
Derivatives...

Warrants in Connection with M&A-Rumours

When rumours appear in the market about any kind of mergers & acquisitions, very often a few investors get active in the warrants market and buy warrants at any implied volatility. High implied volatility leads to high option prices, and higher option prices paid in the beginning of a trade could lead to a lower performance of the warrants. The idea of the next four pages is to find an answer to the question:

Buy any warrants at any price on merger rumours?

As a matter of data collection, we are unable to test every market rumour on M&A speculation in order to see how warrants have performed. However, we can look into implied volatility changes around M&A activities in the recent past, and investigate whether these changes show similar patterns around the announcement date of the transaction which would aid investors in choosing appropriate warrants for the speculation.

Changes of implied volatility can have a massive impact on the value of an option. The sensitivity which measures potential change of the warrant price if volatility changes by 1 percentage point is called tau. It is also called vega or kappa. Tau in percentage of the warrant price generally assumes values between 0% and 6%. Out-of-the-money call warrants, which are normally used for a merger speculation, are particularly exposed to a drop in implied volatility.

Assuming the share price of a stock driven by M&A rumours is to move upwards, the second most important single factor for the warrant price is implied volatility. If the investor knows what kind of implied volatility movement is to be expected, it is easier to choose between different warrants, i.e. whether to buy a deep-in-the-money call warrant with only little exposure to changes in implied volatility (a low tau in % of the warrant price), or an out-of-the-money call warrant, which has a higher exposure to changes in implied volatility (a high tau in % of the warrant price).

In order to avoid losses in a call warrants investment, not only does the underlying share price have to move up, but also implied volatility has to stay flat or to move up.

In the following table, the behaviour of implied volatility around the twenty biggest M&A activities in terms of market capitalisation, over the past four years is reflected. The column “before announcement” shows the stock’s implied volatility change relative to the market’s implied volatility change, within the period between the first newspaper article on rumours, and the announcement of the M&A transaction. The column “after announcement”

Behaviour of Implied Volatilities on M&A-Rumours

Ann. Date	Target Name	Bidder Name	Rumours before	before ann.	Implied Volatility after announcement
07 Mar 1996	Ciba-Geigy	Sandoz	less than 24h	flat	+11%pts for both, then drop to combined level
08 Dec 1997	SBC	UBS	19.11.97	+12%pts within 2 weeks versus SMI	dropped back to previous levels
16 Oct 1997	BAT Industries PLC	Zurich Insurance	11.10.97	flat	flat
26 May 1997	Corange Ltd.	Roche	25.04.97	flat	flat
11 Aug 1997	Winterthur Insurance	Credit Suisse Group	02.07.97	flat CSGN, WI-N increased its impl vola with ca. 6%pts. over that period getting closer to CSGN's level	CSGN (WI-N) dropped of 2%pts (1%pts) against the markets move upwards
03 May 1994	Syntex Corp.	Roche	02.05.94	flat	flat
05 Feb 1997	Ciba Specialty Chemicals		KNOWN	flat	flat
23 May 1994	Gerber Products Company (US)	Sandoz	09.05.95	flat	flat
10 May 1995	Warburg Group PLC, S G	SBC	02.05.95	flat	flat
10 Dec 1996	Hoechst AG	Clariant	-	flat	jumped 7%pts up
27 Aug 1996	Mercantile & General Reinsurance	Swiss Re	-	+1.5% within 2days	-2%pts within 3days
21 Nov 1994	Chiron Corporation (US) (49.99%)	Ciba-Geigy	11.11.94	flat	flat
12 Apr 1995	Kemper Corporation (US)	Zurich Insurance	-	flat	flat
26 Jun 1997	Scudder Stevens & Clark (US)	Zurich Insurance	30.05.97	slightly increasing	flat
17 May 1997	Winterthur Insurance (20%)	Stillhalter Vision / BK Vision	16.05.97	flat	flat
27 Jun 1995	Clariant		08.05.95	flat	flat
05 Feb 1997	Tastemaker (US)	Roche	22.02.97	+6.5% versus SMI	-3.5%pts versus SMI
16 Sep 1995	Rentenanstalt / Swiss Life (25%)	UBS	01.09.95	increasing, but leading also the market with its hike!	flat
13 May 1997	Merck & Co Inc (Crop Protection Business)	Novartis	-	flat	flat
26 Feb 1997	Francaise de Reassurances SA	Swiss Re	21.01.97	flat	flat

flat: indicates that implied volatility of the stocks moves in line with the implied volatility of the SMI
Source: SBC Warburg Dillon Read

indicates whether the announcement itself had any impact on implied volatility. Changes which are smaller than 1 percentage point can be regarded as insignificant, because a change of this magnitude can happen at anytime, even if the underlying stock is not subject to any rumours.

<i>Usually, no changes of implied volatility...</i>	Of the twenty M&A transactions investigated, twelve mergers had no impact on implied volatility.
<i>...except for unanticipated mergers, where there is no additional risk for warrants holders,...</i>	Only the announcement of two mergers (Sandoz/Ciba-Geigy and Clariant/Hoechst) had an impact on implied volatilities. Both mergers came as a surprise to the market and were regarded as significant for the company's strategy and future cash flow generation. Implied volatility jumped several tau points within a short period of time and dropped at the same rate. For investors long warrants ahead of an unanticipated announcement, we can conclude that their position would not suffer from it, because implied volatility is more likely to increase than decrease. With increasing implied volatility ceteris paribus the value of an option increases.
<i>...and rumoured mergers with heavy impact on company's strategy,...</i>	On five merger transactions, rumours had a high impact on implied volatility before and after the announcement. However, these five M&A transactions were quite different in their effects. Two conclusions can be drawn. First, if two stocks have different levels of implied volatility (see Winterthur/Credit Suisse and UBS/Swiss Life), a convergence of the implied volatilities in the direction of the higher one is likely until the merger is announced. Second, after the announcement it is likely that implied volatilities will drop, because investors sell the options they bought on the rumours.
<i>...where there is some additional risk for warrants holders.</i>	The biggest risk is posed by a situation where the implied volatility of a warrants position drops sharply after a merger announcement. This is most likely if implied volatility increased ahead of the announcement.

Choosing the right warrants is the challenge

As we have seen in the table above, it is unpredictable how much implied volatility rises ahead of a merger announcement, and how much of this increase will be lost thereafter. With the help of the Greeks, it is possible to check for sensitivities of call warrants. Before, we discussed options' sensitivity to changes of implied volatility, tau. The most important single value driver for options however is the underlying share price. With any investment the investor takes a view on how much the stock price will rise. An increase in the underlying stock price and a drop in implied volatility have opposite effects. The value of a call warrant is increased by higher stock prices, but decreased by lower implied volatility. In the following table, warrants' sensitivity with respect to implied volatility (Tau) and stock price levels (delta) is shown. The example shows the warrant SBC/SBVWA with prices as of November 24, 1997, when the first rumours of a possible SBC/UBS merger were already in the market, and implied volatility had not yet picked up on the rumours.

Price/Volatility Matrix

Indicative Share Price	Implied Volatility									
	31.0%	32.0%	33.0%	34.0%	35.0%	36.0%	37.0%	38.0%	39.0%	40.0%
365	0.52	0.55	0.59	0.62	0.66	0.69	0.73	0.76	0.80	0.83
385	0.66	0.70	0.73	0.77	0.81	0.85	0.89	0.93	0.97	1.01
405	0.83	0.87	0.91	0.95	0.99	1.04	1.08	1.12	1.16	1.20
425	1.01	1.05	1.09	1.14	1.18	1.23	1.27	1.31	1.36	1.40
445	1.22	1.26	1.31	1.35	1.40	1.45	1.49	1.54	1.58	1.63
465	1.43	1.48	1.53	1.57	1.62	1.67	1.71	1.76	1.81	1.85
485	1.67	1.72	1.77	1.82	1.86	1.91	1.96	2.01	2.05	2.10

Source: SBC Warburg Dillon Read

At that time SBV/SBVWA was a typical warrant for merger speculation on SBC RS with an aggressive strike price of CHF475 (compared to a share price of CHF385). It had a tau of 5.5% of the warrants price, an implied volatility of 31% and a delta of 0.39. A delta of 0.39 implies that following a CHF1 movement of SBC RS, the option, which consists of 50 warrants per share, changes its price by CHF0.39.

An increase by CHF25 in the share price would have resulted in a warrant price increase of CHF0.21. This is approximately the share price increase times the delta divided by the number of warrants per share ($\text{CHF0.195} = \text{CHF25} * 0.39 / 50$). The difference of CHF0.21 and CHF0.195 stems from the non linear relationship between the option price and the share price (i.e. the change of the delta with respect to a change in the share price, which is measured by gamma).

The last two weeks before the merger, SBC implied volatility soared by 9 percentage points. Let's assume that SBC/SBVWA had added 9 percentage points in implied volatility. The warrant would have been at CHF1.01, with the share price staying at CHF385. This effect can be approximated by calculating the initial warrant price of CHF0.66 plus an increase of 49.5% for the increase by 9 tau points (5.5% per tau point). The increase of the warrant price amounts to CHF0.35, which is as large as a warrant price change caused by a CHF40 move in the share price, assuming constant implied volatility at 31%.

Conclusion

When rumours of a merger are in the market, it is most likely that implied volatility will follow its normal pattern. However, if implied volatility starts to pick up, and an investor wants to buy warrants on higher implied volatility than before merger rumours, the upside potential for the share price must be large enough to compensate the warrants investor for a possible loss caused by decreasing implied volatility after the merger announcement. In such a case the investor should consider buying in-the-money warrants near expiration in order not to suffer a loss from implied volatility.