

Proportion of Derivative Warrants Expiring In-the-money and Out-of-the-money

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Summary

- *There are concerns that investors may suffer losses from investing in derivative warrants, as some believe that most derivative warrants expired out-of-the-money. The purposes of this paper are to examine the proportion of derivative warrants expiring in-the-money (ITM) and out-of-the money (OTM), and the factors accounting for that.*
- *The analysis is confined to assessing this single aspect of the derivative warrants market.*
- *For derivative warrants issued after January 2002 and expired before the end of August 2005, about 45% expired ITM whilst the other 55% expired OTM.*
- *As expected, the proportion of derivative warrants expiring ITM and the proportion expiring OTM appear to be associated with the performance of the stock market.*
- *In addition, on an individual underlying basis, the proportion seems to be associated with the performance of the underlying stock.*
- *The proportion of derivative warrants expiring ITM/OTM does not necessarily have any relationship with the profits or losses made by investors. Like the trading in stocks in general, an investor will make money if he can sell the warrants at a price higher than the price at which he initially purchases the warrants and vice versa.*

Objective

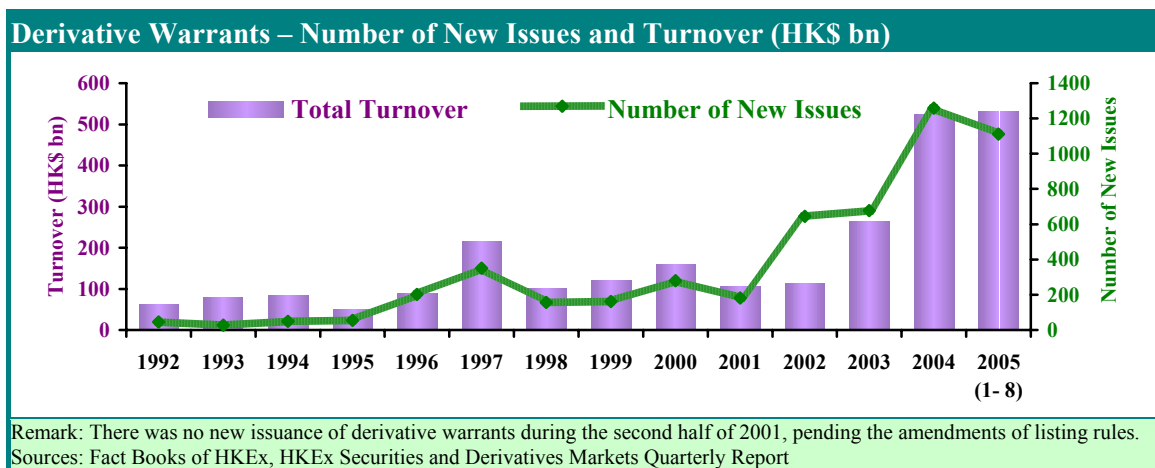
1. There are concerns that investors may suffer losses from investing in derivative warrants as some believe that most derivative warrants expired out-of-the-money. The purposes of this paper are to examine:
 - the proportion of derivative warrants expiring in-the-money (ITM) and the proportion expiring out-of-the-money (OTM); and
 - the factors accounting for that.

¹ This paper is for pure fact-finding and research purposes, and is not an attempt to comment on the developments of any markets/companies or interpret the policies concerned. The views expressed in this paper do not represent those of the SFC.

- The analysis is confined to assessing this single aspect of the derivative warrants market.

Background

- Following the amendments of the listing rules in January 2002 (which removed the obligations to place 85% of derivative warrants before a listing and introduced a requirement for warrant issuers to appoint a liquidity provider), the derivative warrants market was re-launched and has since grown remarkably.



- The derivative warrants market is an important component of the Hong Kong stock market. During the first eight months of 2005, 1,111 derivative warrants were issued, with a total issue size of HK\$108.4 bn. The turnover of derivative warrants amounted to HK\$531.9 bn, contributing 17.9% to the total market turnover during the period. Based on the information released by the World Federation of Exchanges (WFE) which captures trading on the world's major exchanges, Hong Kong was the most active derivative warrants market in the world in 2004.
- All derivative warrants have a fixed term of life. On expiration, some derivative warrants expire ITM whilst others expire OTM. If a derivative warrant expires ITM, the warrant holder will be able to benefit from the difference between the settlement price and the exercise price of the warrant. If a derivative warrant expires OTM, the warrant holder will lose the full value of the premium paid.
- Our results indicate that the proportion of derivative warrants expiring ITM/OTM appears to be associated with the performance of the stock market. In addition, on an individual underlying basis, the proportion of derivative warrants expiring ITM/OTM seems to be associated with the performance of the underlying stock.

7. It must also be pointed out that whether a derivative warrant expires ITM or OTM does not necessarily have any relationship with the profits or losses made by investors. Like the trading in stocks in general, an investor will make money if he can sell the warrants at a price higher than the price at which he initially purchases the warrants and vice versa.

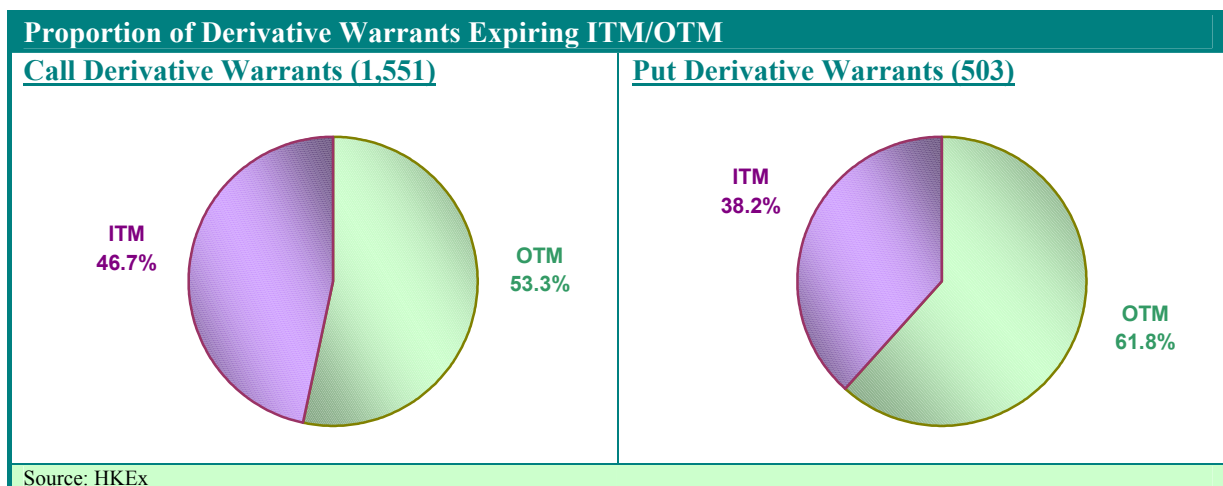
Methodology

8. This study only includes derivative warrants on individual common stocks and on the HSI, and does not cover exotic warrants and warrants on other underlying securities. It is because exotic warrants are of different nature and their final payoffs are calculated by different methods, and are not comparable to derivative warrants on individual common stocks. For simplicity purpose, warrants on baskets or currencies are also excluded in this study.
9. On expiry, a derivative warrant is considered as
- ITM if
 - exercise price \leq settlement price² for call issues and
 - exercise price \geq settlement price for put issues;
 - OTM if
 - exercise price $>$ settlement price for call issues and
 - exercise price $<$ settlement price for put issues.
- Of all derivative warrants in this study, only 0.6% expired at-the-money, i.e. with exercise price equal to settlement price. Thus, the inclusion of at-the-money warrants in the ITM group does not affect the results.
10. The study covers derivative warrants on individual common stocks and on the HSI issued since January 2002 and expired before the end of August 2005. During the period, 2,538 derivative warrants were issued and expired before the end of August 2005. Of these, 2,054 (80.9% of the total) were on individual common stocks and on the HSI which can be further broken down into:
- 1,551 call derivative warrants; and
 - 503 put derivative warrants.

² The settlement price for an equity warrant is calculated as the average of the closing prices of the underlying stock for the five trading days up to and including the trading day before the expiry day. The settlement price for an index warrant is taken as the final settlement price for the underlying index future contract of the expiry month.

About 45% of derivative warrants expired ITM, whilst the other 55% expired OTM

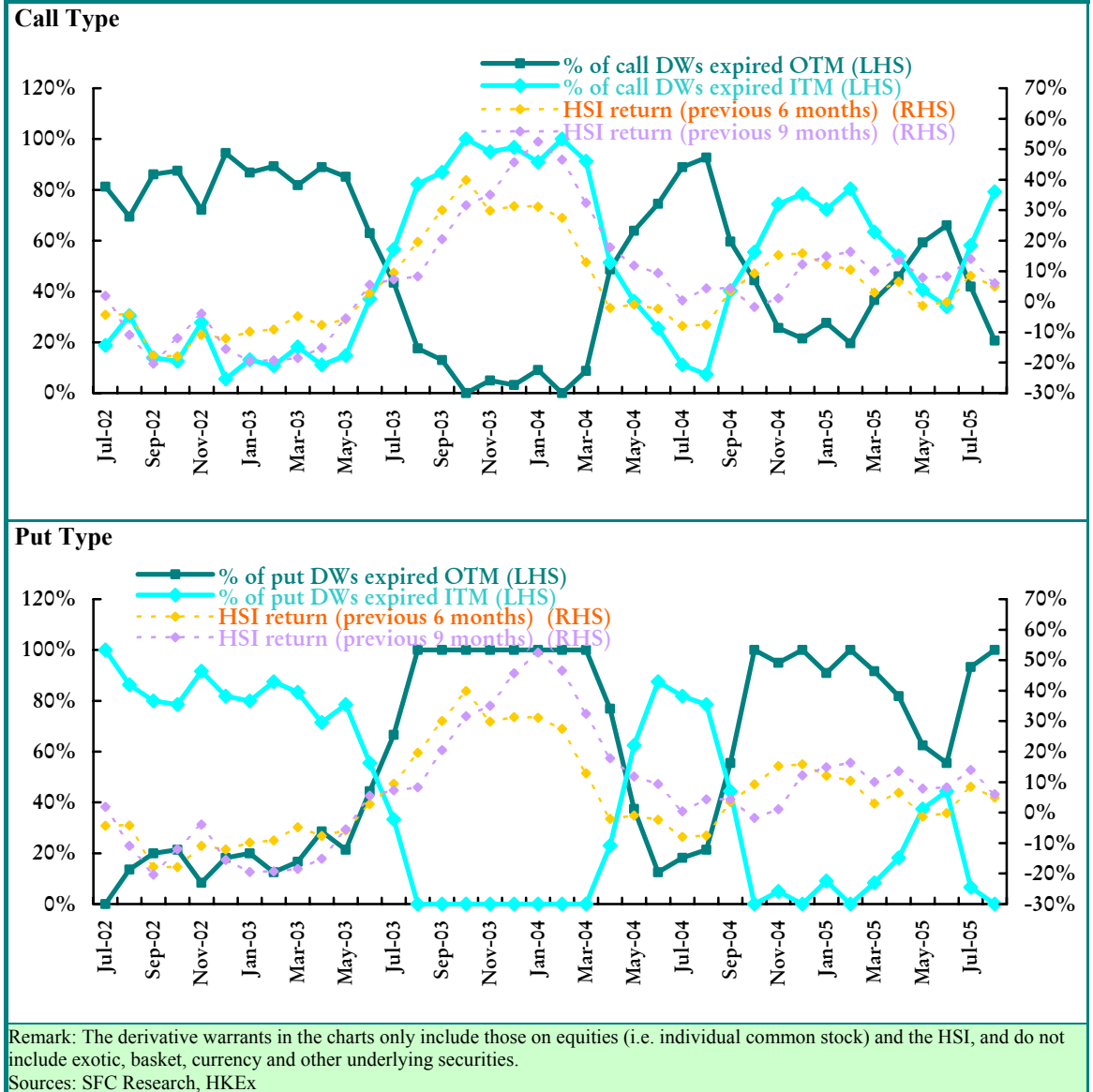
11. Of the 2,054 warrants, 917 (44.6%) derivative warrants expired ITM and 1,137 (55.4%) derivative warrants expired OTM. By type,
 - 46.7% of the 1,551 call derivative warrants expired ITM and the remaining 53.3% expired OTM.
 - 38.2% of the 503 put derivative warrants expired ITM and the remaining 61.8% expired OTM.



Proportion of derivative warrants expiring ITM/OTM is associated with market performance

12. As about 85% of the derivative warrants on individual common stocks and on the HSI are issued with a maturity of 6-9 months, market performance over a 6-9 month period is matched against the proportions of derivative warrants expiring ITM/OTM. The HSI is used as the benchmark index for measuring market performance.
13. The proportion of derivative warrants expiring ITM/OTM is associated with market performance (using the HSI as the benchmark index for market performance). For the 1,551 call derivative warrants on individual common stocks and the HSI issued after January 2002 and expired before the end of August 2005, it is found that the monthly proportion of call derivative warrants expiring ITM in a month was positively correlated with
 - the HSI return of previous 6 months with a correlation of 0.93; and
 - the HSI return of previous 9 months with a correlation of 0.84.
 Other things being equal, the better the market performance, the more likely the call warrants will expire ITM, thus the higher the proportion of warrants expiring ITM.

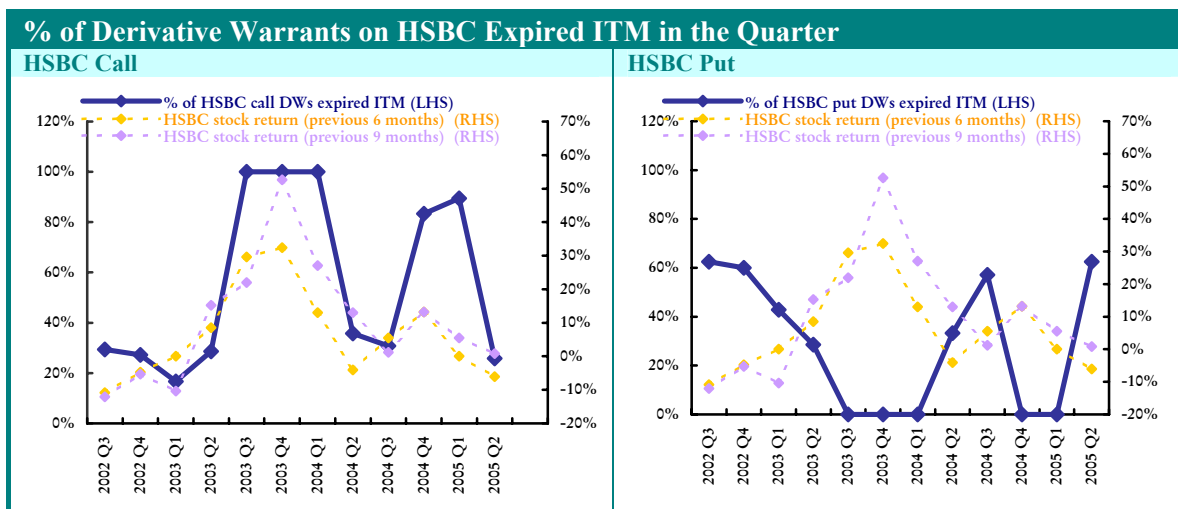
Proportion of Derivative Warrants Expiring ITM/OTM is Associated with Market Performance



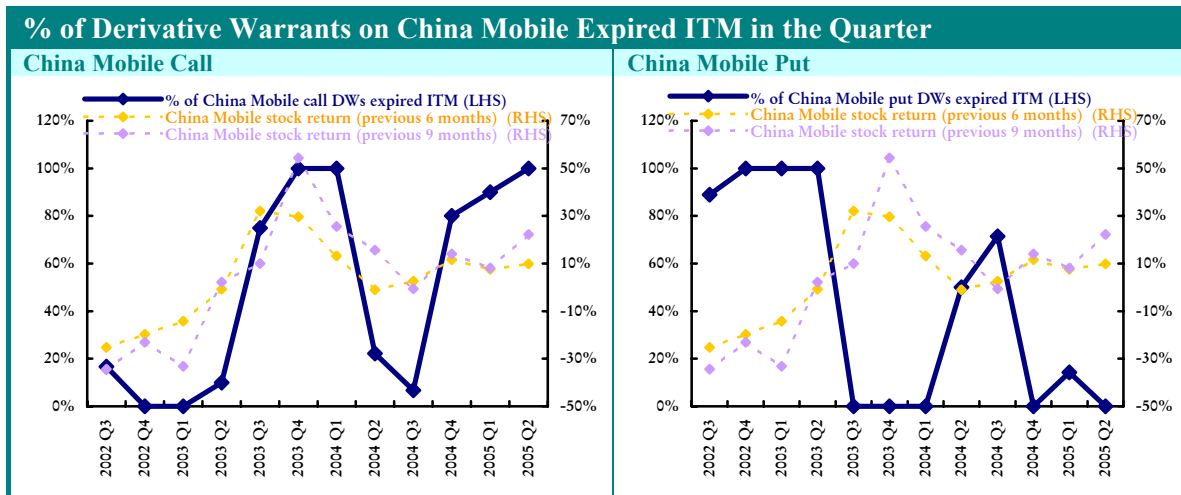
14. For the 503 put derivative warrants on individual common stocks and the HSI issued after January 2002 and expired before the end of August 2005, it is found that the monthly proportion of put derivative warrants expiring ITM in a month was negatively correlated with
- the HSI return of previous 6 months with a correlation of -0.83; and
 - the HSI return of previous 9 months with a correlation of -0.73.
- Other things being equal, the better the market performance, the more likely the put warrants will expire OTM, thus the lower the proportion of warrants expiring ITM.

On an individual underlying basis, proportion of derivative warrants expiring ITM/OTM also seems to be associated with the performance of the underlying stock

15. In what follows, analysis is carried out on the proportion of derivative warrant expiring ITM/OTM on an individual stock basis. The analysis is on the five most popular stocks (in terms of both the number of issues and the issue size) commonly chosen as underlying of derivative warrants.
16. The proportion of derivative warrants issued on the five underlying stocks expiring ITM/OTM is also associated with the performance of the underlying stock. As most derivative warrants on individual common stocks are issued with a maturity of 6-9 months, market performance of the underlying stocks over a 6-9 month period is matched against the proportion of derivative warrants expiring ITM/OTM.
17. The proportion of call derivative warrants expiring ITM appeared to be positively associated with the underlying stock return of previous 6-9 months, whilst the proportion of put derivative warrants expiring ITM appeared to be negatively associated with the underlying stock return of previous 6-9 months.
18. For example, for the derivative warrants issued on the most active underlying stock HSBC, the quarterly proportion of HSBC call derivative warrants expiring ITM in a quarter is positively correlated with
 - the HSBC return of previous 6 months with a correlation of 0.76; and
 - the HSBC return of previous 9 months with a correlation of 0.75.



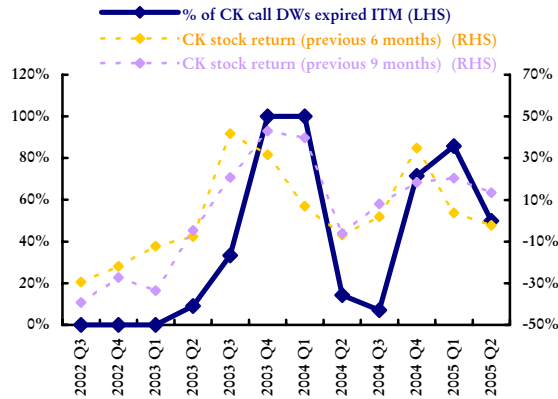
19. Similarly, for the derivative warrants issued on the China Mobile, the quarterly proportion of China Mobile call derivative warrants expiring ITM in a quarter is positively correlated with
- the China Mobile return of previous 6 months with a correlation of 0.77; and
 - the China Mobile return of previous 9 months with a correlation of 0.78.



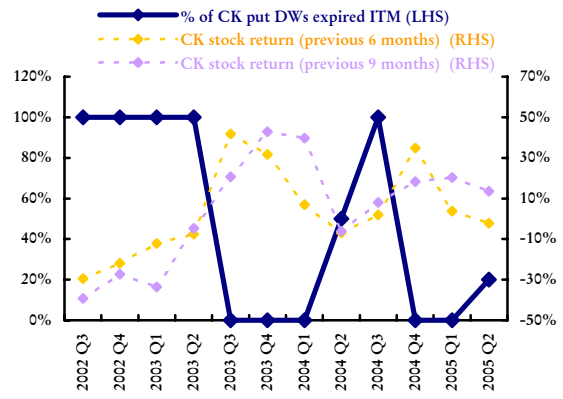
20. For the other three most popular stocks, the proportion of derivative warrants expiring ITM/OTM is also associated with their respective underlying stock returns, as shown in the following charts.

% of Derivative Warrants on Other 3 Most Popular Stocks Expired ITM in the Quarter

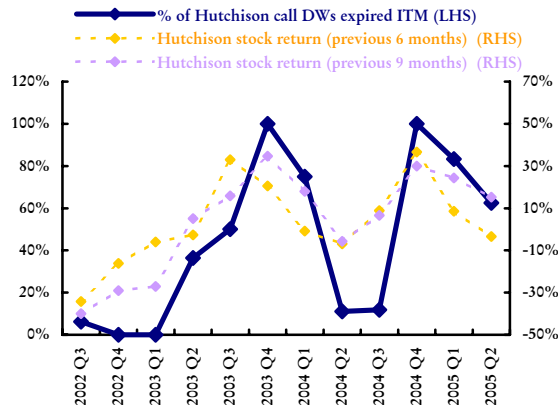
Cheung Kong Call



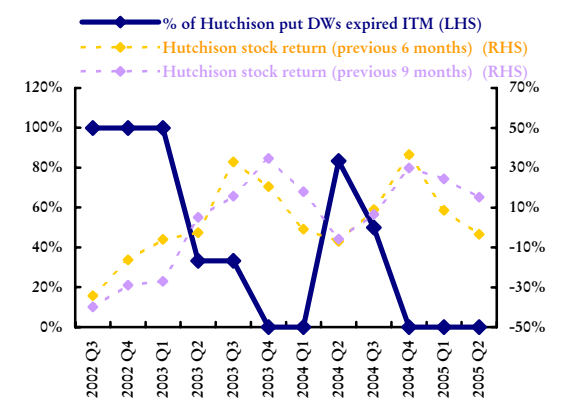
Cheung Kong Put



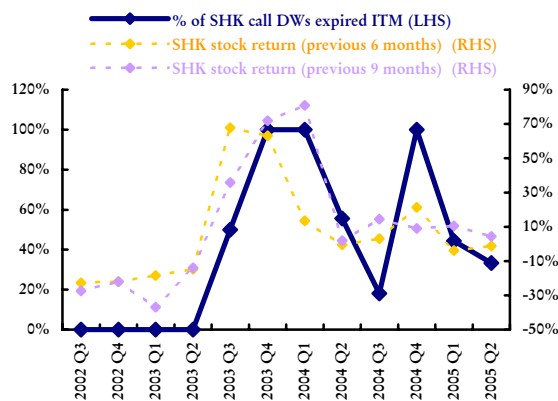
Hutchison Call



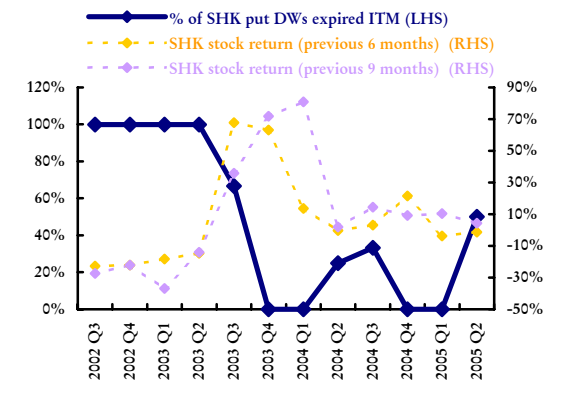
Hutchison Put



Sun Hung Kai Call



Sun Hung Kai Put

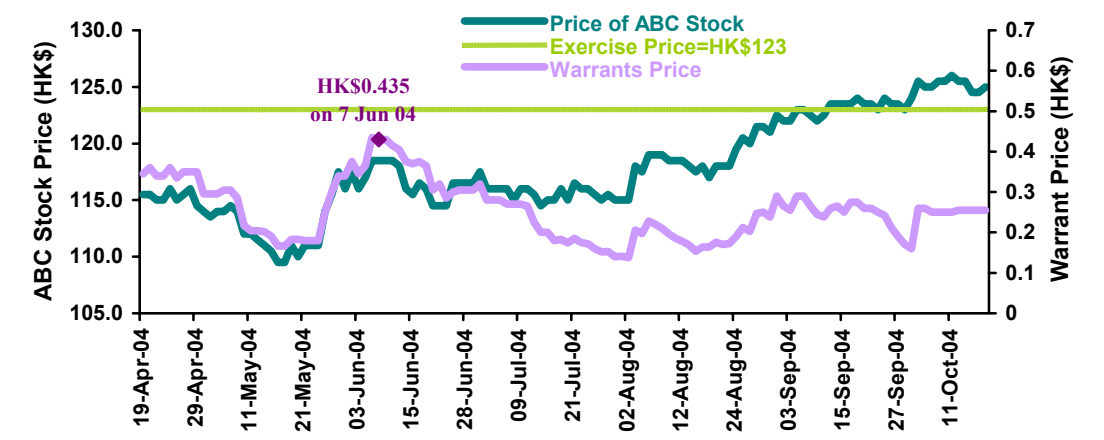


Profitability not affected by proportion of derivative warrants expiring ITM/OTM

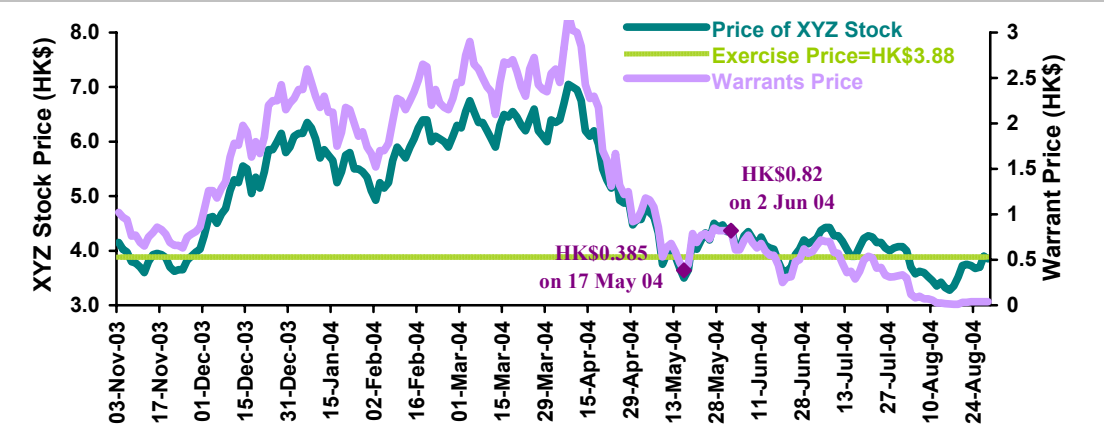
21. Compared to common stocks, derivative warrants usually have higher leverage. Although investors can benefit from the higher leverage to get better return than common stocks, the trading of derivative warrants also leads to higher risks than common stocks. Investors should consider carefully their risk appetites before trading derivative warrants.
22. It should be noted that investment profitability from derivative warrants does not necessarily have any relationship with their proportions expiring ITM/OTM. Like the trading in stocks in general, an investor will make money if he can sell the warrants at a price higher than the price at which he initially purchase the warrants and vice versa.
23. If investors hold the derivative warrants to maturity, they will make money only when the settlement prices are higher than the purchase prices. Consequently, derivative warrants expiring ITM do not necessarily lead to profits for all of their investors.
24. If investors do not hold the derivative warrants to maturity (as is usually the case since people trading derivative warrants tend to have shorter investment horizons), whether a derivative warrant is ITM or OTM at any point during its life is associated with the movement of the underlying stock/index at that time. A derivative warrant may be OTM during the life though expire ITM, and ITM during the life though expire OTM. For example,
 - the ABC call warrant issued in April 2004, though it expired ITM in October 2004, it was OTM most of the time during its life.
 - the XYZ call warrant issued in November 2003, though it expired OTM in August 2004, it was ITM most of the time during its life.
25. The profitability depends very much on the timing and the price of purchases and sales – that investors may make money even if the warrants expire OTM, as long as they sell the warrants prior to maturity and they manage to sell at a better price than the purchase price. Using the same examples,
 - the ABC call warrant expired ITM, if an investor bought it at its peak price of HK\$0.435 on 7 June 2004, there was no chance for him to get the full investment back (given the conversion of 10 warrants to one share).
 - the XYZ call warrant expired OTM, if an investor purchased it at HK\$0.385 on 17 May 2004 and sold at HK\$0.82 on 2 June 2004, he could realise an investment return of 113%.

Proportion of Derivative Warrants Expiring ITM/OTM is Associated with the Movement of Underlying

ABC European Call Warrant Oct 2004 (OTM throughout the life of the derivative warrant but expired ITM)



XYZ European Call Warrant Aug 2004 (ITM throughout the life of the derivative warrant but expired OTM)



Remark: A call derivative warrant is ITM if the share price of the underlying stock exceeds the exercise price. It is OTM if the share price of the underlying stock falls below the exercise price.
Sources: HKEx and Bloomberg