Understanding convertible bond issuances of Chinese listed firms

Abstract

Unlike their counterparts in the US and the EU, most convertible bonds issued by listed firms in China from 2003 to 2014 are converted to equity before the maturity date. This indicates that the convertible bond in China is used as a backdoor equity financing instrument. Our regression results further show that firms are more likely to issue convertible bonds rather than straight debt when debt-related cost is low and stock price run-up is high while, compared to seasoned equity issuers, firms issue convertible bonds when risk-free rate is low. The overall results suggest that listed firms in China still seek equity financing first, they issue convertible bonds to take advantage of the interest rate deduction with the assurance to their investors that the convertibles can be converted to equities. In addition, most convertible bonds were underpriced at the offering date, suggesting convertible bond issuers do not exploit the local investors in China.

1. Introduction

Convertible debt has become a major financing source for companies around the world in recent decades (Dutordoir et al. 2014). Why companies issue hybrid securities like convertible debt instead of issuing straight debt or equity remains an important question. The related literature has developed theoretical models to explain the convertible debt issuance and to provide empirical evidence concerning whether the theoretical models have explanatory power to the real business world. Different theories have been developed to explain the use of convertible debt, including the sweetened debt approach (Green, 1984; Brennan and Kraus, 1987; Brennan and Schwartz, 1988; Mayers, 1998), the delayed equity approach (Stein, 1992), the tax advantage approach (Jalan and Barone-Adesi, 1995), the managerial entrenchment approach (Isagawa, 2002) and the rationing in the equity markets approach (Lewis, Rogalski and Seward, 2001). Meanwhile, studies suggest that convertible debt issuance is also affected by firm- and country-level corporate governance characteristics (Dutordoir et al., 2014), and by investors' demand (Brown et al., 2012; De Jong et al., 2013).

Despite the efforts from the existing literature which are mainly based on well-developed markets with high institutional similarities (Kang and Stulz, 1996; Magennis, Watts and Wright, 1998; Abhyankar and Dunning, 1999; Lewis, Rogalski and Seward, 2003; Loncarski, Horst and Veld, 2008; Dutordoir and Van de Gucht, 2009), less is known regarding the motivations for convertibles' issuance in other environments. This paper therefore intends to fill this gap by investigating the

determinants that drive the issuance of convertible debts in the world's largest developing economy, the Chinese market.

The Chinese convertible bond market is relatively small in size when comparing to its Western counterparts. In 2013, the total number of completed deals for convertible bonds in China's domestic market was valued at $14.6 billion, which only accounts for around 13% of the global market[1]. Nevertheless, the convertible bond market in China provides a unique institutional and economic environment, it is worth investigating for the following reasons. *Firstly*, China's bond market has grown rapidly in recent years and is now ranked as the third largest market in the world following the United States (US) and Japan (source: IMF); the convertible bond market is no exception, according to Caixin (2017), as of November 7, 2017, 120 Chinese listed firms have announced plans to issue convertible bonds, involving 290 billion yuan ($43.6 billion). Although there are quite a few studies that advance our understanding regarding the resettable feature of Chinese convertible bonds (Qiu and Zhang 2013; Martin et al. 2015), it remains unclear what are the characteristics of the firms that issued convertible bonds. It is our attempt to fill this void in the literature. *Secondly*, previous studies that focus on Chinese firms' financing selections did not take into consideration the convertible bonds (Chen, 2004; Zou and Xiao, 2006). Particularly, Chen (2004) argues that due to the lack of proper corporate governance and enforcement of company laws, individual shareholders are not properly protected, and share capital has become a somewhat "free" source of finance[2]. Meanwhile,

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[1] See Financial Times, January 7, 2014.
[2] Chinese firms do not typically pay regular cash dividends but prefer stock dividends. Allen et al. (2005)

banks are generally not willing to lend to small- or medium-sized non-state-owned-enterprises (non-SOEs, hereafter). Thus, a new pecking order may have emerged in which firms prefer equity rather than debt in external financing. Despite the implementation of bankruptcy law in 2006, creditor protection is relatively weak in China (Allen et al., 2005). Bankruptcies are extremely rare since both local and national governments will bail firms out, particularly large firms and state-owned-enterprises (SOEs, hereafter) ones, to prevent them from failing. One explanation could be that the government relies on those firms to maintain employment levels, and to maintain social stability (see for example Bai et al., 2000 and Jiang and Kim 2014). Such an implicit government guarantee explains the Chinese banks' preference for providing loans to large firms as well as SOE ones (Jiang et al., 2013). Since convertible bonds have both debt and equity features, it is therefore important to test the sequential financing order with the inclusion of the convertible financing option in the Chinese market. *Finally*, a strand of literature documents evidence of mispricing in the Chinese warrant market (Xiong and Yu, 2011; Powers and Xiao, 2013; Liu et al., 2014). The warrant-like conversion feature embedded in the local convertible bonds is also likely to be mispriced to take advantage of the "casino-like" markets which are flooded with retail investors[3]. This naturally raises concerns regarding the motivation behind Chinese firms' issuance of convertible bonds and the sophistication of the market.

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observed that Chinese firms tend to underpay cash dividends to their shareholders, compared with firms in other countries. In a recent study, Jiang and Kim (2015) also confirm this finding.

[3] The "casino theory" of China's stock market was first proposed by a Chinese economist Wu Jinglian in 2001. More recently, The Economist (2015) dubbed China's stock market "a crazy casino."

In this paper, we examine a dataset including 655 straight debt issues, 77 convertible debt issues, and 1089 equity issues announced from non-financial public firms in the Chinese market between 2003 and 2014. Following Erel et al. (2013), we use the multinomial logistic regressions to analyze firms' security choices. Our framework controls for a range of firm-level data as well as security market conditions. We also control for provincial-level data to proxy for investor protection rights. In addition, we analyze the determinants of convertible bond first-day theoretical pricing by using a range of convertible bond characteristics.

Our findings suggest that, firstly, Chinese companies use convertible debt mainly as a backdoor equity financing instrument, not as sweetened debt. This is consistent with the equity design of most of China's convertible offerings. Specifically, the median (mean) of the *theoretical* conversion probability (the Delta) of the convertibles is 41.8% (43.8%)[4]. However, the median (mean) of the ex-post *actual* conversion ratio is 99.80% (96.18%), which suggests that almost *all* the convertible bonds issued in our sample period were converted to equities before their maturity.

Secondly, our findings also suggest that firm-level characteristics, ownership concentration and security market conditions have a significant impact on firms' convertible debt choices over other financial instruments, but the influence from the provincial level of investor protection is insignificant. Interestingly, we find that firms

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[4] The delta measure is calculated as $\Delta = e^{-\delta T} N(d_1) = e^{-\delta T} N\left(\frac{\ln\left(\frac{S}{X}\right) + \left(r - \delta + \frac{T\sigma^2}{2}\right)}{\sigma\sqrt{T}}\right)$, where δ is the continuously compounded dividend yield for the fiscal year end preceding the announcement date, T is the initial convertible debt maturity (in years), S is the price of the underlying stock measured seven days before the announcement date, X is the conversion price, r is the three month SHIBOR (measured on the announcement date), and σ is the annual stock return volatility.

tend to issue convertible bonds rather than straight debts although the debt-related cost is low and the stock price run-up is high. Further, bigger firms tend to issue convertible bonds over seasoned equities when risk-free rate is low. These findings indicate that Chinese listed firms still prefer equity for external financing (Chen, 2004). Firms issue convertible bonds to gain profits from the interest rate reductions and avoid losses from shareholders' wealth through seasoned equities offering. As Liu et al. (2016) find, the market is favorable towards the announcements of convertible bond issuance in China, but unfavorable to seasoned equity offering announcements.

Thirdly, we find that most of the convertible debts were underpriced at the offer date. This implies that the issuances of convertible bonds are not necessary to harm the interests of local investors. In addition, the credit rating of the convertible bond is quite high in our sample, but it does not relate to convertible bond underpricing.

The paper proceeds as follows. Section 2 reviews the related literature. Second 3 provides information on the Chinese convertible debt. Section 4 presents the data, and the results of our regression analysis are reported in Section 5. Section 6 concludes.

2. The development of the convertible bond market in China

The first convertible bond issued by Chinese listed firms was to Shen Bao An (000009.SZ). At the end of 1992, Shen Bao An issued 500 million yuan convertible bonds in the Shenzhen Stock Exchange. During that time, however, there were no official regulations regarding the convertible bond issuance, the convertible bond issued by Shen Bao An eventually failed to convert to equities due to bad timing and a

high conversion price. In 1994, the implementation of the Company Law[5] stipulated the legal status of the convertible bonds, the conditions of the issuance, and the basic rights of the related parties. In 1997, "Interim Measures for the Administration of Convertible Bonds"[6] was approved by the State Council: at that time, only state-owned firms (SOEs) were able to issue convertible bonds. The interim measures introduced in 1997 set out the provisions for convertible bond issuance, transaction, conversion and redemption. In April 2001, the Chinese Securities Regulatory Commission (CSRC) issued "Measures for the Issuance of Convertible Bonds by Listed Companies"[7]; this document removed the restrictions on non-SOEs to issue convertible bonds and formed the prelude for convertible bond issuance. However, due to the doldrums of the warrant markets, the issuance of convertibles was prohibited from the second half of 2004 until 2005.

On 6 May 2006, the CSRC issued "Measures for the Administration of Securities Issuance of Listed Companies"[8], and at the same time abolished the previous "Measures for the Issuance of Convertible Bonds by Listed Companies". Some notable requirements that a company that wishes to issue publicly convertible bonds shall comply with are as follows: (1) net assets should be no less than 30 million RMB for a joint stock company, and 60 million RMB for a limited liability company; (2) the average distributable profits in the last three years should be sufficient to cover one year's interests for the bonds; (3) the firm must have maintained a record of

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[5] http://www.npc.gov.cn/wxzl/gongbao/2000-12/05/content_5004608.htm
[6] http://www.csrc.gov.cn/pub/shenzhen/xxfw/tzzsyd/ssgs/ssgsrz/ssrzfz/200902/t20090226_95614.htm
[7] http://www.csrc.gov.cn/pub/zjhpublic/zjh/200804/t20080418_14472.htm
[8] http://www.csrc.gov.cn/pub/hebei/xxfw/gfxwj/200805/t20080503_68707.htm

positive profitability with a ROE of no less than 6% for three consecutive years; (4) the balance of the accumulated corporate bonds after the issuance shall not exceed 40% of the net assets at the end of last period; (5) the issuer must have guarantors with a joint liabilities or an asset-backed pledge, except for those companies whose audited net assets are no less than 1.5 billion RMB; and (6) net assets should be no less than RMB 1.5 billion if the firm is to issue detachable convertible bonds.

In addition, there are also some restrictions on convertible bond issuance; for example, the convertible bonds must be rated initially at the time of issue and thereafter annually by a qualified credit rating agency; the face value of convertible bond must be 100 yuan; and the minimum period of the convertible bond is one year while the maximum is six years. Although the CSRC did not specific the clauses on call-and-put provisions, these provisions in our sample are quite similar. Under the call provision, the issuer can repurchase the convertible bonds which are not converted if the price of the stock exceeds (usually) 30% of the strike price consecutively (15 to 20 days) over a certain period (20 to 30 days); and if the callable price does not usually exceed 105% of the par value (100 yuan). In addition, if the remaining value of the convertible is less than 30 million yuan, the issuer can also purchase back all the convertible bonds outstanding. Under the put provision, the investors can sell back the convertibles to the issuer if the price of the stock is lower than 70% of the strike price consecutively (20 or 30 days) over a certain period (20 or 30 days), and the puttable price usually does not exceed 105% of the par value. Note that in our sample, it is quite rare that the convertible bond triggers the put provision.

3. Literature review

3.1 Theoretical rationales for convertible bond issuance decisions

As shown in the introduction section, there are several schools of theories on the motives of convertible bond issuance, among which two main theories stem from *agency cost* and *information asymmetry*, respectively. Several papers argue that convertible debts can reduce a variety of agency costs. It is well known that maximizing the value of the equity and maximizing the value of the firm can, with outstanding risky debt, lead to agency problems. The risk-shifting model of Green (1984) focusses on potential shareholder–debtholder conflicts of interest, arguing that a convertible bond can help to mitigate shareholders' incentives to engage in risky, negative NPV projects. By adding a conversion option to their bond issues, firms allow debtholders to benefit from the upside potential of their stocks. Convertibles thus reduce the value of the shareholders' residual claim, thereby alleviating the shareholders' tendencies to engage in more risky projects. However, Green's argument is based on the agency problem between management and shareholders. Mayers (1998) complements Green's theory to some extents and considers convertibles as a tool to reduce agency problems between management and shareholders where the company has a sequence of investment opportunities. His sequential-financing model demonstrates that convertible debt is more suitable for financing a sequence of investment options of uncertain value than either short- or long-term bonds are. On one hand, compared to long-term bonds, the convertible can economize on issue costs because conversion leaves funds in the firm when the investment turns out to be

valuable. On the other hand, compared to short-term bonds, the convertible can control the overinvestment problem by returning funds to debtholders through redemption if the investment turns out to be worthless. Note that a critical assumption in Mayers' model is that convertibles are callable, whereby companies are able to force conversion of the convertible debt into equity when the stock price reaches a threshold for a certain period (investment has a positive value).

A stream of literature also models convertible debts as a device to reduce adverse selection costs resulting from asymmetric information between a firm's insiders and outsiders. Brennan and Kraus (1987) and Brennan and Schwartz (1988) develop a model that explains a firm's choice of financing instruments when investors and management disagree on the riskiness of a company. In this case, high perceived levels of risk result in the firm having to pay a higher interest rate on straight debt than managers find reasonable. This problem can be mitigated by issuing convertible bonds. Because the cost of convertibles is evaluated on a weighted basis of the debt component and the equity option component, higher perceived risk translates into lower value of the straight debt component; but at the same time it increases the value of the equity option component, resulting in a reasonably priced convertible debt. A second group of adverse selection models builds on the assumption of asymmetric information about firm value rather than about firm risk. Stein (1992) suggests that firms issue convertible bonds to acquire equity through the "backdoor" in situations where informational asymmetries render conventional equity issues unattractive due to high issue costs and dilution (Myers and Majluf 1984). The intuition for the role of

convertible debt as ''backdoor'' equity financing rests on the trade-off between the sale of mispriced corporate securities and the costs of financial distress. Convertible bonds attenuate the high expected costs of financial distress associated with a debt issue and reduce the large negative announcement effects that typically occur with common equity issues.

3.2 Empirical evidence on convertible debt issuer motivation

Previous empirical literature on convertible debt issuance motives mainly relies on qualitative survey-based analysis and quantitative analysis[9]. Early US survey results obtained by Billingsley and Smith (1996) and Graham and Harvey (2001) are consistent with both the *sweetened debt* and the *delayed equity* viewpoints. However, in a more recent survey analysis, Dong et al. (2017) report evidence to support information asymmetry between management and investors, although it is to be noted that their sample firms are from English-speaking countries (Australia, Canada, the UK, the US). Bancel and Mittoo (2004a, b) focus on the motivations behind Western European convertible debt offerings. Bancel and Mittoo (2004a) survey managers whose firms have already issued convertible debt, and obtain support for both viewpoints. Bancel and Mittoo (2004b) further survey companies that have seriously considered issuing convertible debt over the previous ten years; their findings are mainly consistent with Stein's delayed equity perception.

For quantitative analysis, Lewis et al. (1999) suggest that both the sweetened debt

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[9] See Loncarski et al. (2006) and Dutordoir et al. (2014) for an extensive overview of empirical evidence regarding convertible debt issuance motivations.

and delayed equity financing viewpoints are valid in their results by using a sample of 203 convertible issues on the US market between 1977 and 1984. They point out that firms which issue debt-like convertibles are likely to control for the risk-shifting problem and firms which issue equity-like convertibles are try to mitigate information asymmetry problems. Dutordoir and Van de Gucht (2009) replicate the approach of Lewis et al. (1999) in a Western European setting and find that European convertibles mainly serve as sweetened debts.

4. Data

4.1 Security issues

We collect all convertible debt, straight debt, and seasoned equity issues conducted by domestic firms listed on the Shanghai Stock Exchange and the Shenzhen Stock Exchange from 2003 to 2014. The seasoned issue data are downloaded from Seasoned Equity Offerings Database and China's Bond Market Database. We obtain firm-level financial data from the RESSET database and the Wind database. To avoid survival bias, we include all firms that have been delisted from the stock exchanges. We exclude any firm with a seasoned offering that does not have a CSRC report of the filing in line with Liu et al. (2016); we remove issues of different security types made by the same firm during the same fiscal year in line with Hovakimian et al. (2001); we also remove financial firms (Chinese Securities Regulatory Commission industry code J) because they operate in an astringent regulatory environment and follow different accounting standards. After the screening process, we are left with a final sample of 77 convertible debt, 655 straight debt and 1089 seasoned equity issues.

Note that these figures are comparable with Liu et al. (2016) who investigate similar data in China between 1991 and 2010. The high proportion of equity issues in our sample contrast with the number of seasoned issues in Western European countries (Dutordoir and Van de Gucht, 2009), of which more than half of the issues were straight bonds.

Table 1 presents the samples sorted by issue year. We find that there are substantial temporal fluctuations in equity and convertible debt offering volumes. As we mentioned in the previous section, convertible bond issue was paused in 2005 due to the market downturn. The number of the debt issues was relatively stable - it increased steadily prior to 2012, but reduced significantly thereafter. The volume of seasoned equity issuance first peaked in 2007 before the financial crisis, then dropped, but recently recovered. It seems that the equity market and debt market complement each other.

[Insert table 1 about here]

4.2 Variable description

To facilitate comparisons with the determinants of firms that issue convertible bonds over straight debt and seasoned equity, in our choice of independent variables we closely follow prior literature. Essentially, the selected variables belong to one of three categories: 1) firm-level characteristics, 2) ownership concentration and political linkage, and 3) macroeconomic variables and investor protection proxies at provincial levels. Following Dutordoir and Van de Gucht (2009), the first group of variables includes:

(i) *Total Assets*: book value of total assets of the firms. Logged for all regressions. Total assets can proxy for the magnitude of asymmetric information and financial distress costs (Lewis et al., 1999).

(ii) *Market-to-book*: market-to-book ratio, the market capitalization divided by the book value of total assets, both measured at the end of the calendar year prior to the yearly observation. We calculate market capitalization as the closing share price, multiplied by total shares outstanding. Logged for regression. The MB ratio is a common proxy of future growth opportunities; firms that have higher growth opportunities usually have lower cost of capital.

(iii) *Sales growth*: growth in sales in the fiscal year before the security issue.

The above three measures can proxy for a firm's general financing costs.

(iv) *Leverage*: total debt divided by total assets.

(v) *ROA*: return on assets, calculated as net income divided by the book value of total assets. A high profitability before the security issue allows a firm to easily pay the interest on its debt.

(vi) *Tax/TA*: the ratio of income taxes to total assets.

(vii) *Volatility*: stock return volatility, annualized stock return volatility based on daily stock returns measured over the 60 days before the security issue. Logged for all regressions.

The above four measures can proxy for a firm's debt-related financing costs.

(viii) *Stock run-up 1*: cumulative daily stock return over the window 90 to 2 trading days before the security issue. Stockholders may interpret the run-up as a signal of

good investment projects.

(ix) *Stock run-up 2*: cumulative daily stock return over the window 360 to 91 trading days before the security issue.

(x) *Slack/TA*: financial slack to total assets, calculated as net operating cash flow minus cash dividends minus capital expenditures over the book value of total assets.

(xi) *Issue size/MV*: offering proceeds to market capitalization.

The above four measures can proxy for the firm's equity-related financing costs. Both Slack/TA and Issue size/MV are positively correlated with equity-related financing costs.

The second category includes variables that are set to capture ownership concentration and political linkages:

(i) *Herfindal 5*: an indicator for ownership concentration, calculated as the sum of squared ownership proportions held by each of the top five shareholders.

(ii) *State ownership*: captures the proportion of state-held shares at the end of year.

The above two variables are important in a Chinese setting, because there usually exists a large shareholder in listed firms and ownership is quite concentrated. Further, the presence of the state ownership can offer implicit loan guarantees and lower the cost of firms' financial distress (Chang et al., 2014).

The third group category includes macroeconomic variables and provincial investor protection levels. The variables are:

(i) *Market run-up*: Return on the Shanghai Composite index over the window (-90, -2).

(ii) *Market volatility*: annualized Shanghai Composite index return volatility based on daily index returns measured over the 60 days before the security issue.

(iii) *Risk-free rate*: before 2007, three-month coupon rate for the PBOC's (People's Bank of China) notes; after 2007, three-month Shibor (Shanghai interbank offered rate).

(iv) *Pprts*: PropertyRights is the number of domestic trademark applications per firm for a certain province and year.

(v) *Rlaw*: RuleofLaw is the number of lawyers per 10,000 people for a certain province and year.

The above two variables can be used to proxy for legal protection on a provincial level (Hasan et al. 2014) in China because, similar to Korkeamaki's (2005) hypothesis, presumably, investors in regions with weaker creditor (shareholder) protection rights prefer security types with a smaller debt (equity) component size, which in turn affect the firm's security design.

For the sake of brevity, only the mean and median values of variables of each security issue type are reported in panel A of table 2. The mean (median) value of total assets for firms that issue convertible bonds in our sample is 13,500 (4,250) million yuan, which is much smaller than convertible debt issuers examined in a EU-based study (Dutordoir and Gucht, 2009), but larger than De Jong et al.'s (2013) sample for US firms issued convertible bonds from 1992 to 2007. Another interesting feature is that the biggest average size is found for firms that issued straight debts in both Dutordoir and Gucht's (2009) and De Jong et al.'s (2013) samples, but in our

sample, the average size of firms that issue convertible bonds and straight debts is similar. The mean (median) leverage for convertible bond issuers in our sample is generally higher than their counterparts in the US and the EU.

[Insert table 2 about here]

We are also interested in the first-day-underpricing of convertible bonds. The underpricing is calculated as the theoretical price of convertible bond minus the face value of the convertible bond. Like Chan and Chen (2007) and Ammann et al. (2003), we use the famous Tsiveriotis and Fernandes's (1998) model to obtain the theoretical price of the convertible bonds. Following Chan and Chen (2007) and Datta et al. (1997), we investigate the determinants of convertible bond underpricing by collecting the following variables:

(i) *Issue volume*: the total issue volume of convertible bonds.

(ii) *Credit rating*: as per requested by the CSRC, convertible bond issuers shall obtain an initial rating from the one of the rating agencies[10] in China. The initial ratings of Chinese convertible bonds in our sample are all above A – in total there are five different ratings, ranging from AA- to AAA. We assign each a numerical ranking, from highest (5) to lowest (1), AAA=5, AAA-=4, AA+=3, AA=2 and AA-=1.

(iii) *Coupon rate*: coupon rate on convertible bond face value. Note that some convertible bonds have different coupon rates for each year; in those cases, we use the average of the coupon rate.

Panel B of table 2 reports the statistics. Both underpricing measures are

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[10] The three major rating agency firms in China are United Credit Ratings, China Cheng Xin International Credit Rating, and Dagong Global Credit Rating.

calculated as theoretical convertible price by Tsiveriotis and Fernandes's (1998) model minus the convertible bond facing value (100 yuan). Underpricing1 is calculated by assuming stock price follows a trinomial tree in Tsiveriotis and Fernandes's (1998) model while underpricing2 assumes that stock price follows a binomial tree. Both underpricing measures are similar, the mean (median) is 9.371 (7.994) of underpricing which suggests that convertible bonds are underpriced at the initial offering day[11]. The mean (median) of credit rating is 3.558 (4) which indicates that the convertibles are among the bonds with highest ratings; these contrasts sharply with the US sample in Chan and Chen (2007). The issue volume of convertible bond ranges from 2 million to 100 million with a mean (median) of 13.6 (8.2) million. The average coupon rate is about 2% lower than the risk-free rate; this strongly indicates the equity feature of convertible bond issued in China.

4.3 Difference in mean test

Table 3 reports t-statistics for pairwise differences in means between the convertible sample and the other two security samples. Most of the significant differences between the two groups are found in firm-specific characteristics, suggesting that convertible bond issuers have different firm-specific characteristics than the other two groups, but no major difference is found in macroeconomic- and provincial-level variables except for the risk-free rate, indicating that firms tend to issue convertible bonds when the risk-free rate is relatively low. Specifically, compared to straight debt

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[11] We also use the Black-Scholes model to calculate the underpricing of convertible bond and obtain a very similar result with a mean (median) of 10.591 (9.840).

issuers, convertible bond issuers have a significantly smaller stock return volatility, leverage and market-to-book ratio, and a significantly higher stock run-up, ROA, tax, issue size, state ownership and ownership concentration. In addition, convertible issuers differ significantly from equity issuers on many dimensions: they have larger size, tax, state ownership and ownership concentration, but they are smaller in stock return volatility, leverage, and market-to-book ratio.

[Insert table 3 about here]

To check for multicollinearity problems, we analyze pairwise Pearson correlations between the variables, and present the correlation table in the appendix. The results of this analysis indicate that correlations do not exceed 0.53 and are below 0.3 for the majority of variables.

5. Empirical results

5.1 Model selection

The descriptive statistics and the univariate comparisons in the previous section both suggest that firm characteristics and macroeconomic conditions can affect the ways in which firms raise convertible debts. To identify the effects on the issuance of the firms' funding choices, it is important to estimate this relation in a multivariate setting. Consequently, we employ discrete-choice models that estimate the likelihood of a firm issuing a specified type of security. When a listed firm needs to obtain public financing, it can issue a straight bond, convertible bond, or seasoned equity. Given the number of potential alternative outcomes, we utilize econometric approaches that

allow for multiple discrete choices.

We select the multinomial logit model[12] because it estimates a system in which independent variables affect the choice among a finite number of alternative outcomes. This model is used to predict the probabilities of categorically dependent variable, which has *two or more* possible outcome classes. Whereas the logistic regression model is used when the dependent categorical variable has only two outcome categories.

The output of the multinomial logit model consists of two pairwise regressions: one that models firms' likelihood to choose convertible bonds over straight debts (set as the base outcome) and one that models firms' likelihood to choose convertibles over seasoned equity (set as the base outcome). Specifically, we estimate the following model:

$$\Pr(security\ type = j) = {e^{\beta_j^i x}} \Big/ {\sum_1^3 e^{\beta_k^i x}}, \tag{1}$$

where j equals 1 if the firm issues convertible bonds, 2 for straight debts and 3 for seasoned equity offerings. Note that these pairwise regression results are the outcome of the model that simultaneously incorporates all three security types, i.e., 77 convertible bonds, 655 straight debts and 1,089 seasoned equity offerings.

5.2 The choice between convertible bond and straight debt

Table 4 reports the results of the multinomial logit analysis of the determinants of firms' choice between convertible debt and straight debt. The results in regression

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[12] A Hausman test is applied before the multinomial logit model, to rule out the possibility of the assumption that the independence of irrelevant alternatives (IIA) is violated.

M(1) are largely consistent with the univariate results. In particular, convertible debt issuers have a significantly larger size, stock price run-up, issue proceeds, and stock market volatility, and significantly smaller stock return volatility and leverage than straight debt issuers. Our results contrast sharply with the finding from similar studies in the US (Lewis et al., 1999) and the EU (Dutordoir and Van de Gucht, 2009), in which they find that firms tend to issue convertible bonds when the debt-related cost is higher, and convertible bond issuers are smaller in size than straight debt issuers. Since most of the convertible bonds are finally converted to equities in our sample, our finding provides further evidence on financing behavior of Chinese listed firms: they still prefer equity financing (Chen, 2004; Zou and Xiao, 2006). That is, instead of directly issuing seasoned equities, firms can choose to issue convertible bonds as a delayed equity financing method. The positive coefficients on stock price run-up and market volatility show that convertible bond issuers have some timing ability; they issue convertibles when stock performs well and the market is more volatile to assure the investors that their convertible bonds could be converted in future.

M(2) and M(3) report the regression results with provincial-level legal protection proxies and ownership measures. We do not observe significant coefficients on the two legal protection proxies and the state ownership measure. The positive and significant coefficient on the ownership concentration measure (Herfindal 5) indicates that convertible bond issuers have more concentrated ownership. This finding provides some support for Green (1984)'s risk-shifting theory, that convertible bonds can be used to alleviate agency conflicts between shareholders and debtholders.

[Insert table 4 about here]

5.2 The choice between convertible bond and seasoned equity offering

In this section, we look at the determinants of firms' propensity to issue convertible debt instead of seasoned equity. Like the previous section, the results from the multinomial logit regression are in line with most of the pairwise differences in mean tests. As can be seen from M(1) in table 5, compared to seasoned equity issuers, convertible debt issuers have a significantly larger size and tax, and significantly smaller leverage, market-to-book ratio, issue proceeds and risk-free rate. The results show that most of the equity cost-related measures (stock price run-up, financial slack and issue proceeds) are not significant; instead it seems that firms issue convertible bonds not due to higher equity-related cost, but because they are large firms which want to take advantage of the low risk-free rate, and tax-shield benefits of debt financing.

The regression results with provincial-level investor protection proxies and ownership measures from M(2) and M(3) are quite similar in the previous section. We only find positive and significant coefficient on ownership concentration. Across all the regressions, pseudo-R^2 is above 30%, slightly higher than the corresponding measure recorded by Lewis et al. (1999) and Dutordoir and Van de Gucht (2009). This indicates that the choice between convertibles, straight debt and equity is partially predictable using pre-offering information.

[Insert table 5 about here]

5.3 The determinants of convertible bond underpricing

In this section, we investigate the determinants of convertible bond underpricing. Inspired by previous related papers (Datta et al., 1997; Chan and Chen, 2007), we include bond credit rating, issue volume, coupon rate, and stock price run-up prior to the issuance as independent variables. We should expect a negative relationship between underpricing and bond credit rating, because bonds with lower rating tend to underprice more to attract investors (Datta et al., 1997; Chan and Chen, 2007). This also applies to coupon rate. We should expect a positive sign from the coefficient on issue volume, as the larger the size of issue proceeds the firm wants to sell to investors, the higher underpricing it should have. Chan and Chen (2007) also find that firms underprice the convertible bond more when they experience a stock price crash prior to the issuance; if this is the case, we should expect a negative sign on coefficients of the stock price run-up measures.

We use both underpricing measures as dependent variables, and we also substitute issue proceed/MV to issue volume as a robustness check. However, the regression results in table 6 reveal that only stock price run-up is statistically significant but positive. One possible explanation is that firms whose stock prices perform are more likely to strategically underprice the convertible bonds to attract more investors. The coefficient on credit rate is of the expected sign but insignificant, possibly because the lack of variation in the credit rate measure in our sample.

[Insert table 6 about here]

5.4 Discussion of the results

Overall, the results from table 4 and table 5 reveal significant differences between convertible bond issuers and the other two security issuers. Chinese convertible bond issuers tend to be large, mature firms with more debt capacity than the small, high-risk, high-growth firms dominating the US convertible debt-issuer universe. But unlike EU convertible bond issuers that are also found to have similar features, Chinese convertibles are more equity-like –the average theoretical conversion rate (delta measure) is 43.8%, which is much higher than the corresponding figure (27.96%) in a sample of Western European companies (Dutordoir and Van de Gucht, 2009). So why is this the case? Recall the traditional pecking order theory of Myers (1984) where, when financing is needed, firms shall first rely on internal financing, then debt, and lastly raising equity as a "last resort". However, due to the different institutional environment in China, such as weak creditor protection and ineffective bankruptcy enforcement, dominated state-controlled firms and concentrated ownership, the controlling shareholder and the managers have the incentive to issue seasoned equity when a financing is needed, Chen (2004) thus proposes a new pecking order model in China, i.e. retained funding, equity and finance.

Our finding is generally consistent with Chen's (2004) argument: we find that firms tend to issue convertible bonds even when the debt-related cost is lower and debt capacity is higher. The question remains, however, as to why Chinese convertible issuers do not tap the seasoned equity market instead. The regression results displayed

in table 5, the low coupon rate, and the unfavorable market reaction to SEOs (Liu et al., 2016) identify a consistent picture to answer this question: convertible bond issuers are larger firms with higher debt capacity, and also want to take advantage of the interest rate deduction and to avoid shareholders' wealth loss.

6. Conclusion

Our understanding on the convertible bond issuance is mainly based on firms in developed markets, little is known about Chinese firms in this regard. In this paper, we study why firms issue convertible bonds in China by investigating 77 convertible bonds, 655 straight debts and 1,089 seasoned equities issuances during 2003-2014. We find that the average of the *ex post* actual conversion rate of convertible bonds is 96.18%, indicating that almost all convertible bonds in Chinese stock markets were eventually converted to equities, which is a strong indication that convertibles are used as delayed equity. This motivation is reflected with the equity-like design of most convertible bonds in the Chinese market. Further, our multinomial logit model shows that firms tend to issue convertible bonds over straight debts when the debt-related cost is low and the stock price run-up is high, and bigger firms tend to issue convertible bonds over seasoned equities when risk-free rate is low. In addition, we find that the convertible bonds in China are on average underpriced at the initial trading day.

Appendix

Table A1 Variable description

Total assets (million yuan)	Total assets denote booking value of total assets.
Volatility	Volatility denotes the annualized stock return volatility, and is based on daily stock returns measured over the 60 days before the security issue.
Stock run-up1	Stock run-up1 is the cumulative daily stock return over the window 90 to 2 trading days before the security issue.
Stock run-up2	Stock run-up2 is the cumulative daily stock return over the window 360 to 91 trading days before the security issue.
Leverage	Leverage is total debt divided by total assets.
Profitability (ROA)	Profitability is return on assets, calculated as net income divided by the book value of total assets.
Market-to-book	Market-to-book is the market capitalization divided by the book value of total assets.
Slack/TA	Slack/TA denotes financial slack to total assets, calculated as net operating cash flow minus cash dividends minus capital expenditures over the book value of total assets.
Tax/TA	Tax/TA is the ratio of income taxes to total assets.
Issue size/MV	Issue size/MV is offering proceeds to market capitalization.
Sales growth	Sales growth is yearly sales growth.
State ownership	State ownership captures the proportion of state-held shares at the end of year.
Herfindal 5	Herfindal 5 is an indicator for ownership concentration, calculated as the sum of squared ownership proportions held by each of the top five shareholders.
Market run-up	Market run-up is calculated as return on the Shanghai Composite index over the window (-90, -2) before the security issue.
Market volatility	Market volatility is the annualized Shanghai Composite index return volatility based on daily index returns measured over the 60 days before the security issue.
Risk-free rate	Risk-free rate before 2007 is three-month

	coupon rate for PBOC's (People's Bank of China) notes; after 2007, it is three-month Shibor (Shanghai interbank offered rate).
Pprts	Pprts is PropertyRights; it denotes the number of domestic trademark applications per firm for a certain province and year.
Rlaw	Rlaw is RuleofLaw; it denotes the number of lawyers per 10,000 people for a certain province and year.
Underpricing1	Underpricing1 is convertible bond underpricing which is calculated by assuming that stock price follows a trinomial tree in Tsiveriotis and Fernandes's (1998) model.
Underpricing2	Underpricing2 is convertible bond underpricing which is calculated by assuming that stock price follows a binomial tree in Tsiveriotis and Fernandes's (1998) model.
Credit rating	Convertible bond credit rating: in total there are five different ratings, ranging from AA- to AAA. We assign each a numerical ranking, from highest (5) to lowest (1), AAA=5, AAA-=4, AA+=3, AA=2 and AA-=1.
Issue volume (million)	Issue volume is the total issue volume of convertible bond.
Coupon rate (%)	Coupon rate denotes the interest rate on convertible bond face value. Note that some convertible bonds have different coupon rates for each year; in those cases, we use the average of the coupon rate.

Table A2 Correlation matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1)Total assets	1													
(2)Volatility	**0.092**	1												
(3)Stock run-up1	-0.039	**0.08**	1											
(4)Stock run-up2	**-0.082**	0.044	**0.122**	1										
(5)Leverage	**0.388**	**0.178**	**0.081**	0.046	1									
(6)Profitability	0.043	**0.086**	-0.043	**0.166**	**-0.179**	1								
(7)Market-to-book	**-0.537**	**-0.08**	**0.063**	**0.261**	**-0.458**	**0.313**	1							
(8)Slack/TA	**-0.157**	0.039	0.007	-0.013	**0.048**	**-0.141**	**-0.302**	1						
(9)Tax/TA	0.028	0.031	**0.077**	-0.017	**0.066**	-0.027	0.002	0.001	1					
(10)Issue size/MV	**-0.203**	**-0.077**	0.024	**0.051**	**-0.211**	**0.163**	**0.248**	**0.209**	0.057	1				
(11)Sales growth	**-0.039**	-0.011	**0.048**	**0.058**	**-0.057**	**0.103**	0.028	-0.021	0.032	0.004	1			
(12)Market run-up	0.007	**0.053**	**0.347**	0.288	**0.046**	0.028	**0.06**	-0.044	0.019	0.046	0.041	1		
(13)Market volatility	**0.082**	**0.28**	0.033	0.175	**0.155**	**0.163**	-0.021	0.032	-0.008	**-0.061**	0.005	0.035	1	
(14)Risk-free rate	**-0.079**	**-0.256**	**-0.24**	-0.115	-0.064	-0.16	**0.111**	**-0.088**	0.007	**-0.048**	**-0.071**	**-0.299**	**-0.361**	1

Note: This table presents Spearman pairwise correlation coefficients among variables based on the full sample that includes 1,821 firm-year observations. Bold text indicates that the coefficient is significant at 5% or higher significance level.

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Table 1 Descriptive statistics for security issues

This table reports the number of issues by year, along with percentages, for a sample of convertible bonds, straight debt and seasoned equity issues officered by Chinese listed firms (excluding financials) between January 2003 and December 2014.

	Convertible issuance		Debt issuance		Equity issuance	
Year	No of issues	Percentage	No of issues	Percentage	No of issues	Percentage
2003	14	18.18	0	0	13	1.19
2004	11	14.29	2	0.31	11	1.01
2005	0	0	19	2.9	4	0.37
2006	6	7.79	55	8.4	50	4.59
2007	9	11.69	28	4.27	143	13.13
2008	4	5.19	25	3.82	95	8.72
2009	5	6.49	48	7.33	89	8.17
2010	3	3.9	56	8.55	113	10.38
2011	5	6.49	108	16.49	118	10.84
2012	3	3.9	155	23.66	84	7.71
2013	7	9.09	95	14.5	159	14.6
2014	10	12.99	64	9.77	210	19.28
Total	77	100	655	100	1089	100

Table 2 Summary statistics

Panel A reports descriptive firm-specific statistics for samples of straight debt, convertible debt and equity offerings made by Chinese industrial companies between January 2003 and December 2014. The security samples are retrieved from the Seasoned Equity Offerings Database and China's Bond Market Database. The convertible debt sample consists of 77 offerings, the straight debt sample consists of 655 offerings, and the equity sample consists of 1,089 offerings. Firm-specific characteristics are obtained from RESSET and Wind databases and measured at fiscal year-end prior to the security announcement date, unless otherwise indicated. Panel B reports descriptive convertible-specific statistics for samples of 77 convertible debt offerings made by Chinese industrial companies between January 2003 and December 2014. Variable descriptions can be found in Table A1.

	Convertible issuance		Debt issuance		Equity issuance	
Panel A	Mean	Median	Mean	Median	Mean	Median
Firm-Specific Variables						
Total assets (million yuan)	13,500	4,250	12,400	5,790	7,320	2,820
Volatility	0.052	0.046	0.062	0.055	0.060	0.055
Stock run-up1	0.036	0.035	0.005	-0.002	0.026	0.013
Stock run-up2	0.032	0.010	-0.022	-0.035	0.095	0.081
Leverage	0.352	0.434	0.524	0.539	0.474	0.477
Profitability (ROA)	0.029	0.020	0.020	0.012	0.027	0.017
Market-to-book	0.601	1.017	0.780	0.968	1.059	1.512
Slack/TA	-0.087	-0.003	0.017	-0.009	-0.006	-0.010
Tax/TA	0.021	0.012	0.010	0.008	0.014	0.009
Issue size/MV	0.206	0.166	0.106	0.083	0.201	0.163
Sales growth	0.162	0.095	0.132	0.076	0.166	0.121
State ownership	0.227	0.0002	0.125	0	0.122	0
Herfindal 5	0.262	0.243	0.189	0.163	0.175	0.144
Macroeconomic- and Provincial-level Variables						
Market run-up	0.033	0.029	0.030	0.029	0.033	0.021
Market volatility	0.014	0.013	0.013	0.012	0.014	0.013
Risk-free rate	0.033	0.025	0.043	0.039	0.038	0.043
Pprts	4.181	0.407	4.575	0.57	3.105	0.57
Rlaw	0.774	0.479	0.751	0.609	0.808	0.609
Panel B	Mean	Median	S.D.	Min	Max	
Underpricing1	9.371	7.994	9.751	-9.738	41.077	
Underpricing2	9.432	8.152	9.829	-9.737	41.909	
Credit rating	3.558	4	1.482	1	5	
Issue volume (million)	13.6	8.2	15.6	2	100	
Coupon rate (%)	1.089	1.1	0.448	0.5	2.2	

Table 3 Pairwise difference in mean test

This table reports pairwise difference-in-mean tests of firm characteristics between convertible bond (CB) and straight debt and convertible bond (CB) and seasoned equity-issuing firms. Table A1 gives the definitions of all the variables. *, **, and *** denote significance at the 0.10, 0.05, and 0.01 levels.

	CB vs straight debt	CB vs equity
Firm-Specific Variables		
Total assets (million yuan)	1,110	6,170***
Volatility	-0.010**	-0.008**
Stock run-up1	0.031**	-0.004
Stock run-up2	0.054**	-0.074*
Leverage	-0.172***	-0.122***
Profitability (ROA)	0.008**	0.002
Market-to-book	-0.179***	-0.458***
Slack/TA	-0.104	-0.081
Tax/TA	0.011***	0.007***
Issue size/MV	0.117***	0.005
Sales growth	0.081	-0.004
State ownership	0.101***	0.104***
Herfindal 5	0.072***	0.087***
Macroeconomic- and Provincial-level Variables		
Market run-up	0.003	-0.0005
Market volatility	0.001*	-0.0003
Risk-free rate	-0.006***	-0.005***
Pprts	-0.393	1.077
Rlaw	0.022	-0.035

Table 4 Multinomial logistic regression analysis of the choice between convertible and straight debt

This table reports the coefficients and t-statistics of multinomial logit regressions for the choice between convertible debt and straight debt. These pairwise regression results are the outcome of a multinomial security choice model that simultaneously incorporates the choice between convertible debt, straight debt, and equity. Table A1 gives the definition of all the variables. *, **, and *** denote significance at the 0.10, 0.05, and 0.01 levels.

Variables	M1	M2	M3
Total assets (logged)	0.263*	0.318**	0.076
	[1.827]	[2.101]	[0.490]
Volatility (logged)	-0.548***	-0.556***	-0.544***
	[-2.910]	[-2.914]	[-2.826]
Stock run-up1	3.404***	3.440***	3.349***
	[2.625]	[2.644]	[2.584]
Stock run-up2	1.866***	1.906***	2.058***
	[2.719]	[2.767]	[2.971]
Leverage	-3.451***	-3.585***	-3.203***
	[-4.619]	[-4.769]	[-4.243]
Profitability (ROA)	6.907	7.008	5.317
	[1.616]	[1.619]	[1.231]
Market-to-book (logged)	0.302	0.283	0.218
	[1.099]	[1.017]	[0.790]
Issue size/MV	11.430***	11.484***	10.907***
	[6.966]	[6.974]	[6.641]
Slack/TA	-0.447*	-0.462*	-0.438*
	[-1.807]	[-1.841]	[-1.788]
Tax/TA	11.214	12.000	10.519
	[1.285]	[1.369]	[1.192]
Sales growth	0.065	0.054	0.087
	[0.168]	[0.140]	[0.226]
Market run-up	-0.916	-0.893	-1.003
	[-0.948]	[-0.913]	[-1.031]
Market volatility	48.272*	46.545*	51.992*
	[1.737]	[1.663]	[1.889]
Risk-free rate	-11.055	-13.372	-7.952
	[-0.890]	[-1.067]	[-0.623]
Pprts		-0.022	
		[-1.570]	
Rlaw		0.058	
		[0.300]	
State ownership			0.170
			[0.278]
Herfindal 5			3.136***

			[2.981]
Constant	-10.376***	-11.449***	-7.039**
	[-3.116]	[-3.329]	[-2.012]
Pseudo R^2	0.3034	0.3049	0.3085
Observations	1,821	1,821	1,821

Table 5 Multinomial logistic regression analysis of the choice between convertible and seasoned equity offering.

This table reports the coefficients and t-statistics of multinomial logit regressions for the choice between convertible debt and seasoned equity. These pairwise regression results are the outcome of a multinomial security choice model that simultaneously incorporates the choice between convertible debt, straight debt, and equity. Table A1 gives the definition of all the variables. *, **, and *** denote significance at the 0.10, 0.05, and 0.01 levels.

Variables	M1	M2	M3
Total assets (logged)	0.422***	0.469***	0.212
	[2.964]	[3.159]	[1.376]
Volatility (logged)	-0.280	-0.288	-0.278
	[-1.562]	[-1.584]	[-1.510]
Stock run-up1	1.443	1.446	1.361
	[1.145]	[1.145]	[1.077]
Stock run-up2	-0.449	-0.435	-0.244
	[-0.682]	[-0.658]	[-0.366]
Leverage	-4.220***	-4.348***	-3.978***
	[-5.895]	[-6.025]	[-5.481]
Profitability (ROA)	3.069	2.961	1.386
	[0.784]	[0.746]	[0.351]
Market-to-book (logged)	-1.342***	-1.349***	-1.445***
	[-5.099]	[-5.062]	[-5.421]
Issue size/MV	-5.690***	-5.627***	-6.331***
	[-3.916]	[-3.862]	[-4.338]
Slack/TA	-0.387	-0.403*	-0.381
	[-1.629]	[-1.668]	[-1.624]
Tax/TA	18.715***	20.013***	17.682***
	[2.889]	[3.039]	[2.686]
Sales growth	-0.263	-0.272	-0.240
	[-0.708]	[-0.734]	[-0.647]
Market run-up	-0.004	0.053	-0.078
	[-0.004]	[0.057]	[-0.084]
Market volatility	-2.442	-3.610	1.054
	[-0.092]	[-0.135]	[0.040]
Risk-free rate	-25.025**	-27.093**	-21.468*
	[-2.072]	[-2.230]	[-1.726]
Pprts		-0.019	
		[-1.404]	
Rlaw		-0.046	
		[-0.245]	
State ownership			0.246
			[0.419]
Herfindal 5			3.604***

			[3.546]
Constant	-9.166***	-10.011***	-5.398
	[-2.810]	[-2.989]	[-1.570]
Pseudo R^2	0.3034	0.3049	0.3085
Observations	1,821	1,821	1,821

Table 6 OLS regression of the determinants of convertible bond underpricing.

This table reports the coefficients and heteroskedasticity-adjusted robust t-statistics of OLS regressions for the determinants of convertible bond underpricing. Table 2 gives the definitions of all the variables. *, **, and *** denote significance at the 0.10, 0.05, and 0.01 levels.

VARIABLES	Expected sign	M1 underpricing1	M2 underpricing2	M3 underpricing1	M4 underpricing2
Issue Volume (logged)	+	-0.943 [-0.676]	-0.990 [-0.695]		
Issue size/MV	+			-8.719 [-0.941]	-9.581 [-1.029]
Credit rating	-	-0.302 [-0.408]	-0.291 [-0.389]	-0.435 [-0.590]	-0.425 [-0.571]
Coupon rate	+	-0.627 [-0.280]	-0.509 [-0.225]	0.921 [0.357]	1.156 [0.444]
Stock run-up1	-	1.820 [0.159]	1.265 [0.109]	0.857 [0.074]	0.231 [0.020]
Stock run-up2	-	18.241*** [3.108]	18.500*** [3.111]	16.696*** [2.713]	16.786*** [2.703]
Constant		25.632 [1.099]	26.276 [1.103]	11.147*** [3.110]	11.115*** [3.105]
R-squared		0.159	0.160	0.165	0.168
Observations		77	77	77	77