



# A Study on the Bifurcation of the Proceeds from Convertible Bonds Issuance and Its Policy Significance for Chinese Accounting Standards

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## Abstract

It is difficult to separate the proceeds from a convertible bonds issue into debt and equity components. Based on some previous different approaches, there is a focus on the improved approach whose views are convertible bond issue proceeds can be separated into accrual debt value, accrual equity value and accrual option value according to the characteristics of debt, equity and hybrid securities with embedded option of convertible bonds. It is concluded that the improved approach can be more in accord with modern financial theory and provide a more accurate evaluation of capital structure. And there are some policy significances for Chinese Accounting Standards.

**Keywords:** Proceeds from convertible bonds issue, Bifurcation, Policy significance

## 1. Introduction

Around the world, the issue size of the Convertible Bond has been increased to more than US\$600 billion since New York and Erie RailRoad in USA issued the first convertible bonds in 1843. The convertibles market collapsed last September after Lehman Brothers filed for bankruptcy protection. Recently, with a rising market in American, new issues have begun to make a comeback, with 9 listed companies and a combined capitalisation of more than 3.2 billion dollars after more than one year extended lull.

In China, Since China Baoan Group Co.,Ltd issued the first convertible bonds in 1992 (so far), 40 or so convertible bonds are being traded on the Shanghai and Shenzhen stock exchanges, with a combined capitalisation of more than 50 billion Yuan. Chinese firms, spurred by a rebounding domestic share market in financial crisis, are poised to launch a boom in convertible bond issuance. In fact, convertible market trading volume hits near 6-year high. Turnover in the fledgling market reached 5.37 billion Yuan in February 2009, the highest since December 2003, and remained relatively high at 3.33 billion Yuan in March 2009. China convertible bond issuance set to surge again.

Convertible bonds can be swapped for equity when the stock rises to a preset level, and if the shares don't perform, holders are protected by the security's value as a bond. So they are very attractive. However, a convertible bond is a special financial product without a reciprocal obligation for both sides which is embedded options, having the characteristics of both debt and equity. So it is difficult to recognize and measure its potential value. So the primary purpose of this paper is to research the bifurcation method of the proceeds from convertible bonds issuance and its policy significance for current Chinese Accounting Standards.

## 2. Former Studies on the Division of Convertible Bond Issue Proceeds

According to current accounting standards APB Opinion No.14 which is still effective in US today, the issuing company maintain rigid and simplified classification throughout the life of the convertible debt even as the value of the option to convert changes subsequent to issuance. The International Accounting Standards Board issued International Accounting

Standard No. 32 in 1998 requiring the division of convertible bonds into debt and equity but without specific rules on how to calculate the debt and equity values. Instead, this standard offers only suggestions. One is to value the debt component as the present value of the interest payments and the principal and then subtract this amount from the total value of the debt issue to arrive at the value of the equity portion. The other suggestion is from Black-Scholes model, which directly gets the future value, and then gets the debt value by subtracting future value from total issue proceeds.

Before 2006, Chinese current accounting standards also view convertible bonds as debt. The Chinese Finance Minister issued Accounting Standard for Business Enterprises No.22, No. 34, No. 37 in 2006, which was carried out on January 1, 2007. These new accounting standards require the initial issue price to be split between debt and equity.

In addition, in China, according to Zhu (2006, p.69), convertible bond value equals straight bond value and conversion option value, which is in fact a finally hybrid security. Si (2004, p.15) viewed the value of convertible bonds as portfolios of straight bond and embedded options.

All over the world, before Marcelle and Ann (2005, p.44) brought forward the expected value, most studies focused on the effect on convertible bonds by Modern Option Pricing Theory. Vigeland (1982, p.348) was an earlier researcher who noted that the option theory could be applied to the probability and timing of conversions. King (1984, p.419) actually calculated the option values for many convertible bond issues and regarded as equity.

The current accounting practice and theory has offered a useful framework for applying the current accounting standards for the initial value recognition of convertible bonds. However, as a derivative financial instrument, the option of being converted or not being converted for convertible bonds has not been embodied in the earlier accounting practice and research. But the last expected value method brought forward by Marcelle and Ann (2005) has made significant contributions in these developments.

The Expected Value Method believes that the embedded option of convertible bonds is neither debt nor equity, but with the change of the underlying price, it can produce both debt and equity. If the bond is converted, the bond principal does not need to be repaid. The only payments will be the coupons that were paid prior to conversion. If the bond is not converted, all principal and coupons will be paid. So the expected value of the convertible bond is built on the probabilities of conversion. In certain convertible probability, the expected value of debt is the weighted average of straight bond value and present coupon value, and the weight is the probability of conversion. Accordingly, the expected value of equity can be obtained by subtracting expected debt value from total price of bond issued, which can also be obtained from Black-Scholes model.

That is to say, if  $n$  is potential number of shares,  $p$  is conversion probability, the expected number of shares is  $n(p)$ . The probability of conversion ( $p$ ) is the key factor which can be calculated by the Black-Scholes model.

So the formula about the expected value of the debt and the expected equity value are as follows:

The expected value of the debt =  $(1-p)(\text{value of the straight bond}) + p(\text{value of the coupons})$

The expected equity value = total value - the expected value of the debt

The above methodology also called the separating method, dynamically separates and recognizes the debt and equity value of the total convertible bond issued on the basis of convertible probability, other than IAS32 viewing the value of straight bonds as the value of debt, whether on the date of issuance or right after.

### 3. Improved Approach

The potential value for convertible bonds varies with the market price of the underlying stock and the probability of conversion, which is new dynamic notion. The expected value method has used this notion.

For convertible bonds, sometimes it is equity, sometimes debt, and sometimes both of them. No matter what the situation is, it always has the feature of option before it is converted. And these probabilities shall be embodied on the way of recognition and measurement of the potential share value of conversion for convertible bonds.

Firstly, if there is no conversion at maturity, convertible bonds are characterized as debt, but there is still option compared with vanilla bond. So bond issue proceeds should be divided into the straight bonds value and the option value.

Convertible bond issue proceeds = accrual debt value + accrual option value

Accrual debt value = straight bond value = present value of principal and coupons

Accrual option value = convertible bond issue proceeds - accrual debt value

Secondly, if it is converted completely at maturity, convertible bond is characterized as equity. The bond holder can end up as equivalent stocks at maturity. So convertible bond issue proceeds is the summation of conversion shares value and conversion option value.

Convertible bond issue proceeds = accrual equity value + accrual option value

Accrual equity value = straight equity value = present value of conversion shares value

Accrual option value = convertible bond issue proceeds - accrual equity value

Eventually, if conversion probability is  $p$ , convertibles have “ $p$ ” probability of ending up as stock and “ $1-p$ ” probability of ending up as debt. So convertible bond issue proceeds can be recorded the summation of debt value, equity value and conversion option value.

Convertible bond issue proceeds = accrual debt value + accrual equity value + accrual option value

Accrual debt value =  $(1-p) * \text{straight bond value}$

Accrual equity value =  $p * \text{present value of straight equity}$

Accrual option value = convertible bond issue proceeds - (accrual debt value + accrual equity value)

The method analyzed above is the improved approach. It suggests that if convertible bonds are entirely converted, convertible bond issue proceeds is the summation of option value inherent in a convertible bond and straight equity value which here is a counterpoint of present value of the coupons in the expected value method.

Therefore different understanding of economic reality of convertible bonds above results in different ways to bifurcate issue yield. Then different approaches will influence accurate estimates of debt, equity, diluted EPS and capital structure.

#### 4. Test of Different Methods

Next, we will test and analyze the differences among methods above taking China Merchants Bank’s convertible bonds as an example.

China Merchants Bank founded in 1987, with the stockholding reorganization in May, 1994, has become the first joint stock commercial banks in China and the largest among listed banks based on total asset size. On November 10th, 2004, it issued a 5-year convertible bond with a face value of 6.5 billion Yuan and a coupon rate of 1.75%, which is 3.75% below the straight bond’s 5.5% because of embedded option. Each 1000 Yuan convertible bond can be converted into 107.066381 shares of common stock at the bond’s maturity, i.e. conversion price is 9.34 Yuan. The issuer cannot call the bonds back. The current price of the stock is 9.1 Yuan. The stock pays no dividend. The expected price volatility is 17.52% based on the last year’s (250 working days) closing price of convertible bonds of China Merchants Bank. The risk-free interest rate of 2.25% is from the bank’s 5-year loan interest rates of the same term. The income tax rate is 33%. The net income is 3.144 billion Yuan.

We have purposely simplified the example by assuming that: 1) The issuer cannot call the bonds back; 2) There are no embedded options except for the call options represented by the conversion feature; 3) The call is European style; 4) The exercise date is the same as the bond’s maturity date. Based on these assumptions Black-Scholes model can be used.

Tab.1, Tab.2 and Tab.3 details the company’s convertible bond issue, its embedded option and initial capital structure. The company issued a 5-year convertible bond with a face value of 6.5 billion Yuan and a coupon rate of 1.75%, which contain 695.93 million options and valued at 0.55 Yuan each calculated by using the Black-Scholes model based on the parameters shown in the second column-total option value 0.38 billion Yuan. The present value of 6.5 billion Yuan straight bond without embedded option is 5.46 billion Yuan based on its principal and coupons, which is displayed in the first column. To the calculation of expected numbers of shares, expected value of debt and equity, the conversion probability is a key ingredient. If the bond has no other embedded options, such as issuer calls, and can be converted only at maturity, in the meanwhile the stock does not pay dividends, investors can be assumed to be rational,  $N(d_2)$  in the Black-Scholes model-the probability of the option being in the money at the exercise date-is the conversion probability in the case of a convertible bond.

Therefore Chinese practice now requires bifurcation of convertible bonds into debt and equity and earnings per share after dilution-the separating method following international accounting standard. Therefore there are four methods including straight debt method, separating method, expected value method and improved approach in this paper which are analyzed in Tab.4 to show how the calculation of diluted shares and EPS are affected. Because the straight debt method and the separating debt method have not considered the conversion probability while expected value method and improved approach have done, four methods are divided into two kinds in Tab.4: No.1 is the straight debt method and the separating debt method without consideration of conversion probability and No.2 is expected value method and the improved approach with consideration of conversion probability.

Tab.4 shows that owing to the conversion probability  $p$  0.864 results in the expected conversion shares of stock 601284797 shares in No.2 method other than 695931477.52 conversion shares of stock in No.1 method. Conversion probability is not considered and assumed it is converted completely so that No.1 method’s percentage dilution is 10.16%, which is higher than the percentage dilution 8.78% with the consideration of conversion probability 0.864. To

illustrate the impact on diluted EPS, net income is firstly recalculated by adding the interest associated with the convertible issue, after taxes, to net income. That is to say, in No.2 method, only the portion of the after-tax interest associated with the probability of conversion is added back while all the after-tax interest is added back in No.1 method. The result is a diluted EPS of 0.427 (3.22/7.54) for No.1 method. In contrast, diluted EPS under the second kind method is 0.431(3.21/7.45). Apparently, the diluted EPS of No.1 method is less relatively and is understated. Besides, compared to the Basic EPS 0.46, both EPS are lowered and the effect of dilution is very obvious.

From the above analysis we can see that No.1 method is based on the assumption of “converted entirely”. Especially in straight debt method, convertible bonds are totally treated as debt, which obviously can not portray economic reality of “converted entirely”. In contrast with them, No.2 method can do it well.

Tab.5 illustrates how the leverage calculation is affected by four methods-the straight debt method (No.1), the separating debt method (No.2), the expected value approach (No.3) and the improved approach (No.4). The calculation of most data is figured in Tab.1,2 ,3, but two data will be especially explained as follows:

Firstly, in the expected value method, the expected debt value =  $(1-0.864) \times 5.46 + 0.864 \times 0.49 = 1.16$  billion yuan.

Secondly, in the improved method, accrual debt value =  $(1-0.864) \times 5.46 = 0.74$  billion yuan, accrual equity value =  $0.864 \times 6.50 \times 0.765134 = 4.30$  billion yuan, accrual option value =  $6.50 - 0.74 - 4.30 = 1.46$  billion Yuan.

Namrly, in the improved approach, convertible bond issue proceeds 6.5 billion is divided into three parts of debt, equity and option, 0.74, 4.30 and 1.46 billion yuan respectively. However, both equity and option increase in owner's equity, which must be credited to owner's equity accounts and may affect the leverage and profitability.

In Tab.5, the debt to equity after issue becomes 9.44, 9.27, 8.62 and 8.56 respectively because of the different methods while the debt to equity before issue is the same. It is because with the straight debt method, the convertible bonds are totally viewed as debt, without reflecting the shares and embedded option value. And the separating debt method regards the straight bond value as the debt value while the expected value method regards the expected debt value as debt value. Because the straight debt value is always higher than the expected debt value, the debt value in separating debt method is always higher than that in expected value. With the improved approach, the separated debt value 0.74 billion Yuan is the smallest among the four methods, which make the highest equity value 5.76 billion Yuan, so the ratio of debt and equity is also smallest. The straight debt method overrates the ratio of debt and equity, but separating debt method, the expected value method and the improved approach portray the economic reality by the conversion probability gradually.

## 5. Conclusion and its policy significances

There is a focus on the improved approach whose views are convertible bond issue proceeds can be separated into accrual debt value, accrual equity value and accrual option value according to the characteristics of debt, equity and hybrid securities with embedded option of convertible bonds. It is concluded that the improved approach is a more accurate evaluation method of capital structure so that it can reflect more fully the economic reality of convertible bonds. Therefore there are some policy significances for Chinese Accounting Standards.

### 5.1 Current accounting rules must reflect more fully the economic reality of convertible bonds

Just like The International Accounting Standards, Chinese Accounting Standard for Business Enterprises No.37 requires the division of convertible bonds into debt and equity. But it doesn't value the option so that it doesn't reflect fully the economic reality of convertible bonds.

### 5.2 The definition of liability must include convertible bonds

Chinese Enterprise Accounting Basic Standards defines a liability as probable future sacrifices of economic benefits arising from present obligations of a particular entity to transfer assets or provide services to other entities in the future as a result of past transactions or events. But convertible bonds, viewed as an equity transaction and unissued stock, are not considered an asset and economic benefits. Then convertible bonds can not be “future sacrifices of economic benefits” to redeem debt. So there is a conflict between the definition of liability and convertible bonds characteristics.

### 5.3 The diluted EPS must be computed based on the probabilities of conversion

The potential shares are included in calculating diluted EPS according to Chinese Accounting Standard for Business Enterprises No.34. This is a big step forward. But it is much better if the probabilities of conversion are its reasoning.

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Table 1. CMB's convertible bond issue

Convertible Bond Issue (billion Yuan)	
Issue size	6.50
Coupon	1.75%
Maturity	5
Numbers of potential shares in issue	695931477.52
Implicit strike price	9.34
Yield on vanilla bond	5.50%
value of straight bond	5.46
Value of options	0.38

Table 2. CMB's previous debt and equity issues

Prior Debt and Equity (billion Yuan)	
Debt	581.88
Numbers of shares	6.85
Equity Value	62.32

Table 3. CMB's Conversion Option

Conversion Option	
Current stock price	9.1
Strike price	9.34
Volatility	0.01752
Risk-free rate	2.25%
Dividend	0
Value of each option	0.55
Conversion probability, p	0.864

Table 4. Effect of convertible bond issue on CMB's EPS(billion Yuan)

Measure calculated	No. 1	No. 2
Preexisting shares①(Numbers of shares)	6848181636	6848181636
Additional shares from convertible issue②	695931477.52	601284797
Total shares after issue ③=①+②	7544113114	7449466433
Percentage dilution ④=②/①	0.1016	0.087
Net income after tax(NIAT) ⑤	3.14	3.14
Basic EPS⑥=⑤/①	0.46	0.46
NIAT of diluted EPS ⑦	3.22a	3.21b
Diluted EPS⑧=⑦/③	0.427	0.431

Note: (a) Net income is recalculated by adding the interest associated with the convertible issue [ $6500000000 \times 1.75\% \times (1-33\%) = 76212500$ ] to net income. (b) Only conversion portion of bond's coupons ( $76212500 \times 0.864 = 65847600$ ) is added.

Table 5. Leverage measures for CMB (billion Yuan)

Measure Calculated	No. 1	No. 2	No. 3	No. 4
Debt prior to new issue(1)	581.88	581.88	581.88	581.88
convertible bond issue proceeds (2)	6.50	6.50	6.50	6.50
Value of equity prior to issue of convertible bonds(3)	62.32	62.32	62.32	62.32
Equity part of new bond issue(4)=(2)-(9)	0	1.04	5.34	5.76
Total equity value(5)=(3)+(4)	62.32	63.36	67.66	68.08
PV of convertible bond face(6)	4.97	4.97	4.97	4.97
PV of bond's coupons(7)	0.49	0.49	0.49	0.49
Value of straight bond(8)=(6)+(7)	5.46	5.46	5.46	5.46
Value of "debt" in issue(9)	6.50	5.46	1.16	0.74
Total debt after issue(10)=(1)+(9)	588.38	587.34	583.05	582.63
Debt to equity before issue(11)=(1)/(3)	9.34	9.34	9.34	9.34
Debt to equity after issue(12)=(10)/(5)	9.44	9.27	8.62	8.56