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# Warrant introduction effects on stock return processes

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## Abstract

As the underpricing of warrants remains unsolved after many adjustments presented by previous researchers, we further investigate the impact of the warrant introduction on the underlying stock return processes. This research attempts to determine whether the introduction of warrants influences the return processes of underlying stocks. If the introduction creates a potential dilution effect on stock return process, full dilution adjustment pricing models would lead to underpricing. To examine whether full dilution adjustment is required for warrant pricing, the Generalized Autoregressive Conditional Heteroscedasticity in Mean (GARCH-M) model has been extended to derive four models for testing the dilution effect on stock return processes. Empirical results show that the volatilities of underlying stock return processes are significantly reduced following warrant introduction even after distinguishing dilution from asymmetric effect.

# Notes

<sup>1</sup> The Black-Scholes warrant pricing model is presented by Black-Scholes ([1973](#)) and Galai and Schneller ([1978](#)); they showed that the Black-Scholes option pricing model can price warrants with some modifications and dilution adjustments.

<sup>2</sup> The literature focused on such impact was published by Alkeback and Hagelin ([1998](#)) and Becchetti ([1996](#)). Alkeback and Hagelin ([1998](#)) used the event study methodology to determine the effect on price, volatility and liquidity of the underlying stock at and around warrant introduction. Their results suggested that there is no real effect on the underlying stocks following the warrant introduction; thus there is no significant impact on the price or volatility. Becchetti ([1996](#)) analysed the effect of bond plus equity warrant (Warrant Bond, WB) issues on underlying asset volatility, and the empirical results indicate that the underlying stock volatility decreased after the introduction of WB.

<sup>3</sup> In 2005, HKEx published a brief comparison of the Hong Kong warrant market with overseas counterparts in terms of the number issued and turnover. It showed that Hong Kong was ranked number two in terms of annual turnover of listed warrants among world stock exchanges in 2003, just behind Deutsche Börse (DB) of Germany. Clarification of the double counts problem in Germany, Hong Kong became the world's most actively traded warrant market by turnover value in 2003.

<sup>4</sup> Riche Multi-Media HDG went public on 15 February 2000. The control period is briefly unavailable from 19990617 to 2000214.

<sup>5</sup> Each stock is plotted and it is found that most stocks appear to have smaller volatilities after warrant introduction. Because of page limitation, it is only possible to show the stock return process for some sample companies in the Appendix.

<sup>6</sup> The two deep-in-the-money issued warrants are Harmony Asset and Heritage Intl. HDG. When the warrants were introduced, the stock price was 102 times of the exercise price for the former and 45 times for the latter.

<sup>7</sup> Omitted samples: 1, 2, 3, 13, 15, 19, 27 and 32 are in [Table 1](#). Six of these eight samples (1, 2, 13, 15, 27 and 32) are never in the money, and the other two samples (3 and 19) are almost never in the money.



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