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Mispricing of Chinese warrants



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ABSTRACT

From August 2005 to December 2008, a total of 54 warrants were issued in China. Trading in China's warrant market was extremely active – on a daily basis, turnover often exceeded one. Using three standard pricing models, we document that put warrant market prices averaged 1.2 yuan more than model-generated prices, while call warrant prices averaged 1.9 yuan less. Financial institutions that were authorized to create new warrants exploited these pricing anomalies and generated 20 billion yuan (over \$3 billion) in creating overpriced put warrants. We identify two important factors that explain the mispricing. First, we show that the P/E ratios of underlying stocks are related to the overpricing of put warrants and the underpricing of call warrants. This suggests that investors took the potential burst of a stock market bubble into account and thus imposed an implicit discount on the value of stocks when pricing warrants. Second, investors were paying a premium on warrants to fulfill their speculation/trading purposes. Investors also switched from stock trading to warrant trading after an exogenous increase in a stock transaction tax.

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1. Introduction

From August 2005 to December 2008, a total of 54 warrants were issued in China, and trading was extremely active. On a daily basis 13 billion warrants, with a value of about 22 billion yuan, or 3.4 billion dollars, were traded on average. The maximum daily trading volume was over 73 billion warrants, which was more than 137 billion yuan, or 21 billion dollars. With outstanding warrants averaging 12.9 billion, daily turnover often exceeded one.

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While trading was extremely active, the Chinese warrant market significantly mispriced both call and put warrants.² The 36 call warrants were consistently underpriced relative to theoretical prices constructed using several well-established pricing models. For example, on April 30, 2007, the call warrant issued by Wu Liangye Company had a strike price of 6.809 yuan with 12 months until expiration. The closing price of the underlying stock was 35.66 yuan. Our pricing models generate a theoretical price of approximately 33.5 yuan. The closing price for this warrant, however, was only 24.9 yuan, or 8.6 yuan (26%) below the theoretical price. The closing price was even 4 yuan below the intrinsic value of 28.9 yuan. In contrast, the 18 put warrants were consistently overpriced relative to theoretical values. For example, on June 1, 2007, the put warrant issued by Yanhu Fertilizer had a strike price of 15.1 yuan with three weeks left until maturity. The underlying stock closed at 40.76 yuan. Our pricing models generate a theoretical price that is close to zero for this put warrant. However, the put warrant actually closed at 6.07 yuan on that day.

The aggregate mispricing for both call and put warrants was substantial during the sample period. In Fig. 1 we plot the sum across the active call and put warrants of market price minus theoretical price times the number of outstanding warrants. For call warrants, the aggregate undervaluation reached a peak in March 2008. At that point the 15 existing call warrants were collectively undervalued by approximately 32 billion yuan, or 5 billion dollars. For put warrants, the aggregate overvaluation reached a peak of 24 billion yuan, or 4 billion dollars in June of 2007.

The mispricing of Chinese warrants is also evident in the profits generated from warrant creation. Among the 54 warrants in our sample, 18 were creatable – China's Security Regulatory Commission (CSRC) authorized select financial institutions to create identical warrants and sell them to investors at market prices. This is effectively a short selling mechanism. There were 26 financial institutions that engaged in the creation program. In total, these institutions created 2.2 billion call warrants and 19.6 billion put warrants. They made an aggregate profit of 20 billion yuan in creating put warrants, but sustained losses of 578 million yuan in creating call warrants.

Why did the Chinese market so consistently underprice call warrants and overprice put warrants? We think there were two primary factors at work. First, concerns of a bubble in the Chinese stock market seemed to be present. In mid-2007, for example, the average price to earnings ratio of Chinese listed companies exceeded 50. The inability to short sell shares of stock eliminated the moderating effect of pessimistic traders and there were many comments in the common press hypothesizing the existence of a bubble. Indeed, the Shanghai Stock Market Index subsequently tumbled from over 6200 points to 1800 points over the following year. Since 2009 and up to the end of 2013, the Shanghai Index never exceeded 3500 points. Because the fundamental value of a warrant depends on the value of the underlying asset price during the exercise period, if investors were afraid of the possible burst of the bubble, they might value warrants using discounted stock prices. Using a discounted stock price inflates the value of a put warrant and deflates the value of a call warrant. The greater is the valuation of a particular stock, the more likely that a bubble exists, and the deeper the discount that investors will apply to price the corresponding warrant. Therefore, we predict that the greater the valuation of the underlying stock, the greater will be the underpricing of call warrants and the overpricing of put warrants. Empirically, we find that P/E ratios of underlying stocks have significant explanatory power for the pricing of warrants, particularly in explaining the pricing of call warrants. The underlying stock P/E ratio on its own can explain 21.5% of the variation in the pricing errors (market price–theoretical price) of call warrants. For example, an increase of P/E ratio by 10 exacerbates call warrant underpricing by 7.4 yuan.

The second primary factor that we think explains the mispricing of warrants is that investors were paying a premium to obtain securities that were attractive to speculators. According to Peng (2006), the majority of warrant investors were individual investors who lacked education in option pricing, and thus may have held heterogeneous beliefs about warrant values. In addition, in the Chinese warrant market, short selling was constrained and only possible via warrant creation. Under both heterogeneous beliefs and short-sale constraints, investors may speculate and drive up prices (Scheinkman and Xiong (2003)): they may buy warrants with the expectation of selling at a higher price in the future, thus generating a bubble.

² The last covered put warrant expired on Mar. 2008. The last covered call warrant expired on Dec. 2008. Later on, companies issued equity call warrants – the last one expired on Aug. 2011.

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