Making Derivative Warrants Market in Hong Kong

Chow, Y.F. [1], J.W. Li [1] and M. Liu [1]

[1] Department of Finance, The Chinese University of Hong Kong, Hong Kong
Email: yfchow@baf.msmail.cuhk.edu.hk

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EXTENDED ABSTRACT

Derivative warrants fall under the category of derivative investment instruments. They are option-like products issued by a third party and are traded on the stock exchange like a stock, but unlike exchange traded options, only the issuers are allowed to write or short sell the warrant. These warrants are attractive investment vehicle for two reasons: their leveraging effect and limited loss feature make them attractive to aggressive investors; and they can serve as hedging instruments to reduce the risk exposures arising from other related investments.

In Hong Kong, the institutional constraints for retail investors to participate in the options market make derivative warrants particularly appealing. During 2005, the turnover in Hong Kong's derivative warrants market average HK$3.3 billion a day, representing 18% of the average daily total stock market turnover. This level of turnover makes Hong Kong the most actively traded warrants market in the world. It also suggests a large deal of retail participation. This large degree of retail participation comes with its problem. From time to time, concerns and allegations have been raised about certain practices in the derivative warrant market and the suitability of derivative warrants for retail investors.

One particular concern has been raised is the trading activities of liquidity providers in this market. They are blamed to manipulate the market to the detriment of the retail crowd. Between January 2002 and October 2005, the Hong Kong Securities and Futures Commission considered 255 reports of alleged misconducts relating to derivative warrants. These 255 reports contained a total of 310 allegations, and the majority of allegations concern the trading activities of warrants issuers. About half of these (46%) allege that warrant price failed to track the movements of the underlying asset. An almost equal amount (37%) alleges that the liquidity providers or their related brokers manipulate the warrant market through possibly the creation of false turnover. The liquidity providers are the largest player in the warrant market as they typically turn over their warrants for over 20 times and their trading represent more than 80% of total turnover in the warrant market while raking in billions of dollars in trading profit between year 2002 and 2005. These allegations therefore call for an investigation of the trading activities of the liquidity provider (typically issuers themselves).

This paper attempts to document some stylized facts on the trading behavior of the issuers in Hong Kong's warrants market, and to provide some hypotheses on such observations. In this regard, it should be noted that it is not our objective to investigate whether there are any manipulations in the market.

Specifically, we examine daily trading records and price dynamics and find market makers in Hong Kong's derivative warrant market conduct positive feedback trading. That is, when underlying prices go up (down), they would buy (sell) call / sell (buy) put. We argue that market makers trade in such a fashion mainly to manage the risk of their inventory position.

1. INTRODUCTION

In Hong Kong's warrant market, the issuer and the liquidity provider are essentially the same. As a result, the liquidity provider in their trading activities may perform the following functions: (1) Acting as a market maker that provides immediacy and ensures smooth trading; (2) Distributing warrants to earn premium and then trading to manage its risk. That is, they can serve either as a market maker or a warrant issuer. The objectives however may not be mutually exclusive. Smooth trading in the warrant market may add to the depth to the market that eventually leads the issuance of more warrants. Easley, O'Hara and Srinivas (1998) for example suggest option market with better liquidity attracts traders to use this market more. In their "pooling equilibrium" they show that when the leverage implicit in options is large and when the liquidity in the stock market is high, the overall fraction of informed traders is high. On the other hand, the distribution of more warrants and a better management of the arising risk give rise to possibly higher profits to the warrant issuers that allow them to put more efforts in making the market.

We hypothesize two alternative trading patterns may show up in our dataset as discussed below. The market makers may conduct negative feedback trading or positive feedback trading. Negative feedback trading suggests selling calls/buying put when underlying price goes up and vice versa. This trading pattern follows from standard microstructure literature where market makers are the supplier of immediacy where they marks up price and sell when the security is in demand and market makers marks down price and buy when the security is not in good demand. That is, they trade against moving prices. This practice takes place so that the market maker can fulfill their legal obligation. New York Stock Exchange for example requires its specialist to trade in a stabilizing fashion. Negative feedback trading can be economically plausible. Amihud and Mendelson (1980) and Ho and Stoll (1983) show that specialists will actively control their inventory by setting prices to induce movements towards desired inventory levels. Grossman and Miller (1988) suggest market makers profit from providing liquidity to less patient investors. Hendershott and Seasholes (2007) demonstrate with NYSE specialist daily transaction data that indeed specialist conducts negative feedback trading.

Alternatively, positive feedback trading suggests buying calls/selling puts when underlying price goes up and vice versa. Positive feedback trading may arise when issuers manage their risks by adjusting its delta position toward risk neutrality through buying or selling its warrant positions. Buying and/selling warrants positions are less capital intensive than the buying or selling of the underlying securities and therefore may be preferable to hedge the inventory risk. Alternatively, positive feedback trading may also arise as a result of information trading. Market makers react to information trading in the market and trade in the direction of price movement. Kyle (1985), Glosten and Milgrom (1985) and Easley and O'Hara (1987) emphasize the importance of asymmetric information in determining market maker behavior. While we do not see much extent of asymmetric information in the warrant market for the index, we do expect warrant traders trade to incorporate the public price information of the index as efficiently as possible.

In this study, we have manually collected the daily trading records of the issuers of all Hang Seng Index related warrants. Issuers are required by law to disclose their daily buy/sell volume and average price before the opening of the next trading day in Hong Kong. Our evidence shows the following salient features of the daily trading activities across all issuers: (1) Issuers most likely buy call and sell put when market goes up; (2) Issuers most likely sell call and buy put when market goes down. These trading activities do no support that issuers are trading to provide immediacy to the market, as typical market stabilization involves negative feedback trading rather than the witnessed positive feedback trading.

If the primary concern of the issuers is not providing immediacy, then they may trade in positive feedback either for information reason or rather simply for management of their inventory risk. A priori reasons suggest little information trading would exist in the warrant markets that we examine. The underlying asset in our case is the local market index, which limits the possibility of asymmetric information in the warrant transaction. Prior literature also suggests very limited information trading can be found in the option market due to its relatively low liquidity. For example, see Vijh (1990), Chan, Chung and Johnson (1993) and Chan, Chung and Fong (2002).

In the paper, we conduct empirical tests on these two possible alternatives. If the positive feedback trading is derived from information trading, this information trading should see the highest intensity in those warrants with the highest leverage or the price elasticity, omega (Ω), which is the percentage change of the warrant price with

respect to percentage change in the underlying price. Black (1975), Diamond and Verrecchia (1987), and Mayhew, Sarin and Shastri (1995), and Pan and Poteshman (2006) suggest that informational traders are attracted to investment vehicles with the highest leverage. Alternatively, if the positive feedback trading arises as a result of inventory risk management, this risk management trading should see the highest intensity in those warrants with the highest gamma (Γ), which is the partial derivative of the hedge ratio delta (Δ) with respect to the underlying stock price. As the investment vehicles with the highest gammas provide the most cost effective way of rebalancing toward risk neutrality, risk management consideration suggests that positive feedback trading happens mostly with the high gamma investment vehicles. See Jameson and Wilhelm (1992) who also emphasize the importance of risk management of the warrant market makers.

2. POSITIVE FEEDBACK TRADING OF ISSUERS

As issuers only disclose daily trading records, we examine how the dealer transactions respond to the underlying daily price changes. In particular, we regress signed buy/sell transaction turnover, V_t, with buy assigned a positive value and sell assigned a negative value, on index returns of both the past and the concurrent period:

$$V_t = a_0 + a_1 R_t + a_2 R_{[t-5,t-1]} + a_3 R_{[t-10,t-6]} + a_4 R_{[t-20,t-11]} + e_t \,. \quad (1)$$

Table 1. Results for regression (1) with *t*-statistics in parentheses.

	Call Dollar ($mil)	Put Dollar ($mil)
a_0	1.16**	2.84***
	(–2.14)	(–6.75)
a_1	1078.27***	938.43***
	(–20.54)	(–22.95)
a_2	16.39	50.60**
	(–0.63)	(–2.51)
a_3	6.20	10.21
	(–0.27)	(–0.56)
a_4	7.73	13.94
	(–0.48)	(–1.10)
Adj. R^2	0.303	0.356

Table 1 shows the regression results. It examines how the issuers buy/sell activities relate to the past and the current index percentage changes. We combine the daily buy/sell activities of all contracts for every issuer. The panel shows that the buy/sell activities largely arise from a positive feedback in response to a concurrent price movement. The concurrent returns bear positively to the buy/sell of the call warrants and bear negatively to the buy/sell of the put warrants. In the case of put, there is a minor response to the past five-day returns along the same sign as concurrent return. This minor response while statistical significant, contribute less than 0.4% of explanatory power in explaining the buy/sell activities of put. Concurrent returns, on the other hand, explain over 30% of the transactions variation. There is no explanatory power for past returns in explaining the call transaction activities.

Table 2. Results for regression (2) with *t*-statistics in parentheses.

	Call Dollar ($mil)	Put Dollar ($mil)
b_1	53.19***	–50.95***
	(30.38)	(–37.13)
b_2	0.01***	–0.00
	(7.70)	(–0.05)
Adj. R^2	0.05	0.07

We now examine the possible interaction of an inventory effect and the positive feedback trading. Madhavan and Sofianos (1998) show that the specialists buy and sell according to their inventory positions and they participate more actively as sellers (buyers) when holding long (short) positions. Table 2 analyzes whether our observation of positive feedback trading is robust to the existence of inventory control effect. We add the total value of outstanding warrants in circulation, $V_{i,j,t-1}$, the negative of the issuer inventory for the *j*th issue of the *i*th issuer, in the regression as follows,

$$X_t = b_0 + b_1 R_t + b_2 V_{i,j,t-1} + e_t \,. \quad (2)$$

In our empirical exercise, we have also used in the above regression the number of total outstanding warrants in circulation for individual issue. By and large, it does not change the results.

In Table 2, instead of using as dependent variable as the aggregated daily purchase and sales activities for all issues as in Table 1, we use the daily purchase and sales turnover for individual issue. We use dummies for each issue to control for the possible fixed effect. This empirical design is based on Naik and Yadav (2003) who suggest that market-making is of a decentralized nature and individual dealers may focus more on the inventory risk of individual securities rather than that of the entire inventory portfolio.

Table 2 shows that market-maker inventory appears to be important determinant of the issuer purchase/sales decisions in the case of call warrant. A larger outstanding warrant in circulation is more likely to associate with purchase decision and a smaller outstanding warrant in circulation is more likely to associate with sales decision. This finding seems to be consistent with the inventory control practice as found in Madhavan and Sofianos (1998) where specialists are found to time and control direction of their trades according to their inventory positions. For put, we find that outstanding warrants bear insignificantly with the purchase and sales decision.

Table 2 further demonstrates that positive feedback trading co-exists with the practice of inventory control. With both effects in the regression, neither effect is subsumed by the other effect. Between the two effects, the positive feedback effect in a fixed effect model contributes to an adjusted R^2 of 5%. This is larger than the adjusted R^2 of 1% of the outstanding warrant.

It is of our interest to see whether issuers trade to incorporate the public information of underlying price movement or they trade to manage their inventory risk. In particular, we examine the extent of positive feedback trading across various moneyness and time-to-maturities. In regressions examining positive feedback trading, we investigate the characteristics of individual warrants with which positive feedback trading is most likely to be associated with. We have in our empirical work differentiated warrants

Table 3. Results for regression (3) with *t*-statistics in parentheses.

	Call	Put
c_1	85.92	−73.61
	(30.35)***	(−35.05)***
c_2	32.81	−19.27
	(7.68)***	(−6.67)***
c_3	14.68	−19.44
	(4.19)***	(−6.24)***
c_4	133.82	−128.23
	(23.10)***	(−32.56)***
c_5	14.66	−5.09
	(2.47)**	(−1.66)*
c_6	11.17	−33.24
	(2.85)***	(−6.88)***
Adj. R^2	0.06	0.10

characteristics such as moneyness and time-to-maturity. In particular, we use L and S as dummies to indicate time-to-maturities of over 91 days and under 91 days; and A, O, and I as dummies indicating moneyness (K/S) between 0.95 to 1.05, greater than 1.05 and lower than 0.95 for calls and moneyness between 0.95 to 1.05, lower than 1.05 and greater than 0.95 for puts respectively. We then perform the following regressions,

$$X_t = c_0 \text{ ISSUER DUMMIES} + c_1 \text{L·A·}R_t + c_2 \text{L·O·}R_t + c_3 \text{L·I·}R_t + c_4 \text{S·A·}R_t + c_5 \text{S·O·}R_t + c_6 \text{S·I·}R_t + e_t . \quad (3)$$

X_t in the regression denotes signed daily issuer turnover for particular warrant issue aggregating the purchase/sales activities of an issuers for the day. In the above regression, we have added issuer dummies to control possible difference in practice across issuers.

The empirical results of the first column of Table 3 suggest that at-the-money warrants are much more likely to be traded upon in positive feedback trading than both out-of-the-money warrants for both call and put. For call warrants, in comparing between out-of-the-money warrants and in-the-money warrants, we find out-of-the-money warrants are slightly more likely to be traded upon than in-the-money warrants. For put warrants, on the other hand, we find in-the-money warrants are significantly more likely to be traded upon than the out-of-the-money warrants. This conclusion does not seem to be affected by the possible difference in time-to-maturity.

The empirical results in Table 3 seem to support the notion that issuers trade mostly to neutralize their risk position rather than incorporating information. For most options, price elasticity is highest with out-of-the-money options for both call and put. On the other hand, gamma is highest with at-the-money options for both call and put. The evidences of most active trading in at-the-money warrants suggest that positive feedback trading arises most likely as a result of the issuer risk management.

3. CONCLUSION

Warrant transactions have now become one of the major features of Hong Kong market in 2006, as above 20% of daily turnover in the Hong Kong market were in the warrant market. Issuer participations constitute above 80% of all warrant transactions. These suggest the importance in understanding warrant issuers/market makers trading behavior. This paper documents that warrant issuers conduct positive feedback trading in Hong Kong's warrant market. They buy calls/sell puts when stock market goes up and they sell calls / buy puts when stock market goes down.

We interpret this as evidence of risk management practice after the issuers issue the warrant.

We note however that a similar positive feedback trading practice generated by the widespread usage of portfolio insurance schemes has argued by many to have caused the infamous 1987 stock market crash. The impact of the large following of warrant trading in the Hong Kong market in couple with positive feedback trading on the part of warrant issuers remains to be seen. To prevent the possible adverse consequences of the issuer trading, we suggest that the regulator can designate additional dealers other than the issuers to make market in the warrant markets. Without warrant premium to fall back on, these warrant dealers would likely operate with the traditional market making models. That is, they are most likely to trade in a stabilizing manner. That in turn would offset or at least reduce the damage done by the positive feedback trading of the warrant issuers.

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