frequency that would be expected if there were no relation between the convertible debt market condition and the risk-neutral conversion probability. % Total denotes the number of offerings in each cell relative to the total number of offerings for which all the necessary information is available (i.e. 209). % Row and % Column denote the number of offerings in each cell relative to the total number of offerings in the row and column, respectively. The χ^2 statistic tests the null hypotheses that there is no relation between the convertible debt market condition and the degree of equity-likeness.

Security design	Convertible debt market condition		
	Hot	Non-hot	Total
Debt-like	N = 70 Deviation: 16.48 % Total = 33.49 % Row = 58.82 % Column = 74.47	N = 49 Deviation: -16.48 % Total = 23.44 % Row = 41.18 % Column = 42.61	119
Equity-like	N = 24 Deviation: -16.48 % Total =11.48 % Row = 26.67 % Column = 25.53	N = 66 Deviation: 16.48 % Total = 31.58 % Row = 73.33 % Column = 57.39	90
Total	94	115	209
χ^2 statistic: 21.41***			

* Significant at the 0.10 level
** Significant at the 0.05 level
*** Significant at the 0.01 level

Table XII

Parameter Estimates of Split-Sample Regressions of the Abnormal Stock Returns Realized at Convertible Debt Offering Announcements: Debt-Like versus Equity-Like Convertibles

'Debt-like' convertibles have a risk-neutral conversion probability lower than the sample average of 32.44%; 'equity-like' convertibles have a risk-neutral conversion probability higher than or equal to the sample average of 32.44%. The dependent variable is the abnormal stock return realized on the convertible debt announcement date. All firm-specific independent variables are measured at fiscal year-end prior to the announcement date, unless otherwise indicated. Debt ratio is total debt divided by total assets. Proportion of intangibles is intangible assets divided by total assets. Stock return volatility denotes the standard deviation of the daily stock returns estimated over the window (-240, -40) relative to the announcement date. Profitability is earnings before interest and taxes divided by total assets. Stock price runup is the cumulative stock return realized over the window (-75,-1) relative to the announcement date. Slack denotes the sum of cash and marketable securities divided by total assets. Issue size/market value of equity is issue size divided by the market value of common equity measured one week prior to the announcement date. Market to book ratio is (total assets + market value of common equity measured one week prior to the announcement date - book value of common equity)/total assets. Growth in total sales is (total sales at fiscal year-end immediately after the issue date - total sales at fiscal year-end immediately prior to the issue date)/total sales at fiscal year-end immediately prior to the issue date. Firm size is the natural logarithm of total assets. Aggregate convertible debt volume is a three-month moving average of real convertible debt issue volume, centered round the issue month. Regressions are estimated using weighted least squares, where the weight is the standard deviation of the market model residuals. t-statistics are inserted in parentheses.

Independent variable	Debt-like convertibles	Equity-like convertibles
Intercept	0.102*	-0.006
	(1.77)	(-0.14)
Firm-specific proxies for debt-related costs		
Debt ratio	-0.001	0.087***
	(-0.05)	(4.79)
Proportion of intangibles	-0.079***	-0.048***
	(-3.40)	(-2.68)
Stock return volatility	-0.781*	-1.236***
	(-1.80)	(-2.77)
Profitability	0.069*	0.061
	(1.75)	(1.65)
Firm-specific proxies for equity-related costs		
Stock price runup	-0.028**	-0.010
	(-2.04)	(-0.99)
Slack	-0.038	0.064*
	(-1.16)	(1.95)
Issue size/market value of equity	-0.051	0.028
	(-1.14)	(1.40)
Firm-specific control variables		
Market to book ratio	0.002	0.003***
	(1.00)	(2.89)
Growth in total sales	0.003***	0.003
	(2.77)	(1.04)
Firm size	-0.004	-0.001
	(-1.54)	(-0.32)
Convertible debt market condition		
Aggregate convertible debt volume	-0.000	-0.000*
	(-1.57)	(-1.70)
Adjusted R^2	29.20%	37.94%
N	105	84

* Significant at the 0.10 level
** Significant at the 0.05 level
*** Significant at the 0.01 level

Table XIII

Parameter Estimates of Split-Sample Regressions of the Abnormal Stock Returns Realized at Convertible Debt Offering Announcements: Hot versus Non-Hot Market Convertibles

Hot market offerings are convertibles issued during hot markets, i.e. at least three contiguous months where the aggregate real convertible debt issue volume exceeds the upper quartile of a three-month moving average of aggregate real convertible debt issue volume. All other convertibles are labeled 'non-hot'. The dependent variable is the abnormal stock return realized on the convertible debt announcement date. All firm-specific independent variables are measured at fiscal year-end prior to the announcement date, unless otherwise indicated. Debt ratio is total debt divided by total assets. Proportion of intangibles is intangible assets divided by total assets. Stock return volatility denotes the standard deviation of the daily stock returns estimated over the window (-240, -40) relative to the announcement date. Profitability is earnings before interest and taxes divided by total assets. Stock price runup is the cumulative stock return realized over the window (-75,-1) relative to the announcement date. Slack denotes the sum of cash and marketable securities divided by total assets. Issue size/market value of equity is the issue size divided by the market value of common equity measured one week prior to the announcement date. Market to book ratio is (total assets + market value of common equity measured one week prior to the announcement date - book value of common equity)/total assets. Growth in total sales is (total sales at fiscal year-end immediately after the issue date - total sales at fiscal year-end immediately prior to the issue date)/total sales at fiscal year-end immediately prior to the issue date. Firm size is the natural logarithm of total assets. Eurobond dummy is equal to one for Eurobond offerings, and equal to zero for non-Eurobond (i.e., domestic or foreign) offerings. Maturity denotes the initial maturity of the offering. Conversion premium is the conversion price divided by the stock price measured one week prior to the announcement date. Post-conversion equity dilution is the number of shares issued assuming full conversion of the convertibles divided by (1) the total number of shares outstanding at fiscal year-end before the offering announcement and (2) the number of shares issued assuming full conversion. Regressions are estimated using weighted least squares, where the weight is the standard deviation of the market model residuals. t-statistics are inserted in parentheses.

Independent variable	Hot market convertibles	Non-hot market convertibles
Intercept	0.149** (2.13)	0.034 (0.78)
Firm-specific proxies for debt-related costs		
Debt ratio	-0.014 (-0.41)	0.001 (0.61)
Proportion of intangibles	0.006*** (3.55)	-0.048** (-2.04)
Stock return volatility	-1.359** (-2.40)	-1.079*** (-3.18)
Profitability	-0.056 (-1.20)	-0.004 (-0.18)
Firm-specific proxies for equity-related costs		
Stock price runup	-0.030** (-2.15)	-0.006 (-0.40)
Slack	-0.076** (-2.04)	-0.000 (-0.00)
Issue size/market value of equity	-0.048 (-0.46)	0.026 (1.10)
Firm-specific control variables		
Market to book ratio	0.006*** (3.55)	0.001 (0.61)
Growth in total sales	-0.006 (-1.20)	0.003*** (3.84)
Firm size	-0.004 (-1.42)	-0.002 (-0.98)
Security design variables		
Eurobond dummy	-0.006 (-0.57)	-0.004 (-0.56)
Maturity	0.003 (1.45)	0.001*** (2.50)
Conversion premium	-0.031 (-1.50)	0.005 (0.28)
Post-conversion equity dilution	-0.050** (-2.16)	-0.023 (-1.65)
Adjusted R^2	20.18%	65.62%
N	79	78

* Significant at the 0.10 level
** Significant at the 0.05 level
*** Significant at the 0.01 level