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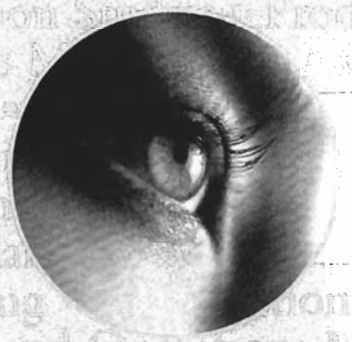

RESEARCH REPORT

ARE EUROPEAN CONVERTIBLES MORE DEBT-LIKE THAN THE US ISSUES? AN EMPIRICAL ANALYSIS

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OR 0438

Are European Convertibles More Debt-Like than the US Issues? An Empirical Analysis

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Abstract English
The popular financial press often suggests that convertible debt issued by European firms is more debt-like in nature than convertible debt issued by US firms. This paper is the first to formally test the validity of this common perception. Our evidence indicates that European convertibles are effectively structured to be more debt-like than US convertibles. We also show that European convertible debt announcements induce less negative stockholder reactions than US announcements, which is consistent with the larger debt component of the former securities. Lastly, we explore some potential explanations for the relatively more debt-like design of European convertibles. Our results indicate that this finding may be attributable to both issuer-related and institutional differences across European and US convertible debt markets.

Abstract Nederlands
In de financiële pers wordt vaak gesuggereerd dat converteerbare obligaties uitgegeven door Europese bedrijven een grotere schuldcomponent hebben dan converteerbare obligaties uitgegeven door Amerikaanse bedrijven. In deze paper testen we de geldigheid van deze populaire opvatting door de kenmerken van een steekproef van Europese en Amerikaanse converteerbare obligaties te vergelijken. We vinden dat Europese converteerbare obligaties inderdaad een grotere schuldcomponent hebben dan hun Amerikaanse tegenhangers. Daarenboven tonen we aan dat de aandelenkoersen van Europese emittenten minder negatief reageren op de aankondiging van de converteerbare uitgifte. Deze bevinding is consistent met de grotere schuldcomponent vervat in Europese convertibles. Tot slot onderzoeken we enkele mogelijke verklaringen voor de verschillende structuur van Europese en Amerikaanse converteerbare obligaties. Onze resultaten geven aan dat de grotere schuldcomponent van Europese convertibles zowel door ondernemingsgerelateerde als door institutionele verschillen tussen de Europese en de Amerikaanse markt voor converteerbare obligaties kan verklaard worden.

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I. INTRODUCTION

Convertible bonds are debt securities that offer the holder the option to convert the bonds into equity of the issuing firm. They thus combine the downside protection of a bond with some of the upside potential of a stock.

Over the past decades, a substantial literature has developed examining the stock price effects of convertible debt announcements. Most studies find that convertibles induce negative announcement effects intermediate between the announcement effects traditionally reported for straight debt and pure equity. This is consistent with the hybrid debt-equity nature of convertible debt. Nevertheless, it is remarkable that European studies on convertible debt generally detect less negative announcement effects than US-based studies. For example, whereas Dann and Mikkelson (1984), Billingsley, Lamy and Smith (1990) and Nanda and Yun (1996) all find a significant negative announcement effect in the order of –2% for their samples of US convertibles, Abhyankar and Dunning (1999) report an abnormal stock price reaction of only -1.2% for their sample of UK convertibles, and Burcalu (2000) detects an announcement effect of only –0.22% for his sample of French convertibles. De Roon and Veld (1998) even report a (non-significant) positive announcement return of 0.16% for their sample of Dutch convertible debt offerings.

The popular financial press offers a potential explanation for this divergence in the event study results obtained by European and US studies, being that convertibles issued by European firms tend to be more debt-like in nature than convertibles issued by US firms. For example, in the article '2001 ways to use convertibles' published in *Corporate Finance* (February 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.'*

Since the pecking-order model of Myers and Majluf (1984) predicts that relatively more debt-like securities should be accompanied by less negative announcement returns, this might explain why European convertibles are generally found to induce less unfavorable stockholder reactions than US convertibles. However, surprisingly, the validity of the common perception that European convertibles have a larger debt component than US convertibles has never been formally examined thus far.

Our paper provides an answer to this gap in the empirical finance literature by conducting an in-depth analysis of the differences between European and US convertibles. First, we investigate the security design differences across European and US convertible debt issues. Our evidence confirms that European convertible debt is effectively structured to be more debt-like than US convertible debt. In a next step, we examine the differences in the stockholder reactions to European and US convertible debt announcements. In line with the existing empirical evidence outlined above, we find that European convertible debt announcements induce a significantly less negative abnormal stock price effect than US convertible debt announcements.

Subsequently, we explore several potential explanations for the different security design of European and US convertibles. Since European convertibles have a larger debt component than US convertibles, we argue that European convertible debt issuers should have smaller debt-related costs than their US-based counterparts. Our results support this hypothesis. In addition, we find that the relatively more debt-like nature of European convertibles may also partly be driven by non-firm-related (i.e., demand-side or regulatory) differences between the European and the US markets.

In the popular financial literature, it is often claimed that the differences between the European and US convertible debt markets should gradually diminish over time, because the European convertible debt market is evolving towards the US convertible debt market. For example, in the article 'Changing the face of equity-linked issuance' published in *Corporate Finance* (August 2000), we read:

> *'(...) the European convertibles market is shifting towards one which looks much more like the US, which is dominated by smaller technology-oriented companies and far less populated than Europe with top-rated blue chips. (...) Bankers believe that Europe's convertibles market is already developing in line with the US template.'*

In contrast with this statement however, we find that most of the differences in the European and US convertible debt (issuer) characteristics uncovered by our study are persistent (and sometimes even increasing) over our research window 1990-2002.
The remainder of this article is organized as follows. The next section describes our sample selection procedure. Section III discusses the security design differences across European and US convertible debt. Section IV compares the stockholder reactions induced by the announcements of European and US convertibles. Section V presents our analysis of firm-related and institutional differences across the European and the US convertible debt market. Section VI concludes the paper.

II. SAMPLE SELECTION PROCEDURE

The sample of European convertible debt issues used in this study was constructed by retrieving a list of all convertible debt offerings made by Western European companies during the period 1990-2002 from Bloomberg Thomson Financial. We thus obtained an initial dataset of 524 observations. Subsequently, we applied the following criteria to select offerings for inclusion in our final sample:

- The offering must be made by an industrial company (exclude financial companies and regulated public utilities) headquartered in Western Europe (exclude subsidiaries of non-Western European firms);
- The offering must be convertible in the issuing firm's stock (exclude exchangeables);
- Security design data must be available on Bloomberg;
- The offering announcement date must be available on Bloomberg, and should not include other confounding corporate event announcements (e.g., announcements of dividend payments or other security offerings);[1]
- The issuing firm's daily stock price data for the full calendar year preceding the announcement date must be available on Datastream;
- The issuing firm's accounting data for the fiscal year-end immediately prior to the announcement date must be available on Datastream.

The final Western European convertible debt sample contains 222 offerings made by 168 different firms.[2]
The sample of US convertibles was constructed in the same manner. Our initial US convertible debt dataset consisted of a list of 1.092 convertibles retrieved from Bloomberg. After applying analogous selection criteria as the ones outlined above, we obtained a final sample of 670 offerings made by 486 different US-based firms.

Table 1 presents the number of European and US convertible debt offerings sorted by issue year. We see that the temporal dispersion of our two convertible debt samples is largely similar. More particularly, both in the European and in the US sample, there is a clustering of offerings towards the end of the research period: approximately 50% of the sample issues are made during the window 1999-2002.

<<Insert Table 1 about here>>

III. DIFFERENCES IN SECURITY DESIGN CHARACTERISTICS ACROSS EUROPEAN AND US CONVERTIBLES

A. Measurement

In this section, we test whether European convertible debt offerings have a larger debt component than US convertibles (as is often suggested in the popular financial press). When firms issue convertibles, they can decide how debt-like or equity-like the convertible debt will be by specifying several security design parameters, such as the conversion premium, the convertible debt maturity, the level of post-conversion equity dilution and callability. Ceteris paribus, convertibles with a high conversion premium are more debt-like in nature, since they have a small probability of ever being converted into equity. Conversely, convertibles with a long maturity are more equity-like in nature, because they have a higher likelihood of becoming in the money over their lifetime (and hence, a higher conversion probability). The level of post-conversion equity dilution (calculated as the number of new shares issued upon conversion divided by the number of new shares plus the number of old shares outstanding at fiscal-year end before the announcement date) is also positively related to the equity component embedded in the convertibles. Lastly, callable convertibles are more equity-like in nature than their non-callable counterparts. The reason is that, by calling its outstanding convertible debt, the issuing firm can force the convertible bondholders to convert their bonds into equity before maturity.[3] Hence, callable convertibles will be converted into equity in more states of the world than non-callable convertibles (Nyborg (1995)).[4]

All of these security design measures however have the disadvantage that they only capture one specific aspect of the convertible debt design. Therefore, we also include a more comprehensive convertible debt design measure in our analysis, being the convertible debt delta (also used by Burcalu (2000)). The delta measures the sensitivity of the convertible bond value to its underlying common stock value. It simultaneously takes into account the convertible debt maturity and the conversion premium (and hence also the level of post-conversion equity dilution, since this variable is inversely related to the conversion premium), thereby providing a more complete picture of the convertible debt design than the individual security features outlined above. More particularly, under the standard Black and Scholes (1973) assumptions, the delta can be represented by the following formula:

$$\Delta = e^{-\delta T} N(d_1) = e^{-\delta T} N\left\{ \frac{\ln(\frac{S}{X}) + (r - \delta + \frac{\sigma^2}{2})T}{\sigma\sqrt{T}} \right\} \qquad (1)$$

With δ: Continuously compounded dividend yield for the fiscal year-end immediately preceding the announcement date;
T: Initial convertible debt maturity (expressed in years);
$N(.)$: Cumulative probability under a standard normal distribution function;
S: Price of the underlying stock 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);
X: Conversion price;
r: For the European convertibles: the continuously compounded yield on a 5-year German Treasury Bond (measured on the announcement date); for the US convertibles: the continuously compounded yield on a 10-year US Treasury Bond (measured on the announcement date);[5]
σ: Stock return volatility per annum, estimated from the continuously compounded equity return measured over the period 240 to 40 trading days prior to the announcement date.

A high delta (approaching 1) means that the convertible bond is very sensitive to its underlying common stock and subsequently has a large equity component. Inversely, a low delta value indicates that the convertible is structured to be highly debt-like in nature.
To assess the statistical significance of the differences between the continuous security design measures across the European and the US sample, we use a parametric two-sample t-test and a non-parametric two-sample Wilcoxon test. The continuous security design characteristics are all winsorized at the 99th and the 1st percentile, in order to reduce the influence of potential outliers.[6] To determine the statistical significance of the difference in the proportion of callable convertibles across the European and the US sample in turn, we use a χ^2-test statistic (i.e., the outcome of a contingency table analysis).

B. Findings

Table 2 presents our univariate test results on the security design characteristics of European versus US convertibles. In Panel A, we report full-sample test results. In Panels B and C, we provide separate test results for convertibles issued in the window 1990-1998 and for convertibles issued in the window 1999-2002, respectively. By means of this split-sample analysis, we want to examine whether the differences between European and US convertibles tend to become smaller over time (as is often claimed in the popular financial press).[7]

<<Insert Table 2 about here>>

Our full-sample results presented in Panel A provide strong support for the common belief that European convertibles are more debt-like in nature than US convertibles. More specifically, we see that the maturity, the level of post-conversion equity dilution, the proportion of callable offerings and the delta (i.e., our main equity component measure) are all significantly smaller for European convertibles than for US convertibles. Our only finding that is inconsistent with the popular claim that European convertibles have a larger

debt component than US convertibles is that the conversion premium for European convertibles is significantly smaller than the conversion premium for US convertibles. Further in the paper, we will provide a possible explanation for this last result.
A comparison of the split-sample test results reported in Panels B and C reveals that the differences in the security design characteristics of European and US convertibles remain stable over time. It should however be noted that both European and US convertibles tend to become substantially more equity-like over the last part of our research window. More specifically, the average delta of the European convertibles increases from 0.58 in the first subperiod to 0.66 in the second subperiod (t-statistic for difference in the average delta values across the two subperiods equals 6.83, p-value < 0.0001), and the average delta of the US convertibles rises from 0.79 in the first subperiod to 0.85 in the second subperiod (t-statistic for difference in the average delta values across the two subperiods equals 3.92, p-value = 0.0001).

IV. DIFFERENCES IN STOCKHOLDER REACTIONS TO EUROPEAN AND US CONVERTIBLE DEBT ANNOUNCEMENTS

A. Testable hypothesis

Myers and Majluf (1984) argue that, in an environment with asymmetric information about firm value, stockholders will interpret risky security offerings as a signal that the issuing firm is overvalued. As a consequence, all risky security offering announcements are predicted to have a negative influence on the issuing firm's stock price. Nevertheless, the announcement effect associated with relatively more debt-like securities should be less negative than the announcement effect associated with relatively more equity-like securities. The reason is that the payoffs of debt-like securities are less sensitive to firm value, so that these offerings are less likely to be inspired by opportunistic issuer motivations (i.e., taking advantage of a temporary firm overvaluation).
Since the previous section revealed that European convertibles have a larger debt component than US convertibles, we thus expect the former securities to induce less negative stockholder reactions than the latter securities.

B. Measurement

To determine the abnormal stock returns at the announcements of European and US convertibles, we use standard event study methodology as described in Dodd and Warner (1983). Our proxy for the market index is the Datastream benchmark index for the country of domicile of the issuing company. The Datastream benchmark indices are value-weighted market indices calculated analogously for all countries, which makes them very suitable for a cross-country analysis like ours. Our results remain however virtually similar when we use other market index proxies (e.g., market indices provided by the specific stock markets on which our sample firms are listed; a pan-European Datastream benchmark index instead of different Datastream benchmark indices for each of our Western European sample countries; etc.).[8]
According to Mikkelson and Partch (1986), event studies that exclusively rely on a pre- or a post-event estimation window might yield biased test results. Therefore, in line with Dann and Mikkelson (1984) and Lewis, Rogalski and Seward (2003), we estimate the market

model regressions over the combined pre- and post-event estimation windows (-200,-61) and (61,200). Our test results are however insensitive to the use of alternative estimation windows (e.g., the pre-event window (-200,-61)).[9]
For assessing the statistical significance of the abnormal return estimates *within* the European and the US convertible debt sample, we use a Patell (1976) Z-test. Since daily abnormal returns are reported to be highly non-normal in nature (Campbell, Lo and MacKinlay (1997)), we cross-check the conclusions obtained by this parametric test by means of a non-parametric Wilcoxon signed-rank test. For determining the abnormal return differences *across* the European and US convertible debt sample in turn, we use a parametric two-sample t-test and a non-parametric two-sample Wilcoxon test.

C. Findings

Table 3 provides an overview of the cumulative abnormal stock returns computed over several windows surrounding the convertible debt announcement date (= day 0).

<<Insert Table 3 about here>>

Our full-sample analysis reported in Panel A indicates that both European and US convertible debt announcements induce a significant negative abnormal stock return. However, the announcement effect associated with European convertibles is significantly less negative in windows (-1,0) and (0) than the announcement effect associated with US convertibles. This finding is in line with our testable hypothesis, as well as with findings reported by previous European and US-based studies (cf. supra).
Our event study analysis also reveals that both European and US convertible debt announcements are preceded by a significant positive abnormal stock runup. Nevertheless, the stock runup prior to European convertible debt announcements is significantly smaller than the stock runup prior to US convertible debt announcements (i.e., 2.86% versus 14.29% on average). Over the post-announcement window (2,60), we detect no abnormal stock price behavior in either of our two convertible debt samples.
In Panels B and C, we report split-sample abnormal return estimates for convertibles issued prior to 1999 and for convertibles issued from 1999 onwards. Our evidence indicates that the difference between the day-0 announcement effects of European and US convertibles decreases over time. In particular, whereas the difference in the day-0 abnormal returns is significant at less than 5% during the period 1990-1998 (Panel B), it is no longer significant during the window 1999-2002 (Panel C). The difference between the abnormal returns measured over the two-day event window (-1,0) however remains significant during our four last sample years.
It is worth noting that the announcement effects associated with both European and US convertible debt offerings become considerably more negative towards the end of our research window. More specifically, the day-0 abnormal returns for the European (US) sample drop from –0.49% (-1.14%) on average over the window 1990-1998 to –2.21% (-2.69%) on average over the window 1999-2002 (t-statistic for difference in the day-0 announcement returns across the two subperiods equals 3.85 for the European sample (p-value = 0.0002) and equals 4.13 for the US sample (p-value < 0.0001)). This is consistent with our earlier finding (cf. previous section) that both European and US convertible debt issues tend to become significantly more equity-like over time.

V. POTENTIAL EXPLANATIONS FOR THE DIFFERENT SECURITY DESIGN OF EUROPEAN AND US CONVERTIBLES

In Section III, we showed that European convertibles tend to have a larger debt component than US convertibles. In this section, we explore some potential, non-mutually exclusive explanations for this finding. First, we analyze the differences in the issuer characteristics across our European and US convertible debt sample. Afterwards, we examine whether the difference in the equity component size of European and US convertibles could be attributable to different institutional features of the European and the US convertible debt markets.

A. Differences in issuer characteristics across the European and the US convertible debt markets

1. Sectoral dispersion

In Table 4, we present the number (percentage) of European and US convertible debt issuers sorted per sector. The sector classification is based upon the FTSE World Actuaries sector codes (retrieved from Datastream). The top five sectors of the European and the US convertible debt issuer universe are printed in italic, with the sector's position added in parentheses.

<<Insert Table 4 about here>>

Table 4 reveals that convertible debt issuance is not confined to a specific industry sector: almost all FTSE sector codes are represented, both in the European and in the US sample. Nevertheless, there seems to be some industry clustering, especially in the I/T sector. More particularly, the sectors 'I/T hardware' and 'Software and computer services' account for 16.86% of the European convertible debt issuers and for 28.60% of the US convertible debt issuers.

The overlap between the top five sectors of our European and US sample is very limited (i.e., only with respect to the two I/T-related sectors). In the European sample, there is a larger representation of companies from Old Economy sectors such as 'Construction and building materials' (8.72% of the European issuers versus 1.44% of the US issuers) and 'Food producers and processors' (6.40% of the European issuers versus 1.44% of the US issuers). To the extent that Old Economy firms have a larger debt capacity than New Economy firms (as documented e.g. by Houben and Kakes (2002)), this could explain why European convertibles tend to have a larger debt component than their US-based counterparts.

In the popular financial press, it is often stated that the European convertible debt issuer universe is moving towards one that is looking more like the US, i.e. towards more technology-oriented firms (cf. quote provided in the introduction). In order to check whether this is effectively the case, we calculated the evolution in the relative importance of each sector from the period 1990-1998 to the period 1999-2002. Our results are represented in the 'Evolution' columns of Table 4.

On the whole, we can conclude from these columns that there are no drastic shifts in the sectoral dispersion of our sample firms: the recorded percentage changes are mostly very small. For the European sample, we see that there effectively is an increase in the relative importance of technology-oriented sectors such as 'Software and computer services', 'Telecommunication services' and 'Media and entertainment', and this at the expense of more traditional sectors such as 'Forestry and paper' and 'Transport'. However, in the US sample, we observe a similar trend. More specifically, the relative importance of technology-driven industries such as 'Pharmaceuticals and biotech' and 'I/T hardware' sharply increases, whereas Old Economy sectors such as 'Household goods and textiles' lose weight. Hence, we can conclude that there is no convergence between the European and the US convertible debt market with respect to the sectoral dispersion of the issuing firms, as both markets seem to be moving in the same direction.

2. Debt-related financing costs

Measurement

In this paragraph, we analyze the differences in firm-specific debt financing costs across European and US convertible debt issuers. Since convertibles issued by European firms tend to have a larger debt component than convertibles issued by US firms, we expect the former firms to have smaller debt-related costs than the latter.

The literature distinguishes three kinds of debt-related financing costs, i.e. financial distress costs, adverse selection costs and moral hazard costs. Financial distress costs arise when a firm is close to bankruptcy due to an excessive debt level. They consist of trustee fees, legal fees and other costs of reorganization or bankruptcy (Copeland and Weston (1992)). Debt-related adverse selection costs are present when there is asymmetric information about the current and future risk of the issuing firm. As a result of this risk uncertainty, new debtholders will require an additional lemon's premium over the interest rate that they would normally ask if there was perfect information (Brennan and Schwartz (1988)). Debt-related moral hazard costs in turn arise because debt contracts may give stockholders an incentive to invest suboptimally. More specifically, debt may either induce stockholders to overinvest in projects with a negative NPV (i.e., the asset substitution problem described by Jensen and Meckling (1976)) or to underinvest in projects with a positive NPV (i.e., the debt overhang problem described by Myers (1977)). Provided that debtholders correctly anticipate these harmful investment incentives, stockholders will have to bear the debt-related moral hazard costs in the form of a higher risk premium on the corporate debt.

In our empirical tests, we use the following proxy variables for capturing the debt-related problems described above. All accounting numbers are measured at fiscal year-end preceding the convertible issue. First, in line with Mayers (1998) and Lewis et al. (1999), we include the leverage ratio, calculated as the ratio of long term debt to total assets. Firms with a high leverage ratio are hypothesized to have a high probability of financial distress, and thus a large cost of attracting new debt capital. Our second debt cost proxy (also used by Marsh (1982) and Lewis et al. (2003)) is the daily stock return volatility, measured over the window (-240,-40) relative to the convertible debt announcement date. Firms with volatile stock returns tend to have a high operational and financial risk, and thus a high likelihood of financial distress. Moreover, for these firms, there is a large degree of uncertainty about firm risk, resulting in high adverse selection costs (Brennan and Schwartz (1988)). As a last debt cost measure, we include the ratio of fixed assets to total assets (also used by MacKie-Mason (1990)). According to Myers (1977), debt-related over- and

underinvestment problems should be less severe when firm value depends heavily on committed assets in place, thus leaving less room for discretionary managerial investment decisions. Hence, the fixed assets ratio serves as an (inverse) proxy for the level of debt-related moral hazard costs associated with our sample firms.

Findings

In Table 5, we report our univariate test results on the differences in the debt-related costs associated with European and US convertible debt issuers.

<<Insert Table 5 about here>>

Panel A reveals that our European sample firms have a significantly smaller leverage ratio and stock return volatility and a significantly higher proportion of fixed assets than our US sample firms. We thus obtain strong support for our hypothesis that European convertible debt issuers should have smaller debt-related costs than US convertible debt issuers.
It should be noted that, according to the signaling model of Brennan and Kraus (1987), the conversion premium is positively related to the stock return volatility of the issuing firm. Hence, our earlier finding that US convertibles tend to have a significantly higher conversion premium (cf. Section III) could be explained by the fact that US issuers have a significantly higher stock return volatility than their European counterparts.[10]
In Panels B and C, we provide split-sample univariate test results for convertibles issued before 1999 and for convertibles issued from 1999 onwards. We see that both European and US convertible debt issuers tend to have higher debt-related costs during the last four sample years (changes in all debt-related cost proxies for the European sample are significant at less than 1%, and changes in the stock return volatility and the fixed assets ratio for the US sample are significant at less than 1%).[11] This could explain our earlier finding that both European and US convertible debt offerings become significantly more equity-like towards the end of our sample period (cf. Section III). The debt-related costs of the European convertible debt issuers however increase more strongly than the debt-related costs of the US convertible debt issuers, so that the differences between the debt-related costs associated with European and US issuers decrease over time. In particular, whereas the differences between the leverage ratios and the fixed assets ratios of European and US issuers are statistically significant over the window 1990-1998 (Panel B), they are no longer significant over the window 1999-2002 (Panel C).
It should be recalled that, unlike the differences in the debt cost proxies, the difference in the equity component size of European and US convertibles does not diminish over time (cf. Section III). We can thus conclude that the different security design of European and US convertible debt cannot solely be attributable to differences in debt-related financing costs across European and US issuers.

3. Equity-related financing costs

Measurement

Another plausible explanation for the relatively more debt-like structure of European convertibles is that European convertible debt issuers face higher equity-related adverse

selection costs than US convertible debt issuers. As noted above, equity-related adverse selection costs arise from the fact that, in an environment with asymmetric information about firm value, stockholders automatically infer from an equity(-linked) security offering that the firm is overvalued. As a result, firm value drops at the announcement of equity(-linked) security issues (Myers and Majluf (1984)). The higher the perceived level of firm overvaluation, the more severe this equity-related adverse selection problem.

In order to test the hypothesis that European convertible debt issuers have higher equity-related financing costs than US convertible debt issuers, we use the following proxy variables. Again, all accounting numbers are measured at fiscal year-end preceding the convertible issue. First, we include the amount of slack capital, calculated as the ratio of cash plus marketable securities divided by total assets. When a firm with sufficient slack capital issues risky securities, stockholders are more likely to infer that this firm is overvalued, since undervalued firms would rather resort to internal slack financing (according to the pecking order theory of Myers and Majluf (1984)). Therefore, firms with a large amount of slack capital are expected to incur high equity-related adverse selection costs (de Jong and Veld (2001)). As a second equity cost proxy, we use the raw pre-announcement stock price runup, measured over the window (-75,-1) relative to the announcement date. Stockholders may interpret a large pre-announcement stock runup as a signal of opportunistic timing behavior, which again results in high equity-related financing costs (Lucas and McDonald (1990)).

On the other hand, Choe, Masulis and Nanda (1993) argue that the equity-related adverse selection problem should be less severe for offerings announced after a high stock market runup, since information asymmetries for the economy as a whole tend to be smaller during market expansions. We therefore use the pre-announcement market runup (calculated as the return on the Datastream benchmark index for the issuing firm's country of domicile, realized over the window (-75,-1) relative to the announcement date) as a third (inverse) proxy for the level of equity financing costs faced by our sample firms. Our last equity cost measure is the relative issue size, calculated as the issue size divided by the market value of equity. According to the model of Krasker (1986) (i.e., a generalization of the Myers and Majluf (1984) model), this variable should be a direct measure for the level of equity-related adverse selection costs incurred by the issuing firm. All of the equity-related cost proxies included in our study are widely used in the literature (see e.g. de Jong and Veld (2001) and Lewis et al. (2003)).

Findings

Table 6 presents our univariate test results on the differences in equity-related financing costs across European and US convertible debt issuing firms.

<<Insert Table 6 about here>>

Panel A of the table indicates that European convertible debt issuers actually have significantly smaller values on all of our equity-related cost measures, except for the pre-announcement market runup. Hence, we can conclude that the relatively more debt-like design of European convertibles can not be attributed to the fact that European issuers face higher equity financing costs than US issuers.

In Panels B and C, we again report split-sample univariate test results for convertibles issued prior to 1999 and for convertibles issued from 1999 onwards. The panels reveal that

the differences in the equity-related cost measures for European and US issuers are stable over our research window: only the difference in the relative issue sizes becomes insignificant during the window 1999-2002. In contrast with the debt-related cost proxies, there is no general time trend in the values of the equity-related cost proxies. More particularly, both for the European and the US sample firms, some proxy variables (e.g., slack capital) show increasing equity-related costs, whereas other proxy variables (e.g., relative issue size) show decreasing equity-related costs over time.

4. Multivariate analysis

Measurement

In order to test the robustness of our different univariate test results, we also conduct a multivariate logistic regression analysis of the differences in the characteristics of European and US convertible debt issuers. The dependent variable of this regression analysis equals one for convertibles issued by European firms, and equals zero for convertibles issued by US firms. As independent variables, we use all of the debt- and/or equity-related cost proxies discussed above. In addition, we include two control variables that could act as proxies for both debt- and equity-related financing costs. First, we control for the issuing firm's growth opportunities with 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 total assets. Firms with many growth opportunities are more difficult to value, which results in high debt-related financial distress costs and equity-related adverse selection costs (Lewis et al. (2003)). Debt-related over- and underinvestment problems may also be larger for firms with many growth options, because stockholders and bondholders may disagree over the optimal exercise of the options (Barclay and Smith (1995)). Hence, the market to book ratio acts as a proxy for both debt- and equity-related financing costs.
As a second control variable, we include the issuing firm size, measured by the natural logarithm of the book value of total assets (expressed in constant December 2002 dollars by means of the IMF monthly Consumer Price Index for Europe and for the US). Since both debt-related financial distress costs and equity-related adverse selection costs should be smaller for large companies (Krishnaswami and Yaman (2004)), firm size acts as an inverse proxy for the level of external financing costs in general.

Findings

Table 7 reports our logistic regression results. We see that these results largely confirm the findings obtained through the separate univariate tests. The only differences are that the fixed assets/total assets ratio becomes insignificant, whereas the market runup becomes significant. The latter variable is estimated with a positive coefficient, which again indicates that European convertible debt issuers face smaller equity-related costs than US convertible debt issuers. The two control variables have insignificant regression parameters.

<<Insert Table 7 about here>>

On the whole, our analysis of the differences in the characteristics of European and US convertible debt issuers reveals that US convertible debt issuers face both higher debt- and equity-related financing costs than their European counterparts. Hence, the relatively more equity-like design of US convertibles remains an unresolved issue. One plausible explanation for this finding is that the debt-related costs associated with US issuers are so important that these firms mainly structure their convertible debt in order to mitigate these costs, even at the expense of incurring some equity-related adverse selection problems. This interpretation is in line with findings of a recent study of Krishnaswami and Yaman (2004) on the security design determinants of US convertible debt offerings.[12]

B. Institutional differences across the European and the US convertible debt markets

Thus far, our search for an explanation of the security design differences across European and US convertibles has only focused on the supply-side, i.e. on differences in the characteristics of European and US convertible debt issuing firms. The popular financial press however suggests that the European and the US convertible debt markets may also differ with respect to various non-firm-related aspects, e.g. demand-side characteristics, tax and accounting regulations and other institutional features. For example, in the article '2001 ways to use convertibles' published in *Corporate Finance* (February 2001), we read:

> *'Part of the difference (between European and US convertibles) is explained in the mentality of the end-users. In the US (...), the investment banks that deal in the product normally locate their teams on the same floor as the stock guys, and investors generally come from an equity background. All this makes perfect sense in a market where venture capital and investment risk-taking is part and parcel of the culture. Unlike the US, most dedicated convertible funds in Europe operate with a bond fund mentality – complete with longer-term outlooks and conservative targets. European investors prefer stronger, more established credits, and generally look upon the convertibles market as an extension to the bond market, with the focus on debt service and equity coverage.'*

In order to examine whether the different security design of European and US convertibles may be driven by non-firm-related differences between the European and the US convertible debt market, we conduct the following cross-sectional OLS regression analysis. As dependent variable, we include our main equity component measure, i.e. the convertible debt delta. As independent variables, we include all of the firm-specific debt and equity cost measures discussed above, as well as a Europe dummy equal to one for European convertibles, and equal to zero for US convertibles. The regression coefficient of the Europe dummy captures the impact of non-issuer-related differences between the European and US convertible debt market on the convertible debt equity component size.[13]
Table 8 presents our regression results. Since White's test rejects the null hypothesis of no heteroscedasticity, the reported t-statistics are calculated by means of White's heteroscedasticity-corrected standard deviations.

<<Insert Table 8 about here>>

The regression coefficients of the firm-specific variables indicate that debt-related costs are more important convertible debt design determinants than equity-related costs. More specifically, the parameter estimates of the leverage ratio and the stock return volatility are significant and have the predicted positive impact on the convertible debt equity component size. By contrast, none of the equity-related cost proxies are significant.[14] With respect to the control variables, we find that firm size has a significant negative impact on the convertible debt delta.

Our main variable of interest in this regression analysis however is the Europe dummy. This variable is estimated with a highly significant regression parameter. Hence, we obtain strong evidence for our conjecture that the different security design of European and US convertibles may partly be driven by non-issuer-related differences across the European and the US convertible debt markets.

VI. SUMMARY AND CONCLUSION

In the popular financial press, it is often claimed that European convertible debt is more debt-like in nature than US convertible debt. This paper is the first to formally investigate the validity of this common belief. Our findings support that European convertibles effectively have a larger debt component than US convertibles. In a next step of our analysis, we compare the stockholder reactions upon the announcements of European and US convertible debt offerings. We find that European convertibles induce less negative abnormal stock price reactions than US convertibles, which is consistent with the relatively more debt-like structure of the former securities.

Subsequently, we examine some potential explanations for the different security design of European and US convertibles. Our analysis of the differences in the firm characteristics reveals that US issuers have both higher debt- and equity-related financing costs than European issuers. One plausible explanation for the relatively more equity-like nature of US convertibles could then be that the debt-related problems associated with US issuers are much more severe than their equity-related problems. As a result, US firms may design their convertibles mainly in order to reduce debt-related costs, even at the expense of incurring some additional equity-related costs. Nevertheless, our evidence indicates that supply-side differences between the European and US convertible debt markets tell only part of the story. More specifically, we find that the divergence in the equity component size of European and US convertibles is also partly attributable to non-firm-related differences between the European and the US convertible debt markets.

Articles in the popular financial press often suggest that the security- and issuer-related characteristics of European convertibles are gradually shifting towards the security- and issuer-related characteristics of US convertibles, so that the differences between the European and US convertible debt markets should eventually disappear. Our study casts doubt on this conjecture. More specifically, we show that most of the security- and issuer-related dissimilarities between the European and US convertible debt markets tend to remain stable over time. Rather than converging towards each other, the European and US convertible debt markets seem to be moving in the same direction. For example, both European and US convertibles tend to become more equity-like (with, as a consequence, more negative announcement effects), and both the European and the US convertible debt issuer universe tend to become more technology-oriented towards the end of our sample period.

This study is relevant both from an academic and a practitioner's point of view. First, it offers a potential explanation for the divergence in the results obtained by European and

US-based studies on convertible debt. Second, it has important implications for the appropriate treatment of convertible bonds for taxation and financial reporting purposes. More specifically, our results suggest that European convertibles should receive a different (i.e., more debt-like) tax and accounting treatment than US convertibles. Lastly, this study may also be useful for investors that need to decide between adopting European or US convertibles in their portfolios. In particular, our findings indicate that European convertibles are more appropriate for investors with conservative targets, whereas US convertibles are more suitable for investors with a high risk tolerance.

NOTES

1. Confounding announcements were identified by means of the Bloomberg Corporate Actions Calendar, the Financial Times World Press Monitor, the Ebscohost database and the company websites.
2. The countries represented in our Western European convertible debt sample are (ordered by decreasing numbers of convertible debt offerings): France, the UK, the Netherlands, Switzerland, Germany, Sweden, Norway, Finland, Italy, Austria, Belgium, Spain, Denmark and Greece.
3. Of course, this so-called 'forced conversion' will only succeed if the conversion value of the convertibles is higher than the call price. If this is not the case, convertible bondholders will ask for redemption of their bonds (at the call price), thus leaving the issuing firm with an additional debt burden.
4. More specifically, non-callable convertible bonds of non-dividend paying firms will never be converted into equity before maturity. Non-callable convertible bonds of dividend paying firms will only be converted prior to maturity if the after-tax dividend payments on the newly issued stocks exceed the after-tax coupon payments on the convertibles (Asquith and Mullins (1991)).
5. The German interest rate plays a leading role in the European economy, hence our choice for the yield on a German Treasury Bond as a proxy for the European risk-free interest rate. Since the average (median) maturity of our European sample offerings is only 6.71 (5.48) years, a 5-year Treasury Bond rate seems more appropriate than the 10-year Treasury Bond rate used for the US convertible debt sample (which has an average (median) maturity of 10.25 (7.03) years). Our test results are however robust to the use of other proxies for the risk-free interest rate in the delta calculation for the European convertibles, e.g. a US Treasury Bond rate instead of a German Treasury Bond rate, a 10-year rate instead of a 5-year rate, etc. (detailed results of these robustness checks are available upon request).
6. We applied the same winsorization procedure to all of the other continuous variables discussed throughout this paper. All of our findings remain virtually similar when we use unwinsorized data, or when we winsorize our data at the 95^{th} and the 5^{th} percentile (detailed results of these robustness checks are available upon request).
7. We choose 01/01/1999 as cutoff point for our split-sample univariate analyses because, both in the European and the US sample, approximately 50% of the offerings are made after this date (cf. Table 1 supra). Our split-sample univariate test results remain however qualitatively similar when we use other cutoff points (e.g. 01/07/1996, which is exactly halfway our research window). Detailed split-sample univariate test results obtained with alternative cutoff points are available upon request.
8. Event study results obtained by means of alternative market index proxies are available upon request.
9. Event study results obtained through alternative estimation windows are available upon request.
10. It is worth noting that the daily return volatility of the Datastream US market index over the window 1990-2002 (i.e., 1.04% on average) is not significantly different from the daily return volatility of the Datastream Western European market index over the same window (i.e., 0.95% on average). Thus, our finding that US companies have a significantly higher stock return volatility than European companies seems to be uniquely confined to the convertible debt issuer universe (i.e., not to the entire population of US versus European firms).
11. For parsimony, we don't report t-statistics and p-values for the changes in the average value of the debt-related cost proxies between the two subperiods. These statistics are available upon request.
12. More specifically, Krishnaswami and Yaman (2004) examine the impact of debt-related financial distress and moral hazard costs and equity-related adverse selection costs on the equity component size of US convertibles. They find that the structure of convertibles is strongly influenced by financial distress considerations. By contrast, debt-related moral hazard costs and equity-related adverse selection costs have only very limited power for explaining the convertible debt design.
13. Strictly spoken, the Europe dummy captures all the differences between the European and the US convertible debt sample not accounted for by the nine debt- and/or equity-related cost proxies included in the regression analysis. It could thus be that the Europe dummy picks up some firm-related characteristics that are not explicitly measured by these nine proxy variables, thereby introducing a bias in our test results. Unfortunately however, it is impossible to conduct a more direct test of the impact of non-issuer-related aspects on the convertible debt equity component size. In our opinion, the proposed regression analysis is the best way of approximating this impact.
14. Note that this finding is in line with our earlier-formulated intuition that (US) convertible debt issuers mainly design their convertibles in order to mitigate debt-related costs, even at the expense of incurring some extra equity-related costs.

REFERENCES

Abhyankar, A. and 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*, 1043-1065.

Asquith, P. and Mullins, D., 1991, Convertible Debt: Corporate Call Policy and Voluntary Conversion, *Journal of Finance 46*, 1273-89.

Barclay, M. and Smith, C., 1995, The Maturity Structure of Corporate Debt, *Journal of Finance 50*, 609-631.

Billingsley, R., Lamy, R. and Smith, D., 1990, Units of Debt with Warrants: Evidence of the 'Penalty-Free' Issuance of an Equity-Like Security, *Journal of Financial Research 13*, 187-199.

Black, F. and Scholes, M., 1973, The Pricing of Options and Corporate Liabilities, *Journal of Political Economy 81*, 637-659.

Brennan, M. and Kraus, A., 1987, Efficient Financing under Asymmetric Information, *Journal of Finance 42*, 1225-1243.

Brennan, M. and Schwartz, E., 1988, The Case for Convertibles, *Journal of Applied Corporate Finance 1*, 55-64.

Burcalu, R., 2000, New Evidence on the Pecking Order Hypothesis: The Case of French Convertible Bonds, *Journal of Multinational Financial Management 10*, 439-459.

Campbell, J., Lo, A. and MacKinlay, C., 1997, The Econometrics of Financial Markets, (Princeton University Press, Princeton).

Choe, H., Masulis, R. and Nanda, V., 1993, Common Stock Offerings across the Business Cycle: Theory and Evidence, *Journal of Empirical Finance 1*, 3-31.

Copeland, T. and Weston, J., 1992, Financial Theory and Corporate Policy, (Addison-Wesley Publishing Company).

Corporate Finance, August 2000, Changing the Face of Equity-Linked Issuance, 24-27.

Corporate Finance, February 2001, 2001 Ways to Use Convertibles, 24-26.

Dann, L. and Mikkelson, W., 1984, Convertible Debt Issuance, Capital Structure Change and Financing-Related Information, *Journal of Financial Economics 13*, 157-186.

De Jong, A. and Veld, C., 2001, An Empirical Analysis of Incremental Capital Structure Decisions under Managerial Entrenchment, *Journal of Banking and Finance 25*, 1857-1895.

De Roon, F. and 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,* 1481-1506.

Dodd, P. and Warner, J., 1983, On Corporate Governance: A Study of Proxy Contests, *Journal of Financial Economics 11*, 401-438.

Houben, A. and Kakes, J., 2002, ICT Innovations and Economic Performance: the Role of Financial Intermediation, *Kyklos 55*, 543-562.

Jensen, M. and Meckling, W., 1976, Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics 3*, 305-360.

Krasker, W., 1986, Stock Price Movements in Response to Stock Issues under Asymmetric Information, *Journal of Finance 41*, 93-105.

Krishnaswami, S. and Yaman, D., 2004, The Role of Convertible Bonds in Alleviating Contracting Costs, *SSRN Working paper.*

Lewis, C., Rogalski, R. and Seward, J., 1999, Is Convertible Debt a Substitute for Straight Debt or for Common Equity?, *Financial Management 28*, 5-27.

Lewis, C., Rogalski, R. and Seward, J., 2003, Industry Conditions, Growth Opportunities and Market Reactions to Convertible Debt Financing Decisions, *Journal of Banking and Finance 27*, 153-181.

Lucas, D. and McDonald, R., 1990, Equity Issues and Stock Price Dynamics, *Journal of Finance 45*, 1019-1043.

MacKie-Mason, J., 1990, Do Taxes Affect Corporate Financing Decisions?, *Journal of Finance 45*, 1471-1493.

Marsh, P., 1982, The Choice Between Equity and Debt: an Empirical Study, *Journal of Finance 37*, 121-144.

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

Mikkelson, W. and Partch, M., 1986, Valuation Effects of Security Offerings and the Issuance Process, *Journal of Financial Economics 15*, 31-60.

Myers, S., 1977, Determinants of Corporate Borrowing, *Journal of Financial Economics 5*, 147-175.

Myers, S. and Majluf, N., 1984, Corporate Financing and Investment Decisions when Firms Have Information that Investors Do Not Have, *Journal of Financial Economics 13*, 187-221.

Nanda, V. and Yun, Y., 1996, Financial Innovation and Investor Wealth: a Study of the Poison Put in Convertible Bonds, *Journal of Corporate Finance 3*, 1-22.

Nyborg, K., 1995, Convertible Debt as Delayed Equity: Forced Versus Voluntary Conversion and the Informational Role of Call Policy, *Journal of Financial Intermediation 4*, 358-395.

Patell, J., 1976, Corporate Forecasts of Earnings per Share and Stock Price Behavior: An Empirical Test, *Journal of Accounting Research 14*, 246-276.

TABLE 1

European and US Convertible Debt Offerings Sorted per Issue Year

	Number of offerings (Cumulative %)	
	European convertibles	US convertibles
1990	4 (1.80%)	18 (2.69%)
1991	8 (5.41%)	34 (7.76%)
1992	7 (8.56%)	32 (12.54%)
1993	17 (16.22%)	43 (18.96%)
1994	18 (24.32%)	16 (21.34%)
1995	4 (26.13%)	27 (25.37%)
1996	8 (29.73%)	64 (34.93%)
1997	22 (39.64%)	76 (46.27%)
1998	24 (50.45%)	44 (52.84%)
1999	28 (63.06%)	49 (60.15%)
2000	36 (79.28%)	89 (73.43%)
2001	26 (90.99%)	124 (91.94%)
2002	20 (100.00%)	54 (100.00%)
Total	222	670

The European convertible debt sample consists of 222 offerings made by Western European industrial firms between 1990 and 2002. The US convertible debt sample consists of 670 offerings made by US industrial firms between 1990 and 2002.

TABLE 2

Differences in Security Design Characteristics across European and US Convertibles

Panel A: Research window 1990-2002 (full sample)

Security design measure	European convertibles (1)	US convertibles (2)	Test statistics for differences across (1) and (2)
Conversion premium	Average: 1.17	Average: 1.23	t-test: -3.76***
	Median: 1.17	Median: 1.21	Wilcoxon test: -2.94***
Maturity (years)	Average: 6.71	Average: 10.25	t-test: -11.17***
	Median: 5.48	Median: 7.03	Wilcoxon test: -9.87***
Post-conversion equity	Average: 0.10	Average: 0.12	t-test: -1.92*
dilution	Median: 0.07	Median: 0.10	Wilcoxon test: -4.44***
Call dummy = 1	78.38%	98.36%	χ^2-test: 107.77***
Delta	Average: 0.63	Average: 0.82	t-test: -16.73***
	Median: 0.63	Median: 0.84	Wilcoxon test: -15.39***

Panel B: Convertibles issued between 1990 and 1998

Security design measure	European convertibles (1)	US convertibles (2)	Test statistics for differences across (1) and (2)
Conversion premium	Average: 1.15	Average: 1.23	t-test: -3.59***
	Median: 1.14	Median: 1.20	Wilcoxon test: -5.05***
Maturity (years)	Average: 7.77	Average: 9.77	t-test: -4.92***
	Median: 7.00	Median: 9.89	Wilcoxon test: -4.48***
Post-conversion equity	Average: 0.10	Average: 0.12	t-test: -1.79*
dilution	Median: 0.06	Median: 0.11	Wilcoxon test: -4.93***
Call dummy = 1	81.25%	99.72%	χ^2-test: 64.51***
Delta	Average: 0.58	Average: 0.79	t-test: -11.86***
	Median: 0.58	Median: 0.81	Wilcoxon test: -11.05***

Panel C: Convertibles issued between 1999 and 2002

Security design measure	European convertibles (1)	US convertibles (2)	Test statistics for differences across (1) and (2)
Conversion premium	Average: 1.20	Average: 1.22	t-test: -1.79*
	Median: 1.24	Median: 1.22	Wilcoxon test: 0.66
Maturity (years)	Average: 5.63	Average: 10.78	t-test: -10.89***
	Median: 5.00	Median: 7.00	Wilcoxon test: -9.73***
Post-conversion equity	Average: 0.10	Average: 0.12	t-test: -1.69*
dilution	Median: 0.08	Median: 0.10	Wilcoxon test: -2.00**
Call dummy = 1	75.45%	96.84%	χ^2-test: 47.03***
Delta	Average: 0.66	Average: 0.85	t-test: -13.60***
	Median: 0.66	Median: 0.87	Wilcoxon test: -11.57***

Conversion premium is the conversion price divided by the stock price measured one week prior to the announcement date. Maturity denotes the initial maturity of the offering. 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. Call dummy equals one for callable bonds, and equals zero for non-callable bonds. Delta measures the sensitivity of the convertible debt value to its underlying common stock value (cf. Equation (1)).

* Significant at the 0.10 level

** Significant at the 0.05 level

*** Significant at the 0.01 level

TABLE 3

Daily Abnormal Stock Returns around European and US Convertible Debt Offering Announcements

Panel A: Research window 1990-2002 (full sample)

Interval	Average (median) AR (%)	% Negative AR's	Z-statistic	Wilcoxon signed-rank statistic	Test statistics for differences across EU and US sample
		1. Pre-announcement period window			
(-60,-2)	EU: 2.86 (3.97)	40.99	2.48**	2,521***	t-test: -6.11***
	US: 14.29 (9.98)	29.15	11.80***	58,915***	Wilcoxon test: -4.84***
		2. Announcement period windows			
(-1,0)	EU: -1.18 (-1.09)	64.41	-4.14***	-4,664***	t-test: 5.01***
	US: -2.97 (-2.54)	70.00	-16.59***	-60,784***	Wilcoxon test: 4.33***
0	EU: -1.34 (-1.08)	68.08	-7.59***	-5,976***	t-test: 2.00**
	US: -1.87 (-1.86)	69.25	-14.66***	-52,945***	Wilcoxon test: 2.16**
(0,1)	EU: -1.42 (-1.24)	64.41	-5.37***	-4,872***	t-test: 1.08
	US: -1.78 (-1.84)	64.78	-10.39***	-41,103***	Wilcoxon test: 1.49
		3. Post-announcement period window			
(2,60)	EU: -0.91 (-0.58)	51.35	-0.77	-499	t-test: 0.27
	US: -1.36 (0.84)	47.61	-1.00	215	Wilcoxon test: 0.49

Panel B: Convertibles issued between 1990 and 1998

Interval	Average (median) AR (%)	% Negative AR's	Z-statistic	Wilcoxon signed-rank statistic	Test statistics for differences across EU and US sample
		1. Pre-announcement period window			
(-60,-2)	EU: 2.81 (2.74)	41.96	1.41	512	t-test: -2.77***
	US: 8.79 (8.11)	31.44	7.04***	14,755***	Wilcoxon test: -3.04***
		2. Announcement period windows			
(-1,0)	EU: -0.42 (-0.50)	61.61	-1.08	-777**	t-test: 3.75***
	US: -1.91 (-1.84)	67.80	-9.76***	-15,334***	Wilcoxon test: 3.54***
0	EU: -0.49 (-0.55)	61.60	-3.16***	-1,139***	t-test: 2.17**
	US: -1.14 (-1.48)	67.80	-7.63***	-13,902***	Wilcoxon test: 2.60***
(0,1)	EU: -0.65 (-0.68)	60.71	-2.58***	-1,067***	t-test: 0.91
	US: -1.06 (-1.45)	62.15	-5.27***	-9,751***	Wilcoxon test: 1.22
		3. Post-announcement period window			
(2,60)	EU: -1.16 (-0.81)	51.79	-0.46	78	t-test: 0.82
	US: -2.01 (-1.10)	51.69	-1.75*	-2,622	Wilcoxon test: 0.58

Panel C: Convertibles issued between 1999 and 2002

Interval	Average (median) AR (%)	% Negative AR's	Z-statistic	Wilcoxon signed-rank statistic	Test statistics for differences across EU and US sample
		1. Pre-announcement period window			
(-60,-2)	EU: 2.90 (6.31)	40.00	2.10**	697**	t-test: -5.60***
	US: 20.43 (13.63)	26.58	9.73***	14,553***	Wilcoxon test: -4.04***
		2. Announcement period windows			
(-1,0)	EU: -1.96 (-1.59)	67.27	-4.80***	-1,513***	t-test: 3.71***
	US: -4.15 (-4.01)	72.47	-13.83***	-14,927***	Wilcoxon test: 3.05***
0	EU: -2.21 (-2.01)	74.55	-7.60***	-1,856***	t-test: 1.20
	US: -2.69 (-2.67)	70.89	-13.28***	-12,730***	Wilcoxon test: 1.13
(0,1)	EU: -2.20 (-1.85)	68.18	-5.03***	-1,381***	t-test: 0.22
	US: -2.61 (-2.59)	67,72	-9.55***	-10,552***	Wilcoxon test: 1.09
		3. Post-announcement period window			
(2,60)	EU: -0.66 (-0.57)	50.91	-0.62	130	t-test: 0.23
	US: -0.48 (4.07)	43.04	-0.40	1,911	Wilcoxon test: 1.12

'EU' indicates the sample of European convertibles, 'US' indicates the sample of US convertibles. Abnormal stock returns are calculated by means of the market model, with the market index proxied by the Datastream benchmark index for the issuing firm's country of domicile. 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.

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

TABLE 4

European and US Convertible Debt Issuers Divided per Sector

Sector	European issuers		US issuers	
	Total sample	Evolution	Total sample	Evolution
Aerospace and defense	2 (1.16%)	+2.13%	7 (1.44%)	-0.66%
Automobiles and parts	7 (4.07%)	-1.86%	9 (1.85%)	+0.48%
Beverages	4 (2.33%)	+2.18%	0 (0.00%)	-
Chemicals	3 (1.74%)	-0.96%	4 (0.82%)	-1.44%
Construction and building materials	*15 (8.72%) (2)*	-2.71%	7 (1.44%)	+0.08%
Distributors	0 (0.00%)	-	0 (0.00%)	-
Diversified industrial	3 (1.74%)	-3.03%	4 (0.82%)	-0.70%
Electronic and electric equipment	8 (4.65%)	-2.87%	16 (3.29%)	+0.53%
Engineering and machinery	*14 (8.14%) (3)*	-0.63%	17 (3.50%)	+0.91%
Food and drug retailers	1 (0.58%)	+0.05%	9 (1.85%)	-2.13%
Food producers and processors	*11 (6.40%) (4)*	+0.38%	7 (1.44%)	+0.30%
Forestry and paper	5 (2.91%)	-5.05%	2 (0.41%)	+0.02%
General retailers	9 (5.23%)	-1.81%	25 (5.14%)	-0.11%
Healthcare	3 (1.74%)	+1.12%	*33 (6.79%) (5)*	-3.38%
Household goods and textiles	6 (3.49%)	+0.16%	17 (3.50%)	-3.53%
I/T hardware	*10 (5.81%) (5)*	-0.74%	*85 (17.49%) (1)*	+6.85%
Leisure and hotels	8 (4.65%)	+0.27%	21 (4.32%)	-3.49%
Media and entertainment	*11 (6.40%) (4)*	+2.45%	20 (4.12%)	+3.21%
Mining	1 (0.58%)	+1.06%	4 (0.82%)	-1.06%
Oil and gas	5 (2.91%)	+3.25%	25 (5.14%)	-2.70%
Packaging	0 (0.00%)	-	0 (0.00%)	-
Personal care and household products	1 (0.58%)	-1.01%	2 (0.41%)	+0.02%
Pharmaceuticals and biotech	4 (2.33%)	+0.11%	*47 (9.67%) (3)*	+12.00%
Software and computer services	*19 (11.05%) (1)*	+5.80%	*54 (11.11%) (2)*	+3.92%
Steel and other metals	5 (2.91%)	+2.24%	1 (0.21%)	+0.38%
Support services	3 (1.74%)	-0.96%	*37 (7.61%) (4)*	-5.91%
Telecommunication services	6 (3.49%)	+3.30%	20 (4.12%)	-0.89%
Tobacco	0 (0.00%)	-	1 (0.21%)	+0.38%
Transport	8 (4.65%)	-2.87%	12 (2.47%)	-2.47%
Total	172	0.00%	486	0.00%

The European sample consists of 172 different Western European firms that issued convertibles between 1990 and 2002. The US sample consists of 468 different US firms that issued convertibles between 1990 and 2002. The sector classification is based upon the FTSE World Actuaries sector codes. The top five sectors (i.e., the sectors with the largest issuer representation) for the European and the US sample are printed in italic, with the sector's position added in parentheses. The columns labeled 'Total sample' describe the sector classification of all sample firms. The columns labeled 'Evolution' describe the evolution (% increase (+) / % decrease (-)) in the proportion of European and US sample firms classified in each sector from the period 1990 – 1998 to the period 1999 – 2002.

TABLE 5

Differences in Debt-Related Costs across European and US Convertible Debt Issuers

Panel A: Research window 1990-2002 (full sample)

Variable	European convertibles (1)	US convertibles (2)	Test statistics for differences across (1) and (2)
Long term debt/TA	Average: 0.19	Average: 0.21	t-test: -1.84*
	Median: 0.15	Median: 0.18	Wilcoxon test: -2.28**
Stock return volatility	Average: 0.03	Average: 0.04	t-test: -11.63***
	Median: 0.02	Median: 0.03	Wilcoxon test: -10.14***
Fixed assets/TA (-)	Average: 0.31	Average: 0.27	t-test: 2.19**
	Median: 0.27	Median: 0.21	Wilcoxon test: 2.36**

Panel B: Convertibles issued between 1990 and 1998

Variable	European convertibles (1)	US convertibles (2)	Test statistics for differences across (1) and (2)
Long term debt/TA	Average: 0.16	Average: 0.21	t-test: -2.93***
	Median: 0.14	Median: 0.18	Wilcoxon test: -2.14**
Stock return volatility	Average: 0.02	Average: 0.03	t-test: -11.25***
	Median: 0.02	Median: 0.03	Wilcoxon test: -9.65***
Fixed assets/TA (-)	Average: 0.34	Average: 0.30	t-test: 1.72*
	Median: 0.32	Median: 0.23	Wilcoxon test: 2.22**

Panel C: Convertibles issued between 1999 and 2002

Variable	European convertibles (1)	US convertibles (2)	Test statistics for differences across (1) and (2)
Long term debt/TA	Average: 0.21	Average: 0.21	t-test: 0.02
	Median: 0.17	Median: 0.17	Wilcoxon test: -1.38
Stock return volatility	Average: 0.03	Average: 0.05	t-test: -9.14***
	Median: 0.03	Median: 0.04	Wilcoxon test: -7.41***
Fixed assets/TA (-)	Average: 0.27	Average: 0.24	t-test: 1.44
	Median: 0.22	Median: 0.18	Wilcoxon test: 1.05

Long term debt/TA is debt with a maturity > 1 year divided by the book value of total assets, measured at fiscal year-end prior to the announcement date. Stock return volatility denotes the standard deviation of the daily stock returns estimated over the window (-240, -40) relative to the announcement date. Fixed assets/TA is the amount of fixed assets divided by the book value of total assets, measured at fiscal year-end prior to the announcement date.

* Significant at the 0.10 level

** Significant at the 0.05 level

*** Significant at the 0.01 level

TABLE 6

Differences in Equity - Related Costs across European and US Convertible Debt Issuers

Panel A: Research window 1990-2002 (full sample)

Variable	European convertibles (1)	US convertibles (2)	Test statistics for differences across (1) and (2)
Slack	Average: 0.12	Average: 0.20	t-test: -8.17***
	Median: 0.09	Median: 0.11	Wilcoxon test: -2.71***
Stock runup	Average: 0.06	Average: 0.18	t-test: -4.80***
	Median: 0.08	Median: 0.14	Wilcoxon test: -4.27***
Market runup	Average: 0.05	Average: 0.03	t-test: 1.59
	Median: 0.04	Median: 0.04	Wilcoxon test: 1.36
Issue size/MV equity	Average: 0.17	Average: 0.19	t-test: -2.09**
	Median: 0.13	Median: 0.15	Wilcoxon test: -2.59***

Panel B: Convertibles issued between 1990 and 1998

Variable	European convertibles (1)	US convertibles (2)	Test statistics for differences across (1) and (2)
Slack	Average: 0.11	Average: 0.16	t-test: -3.49***
	Median: 0.09	Median: 0.08	Wilcoxon test: 0.39
Stock runup	Average: 0.09	Average: 0.15	t-test: -2.40**
	Median: 0.08	Median: 0.14	Wilcoxon test: -2.54***
Market runup	Average: 0.06	Average: 0.07	t-test: -0.86
	Median: 0.07	Median: 0.06	Wilcoxon test: 0.54
Issue size/MV equity	Average: 0.17	Average: 0.25	t-test: -4.04***
	Median: 0.15	Median: 0.20	Wilcoxon test: -4.23***

Panel C: Convertibles issued between 1999 and 2002

Variable	European convertibles (1)	US convertibles (2)	Test statistics for differences across (1) and (2)
Slack	Average: 0.12	Average: 0.27	t-test: -7.89***
	Median: 0.08	Median: 0.18	Wilcoxon test: -4.23***
Stock runup	Average: 0.04	Average: 0.21	t-test: -4.24***
	Median: 0.06	Median: 0.12	Wilcoxon test: -2.79***
Market runup	Average: 0.03	Average: -0.01	t-test: 3.53***
	Median: 0.02	Median: -0.01	Wilcoxon test: 3.40***
Issue size/MV equity	Average: 0.16	Average: 0.11	t-test: 1.40
	Median: 0.11	Median: 0.11	Wilcoxon test: 0.72

Slack denotes the sum of cash and marketable securities divided by total assets, measured at fiscal year-end prior to the announcement date. Stock runup is the cumulative raw stock return realized over the window (-75, -1) relative to the announcement date. Market runup is the cumulative return on the Datastream benchmark index for the issuing firm's country of domicile, measured over the window (-75,-1) relative to the announcement date. Issue size/MV equity is the issue size divided by the market value of common equity, measured one week prior to the announcement date.

* Significant at the 0.10 level

** Significant at the 0.05 level

*** Significant at the 0.01 level

TABLE 7

Logistic Regression Analysis of Differences in Firm Characteristics across European and US Convertible Debt Issuers

Independent variables	Parameter estimate (χ^2-statistic)
Intercept	-1.349
	(1.98)
Proxies for debt-related costs	
Long term debt/TA	-1.259***
	(4.85)
Stock return volatility	-56.040***
	(45.84)
Fixed assets/TA (-)	-0.164
	(0.15)
Proxies for equity-related costs	
Slack	-1.191*
	(-3.13)
Stock runup	-1.830***
	(21.43)
Market runup	2.602**
	(5.51)
Issue size/MV equity	-1.625***
	(6.42)
Control variables	
Market to book ratio	-0.047
	(1.62)
Ln(total assets)	0.023
	(0.16)
McFadden's R^2	15.88%
N	880

The dependent variable equals one for convertibles issued by European firms, and equals zero for convertibles issued by US firms. All firm-specific independent variables are measured at fiscal year-end prior to the convertible debt announcement date, unless otherwise indicated. Long term debt/TA is debt with a maturity > 1 year 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. Fixed assets/TA is the ratio of fixed assets divided by total assets. Slack denotes the sum of cash and marketable securities divided by total assets. Stock runup is the cumulative raw stock return realized over the window (-75,-1) relative to the announcement date. Market runup is the cumulative return on the Datastream benchmark index for the issuing firm's country of domicile, measured over the window (-75,-1) relative to the announcement date. Issue size/MV 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 calculated as (total assets + market value of common equity measured one week prior to the announcement date - book value of common equity)/total assets. Ln(total assets) is the natural logarithm of the book value of total assets, expressed in constant December 2002 dollars by means of the IMF monthly Consumer Price Indices for Europe and the US. χ^2-statistics are inserted in parentheses.

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

TABLE 8

OLS Regression Analysis of Impact of Issuer Characteristics and Institutional Features on the Size of the Equity Component of Convertible Debt

Independent variables	Parameter estimate (t-statistic)
Intercept	0.788***
	(17.00)
Proxies for debt-related costs	
Long term debt/TA	0.051***
	(2.84)
Stock return volatility	3.964***
	(13.67)
Fixed assets/TA (-)	0.034
	(1.10)
Proxies for equity-related costs	
Slack	0.008
	(0.41)
Stock runup	0.014
	(1.29)
Market runup	-0.064
	(-1.52)
Issue size/MV equity	0.020
	(0.59)
Control variables	
Market to book ratio	0.000
	(0.43)
Ln(total assets)	-0.010***
	(-3.46)
Europe dummy	-0.136***
	(-12.50)
R^2 adjusted	48.88%
N	868

The dependent variable used as proxy for the convertible debt equity component size is the delta. The delta measures the sensitivity of the convertible debt value to its underlying common stock value (cf. Equation (1)). All firm-specific independent variables are measured at fiscal year-end prior to the convertible debt announcement date, unless otherwise indicated. Long term debt/TA is debt with a maturity > 1 year 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. Fixed assets/TA is the ratio of fixed assets divided by total assets. Slack denotes the sum of cash and marketable securities divided by total assets. Stock runup is the cumulative raw stock return realized over the window (-75,-1) relative to the announcement date. Market runup is the cumulative return on the Datastream benchmark index for the issuing firm's country of domicile, measured over the window (-75,-1) relative to the announcement date. Issue size/MV 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 calculated as (total assets + market value of common equity measured one week prior to the announcement date - book value of common equity)/total assets. Ln(total assets) is the natural logarithm of the book value of total assets, expressed in constant December 2002 dollars by means of the IMF monthly Consumer Price Indices for Europe and the US. Europe dummy is equal to one for convertibles issued by European firms, and equal to zero for convertibles issued by US firms. t-statistics (calculated by means of White's heteroscedasticity-corrected standard deviations) are inserted in parentheses.

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