

Mythbusters: Equity Options

Equity Derivative Strategy

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Sales Literature

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Overview

- Investors are increasingly seeking enhanced returns and reduce risks to their existing stock positions through the use of equity options. A recent Financial News survey of Fund Managers pointed to a majority of funds now using derivatives. (*Derivatives in fund management: reaching the tipping point*, May 2006)
- In this note we seek to candidly discuss the pros and cons of equity options when considered part of the portfolio management process and to clarify which of the many myths about derivatives are accurate and which are false and often premised on fear of the unknown.
- We have chosen six of the most popular comments we hear when discussing derivatives with potential new derivative investors:
 - Myth 1: Derivatives are a zero-sum game
 - Myth 2: Buying options is wasting money on an outcome considered unlikely (The “Real men don’t hedge!” syndrome)
 - Myth 3: Selling an option is like getting paid to leave a limit order
 - Myth 4: Actively trading stock can replicate an option payoff profile
 - Myth 5: Derivatives are “weapons of financial mass destruction” (Buffet) and serve to increase market volatility
 - Myth 6: Closing out my derivative exposure might be hardest at the worst time
- In the author’s view, the response to these myths is generally both true and false. There are certainly elements of truth in each but a deeper understanding of derivatives and derivatives markets brings to light substantial misconceptions that have grown out of accepting these myths verbatim.
- ***The conclusions we draw from this examination of the derivatives industry is that portfolio managers should recognize a genuine purpose for options in their portfolio management process but should be cognizant of their appropriateness for an individual trade. Consideration of derivatives in the portfolio management process is essential to maximizing risk-adjusted returns.***
- In essence, equity options allow for a more precise expression of an equity view. Not only must a manager assess the potential return of an equity investment, they must also assess the risk faced by investing in equities to achieve that return.
- The risk can be most easily assessed by reference to the implied volatility priced into options and a calculation of historic/realised volatility can be useful for assessing a fair level for this.
- ***A combination of both the return expectation and the risk expectation should make the appropriate execution self-evident – whether to use stock or options or a combination of both.***
- Other factors can also influence the suitability of derivatives. Gap risk exposure and consistent inefficiencies are two.
- Finally we discuss simple ways to begin assessing the equity risk being priced into options using Bloomberg tools and also discuss some of the known market inefficiencies that remain attractive opportunities.

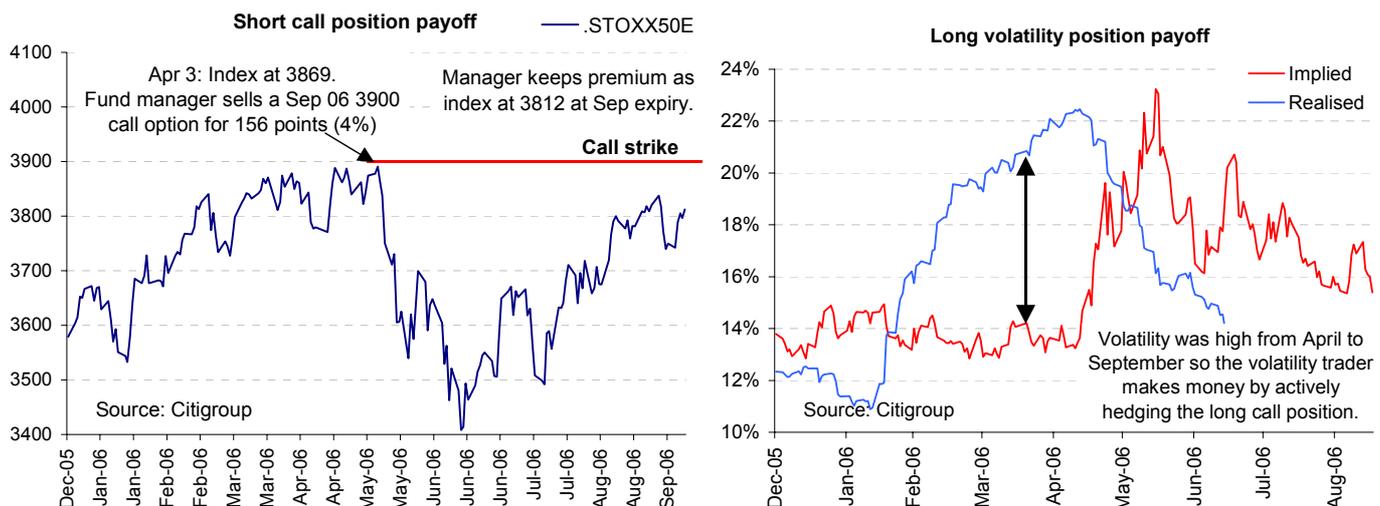
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Myth 1: Derivatives are a zero-sum game

TRUE – but oversimplified and trivializes obvious opportunities

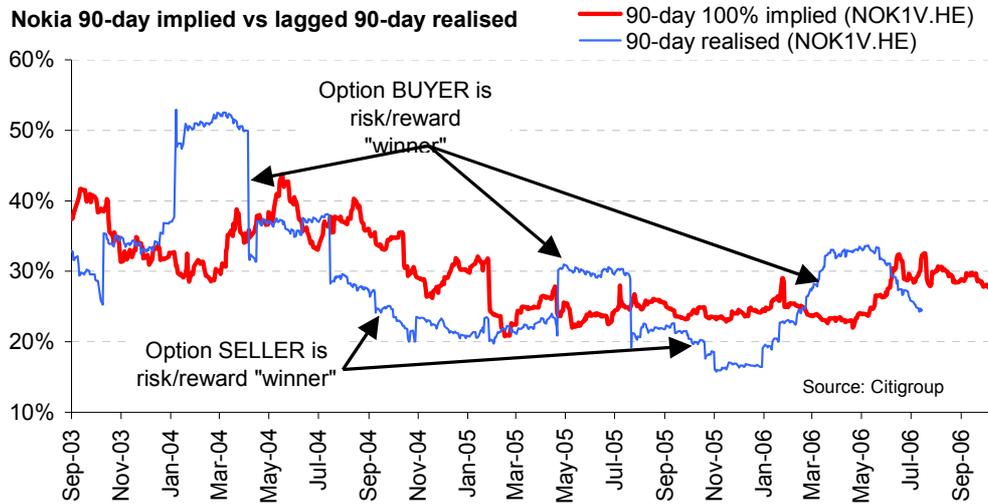
Fact: Derivatives are a zero-sum game where buyers of cheap and sellers of expensive options will in the very long run make money. On any individual trade however there are several factors influencing profitability. Different objectives and trading behavior can mean both the buyer and the seller of an option can make money. Additionally, strong demand for certain derivative products through the retail structured products market can create temporary but significant derivative mispricings that are positive expected alpha opportunities.

- It is true that viewed in isolation a derivative contract will have a winner offset by an equal loser. When used in combination with the underlying equity however, it is possible that both the buyer and the seller can achieve their profit objectives on an individual trade.
- The reason this is possible is because one category of investors use options for a directional exposure (return) and others use options in combination with an actively managed stock position for a volatility exposure (risk). Both may have correct views that return a profit. The chart below shows where a directional investor sold a call option to a volatility trader (long volatility), where both investors profited (the stock did not rally above the strike but was more volatile than the option originally priced).



- In the long run, the winner and the loser are determined by who trades options that are most consistently priced in their favour. Either the volatility trader will be able/unable to consistently predict and trade at the “fair” price or the directional trader will have been more/less successful at consistently predicting the direction of the stock and at trading options that reflect mispriced risk.
- The chart below shows the implied volatility priced into an option initially and the realised volatility experienced over the life of the option. This highlights where on a probability weighted basis the option buyer would have been the “winner” and vice versa. Note again however that this applies to the long-term – on any individual trade it is possible for both investors to have profitable positions.

Mythbusters: Equity Derivatives



- An additional consideration is the make up of participants in the equity derivative market. Some of the most significant influences are often related to retail structured product issuance. The demand for some products can be so significant that it creates temporary but relatively obvious derivative mispricings. Examples include compression of implied dividends, implied volatility and excessive implied correlation.

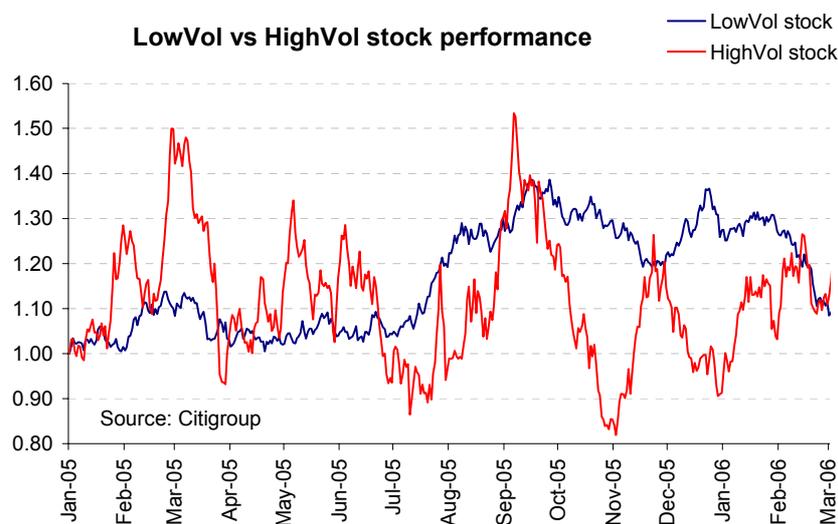
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Myth 2: Buying options is wasting money on an outcome considered unlikely (The “Real men don’t hedge!” syndrome)

FALSE – mispriced options provide a risk/return “free kick” – rotating the efficient frontier.

Fact: Options help investors more explicitly quantify their view of the risk of trading an equity position in pursuit of an expected return.

- Buying cheap options and selling expensive options will in the long-run produce a higher risk-adjusted return than trading an equivalent stock position as explained in the previous section.
- In determining the cheapness/richness of options one must look at the risk of owning the equity (realised) vs the risk that is priced into the option (implied). The risk is summarized to a single volatility number that reflects the magnitude of return given a fixed probability. (ie. high risk stocks would have a higher return for the same probability of occurrence - higher volatility).
- The chart below compares the returns of LowVol and HighVol. It is clear that over a given period, two stocks can have the same return but can have significantly different risk profiles.



- This risk measure called volatility can be:
 - Realised volatility - measures the historical average return for a given probability (backward looking) or
 - Implied volatility - an option input that makes an assumption about the potential future return for a given probability (forward looking).
- If the investors view of future realised volatility is different to that priced in the derivative markets then an option strategy is probably appropriate. (See last section for estimating future volatility)
- This awakening often answers the question “When is using an option better than trading the stock?”. The answer has two parts:
 - 1) Buying underpriced and selling overpriced options should produce a better risk-adjusted return than trading an equivalent stock position (rotates the efficient frontier – higher returns per unit of risk).
 - 2) When investor expectations of risks equal those being priced in options then it is still possible an option may be appropriate if there are gap risks or if leverage is required (see Myth 4 for more information on this gap risk benefit to options).

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Myth 3: Selling an option is like getting paid to leave a limit order

TRUE – but its not free money. The premium is for the trading decision opportunity value.

Fact: Money received for selling an option is compensation for taking the risk that there could be a more opportune time in the future to make a trading decision. While buying options gives the owner the RIGHT to trade, the seller has an OBLIGATION to trade that can only be avoided by buying the option back (which may have unfavourably changed price)

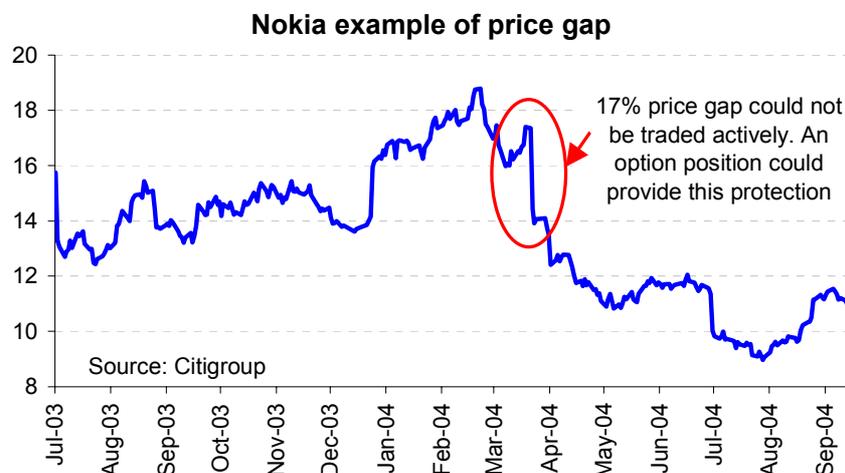
- Everybody likes receiving money and selling options has long been considered one of the best ways to enhance yields. Overwriters in particular have successfully used this strategy in very significant size for the last several decades. Essentially they receive an enhanced yield for agreeing to sell their position should a certain price level be exceeded.
- This is often referred to as “getting paid to leave a limit order” – which is true. The catch however is that revoking the order before execution (expiry) may cost more than the initial receipt.
- From a directional perspective there is an argument for selling options to enhance yield if the investor would genuinely be happy to trade at a chosen level and has no intention of changing that decision. In terms of genuinely enhancing the risk/return profile of a portfolio however, the investor must again consider the amount of compensation they receive for the option relative to the risks that it prices.

Myth 4: Actively trading stock can replicate an option payoff profile

FALSE – complexity, transaction costs and gap risk must be considered.

Fact: In a perfect trading world of zero transaction costs and infinite liquidity this statement would be true. In the real world however these are significant factors. Options transfer the complexity and cost of the replication trading as well as the gap risk (significant stock price jumps) to the cheapest supplier – market-makers at broker/dealers.

- Actively managing a stock position in an attempt to replicate an option payoff profile requires near constant trading in the underlying security, which is not possible for most investors either from a time or expense perspective.
- Even loosely replicating an option payoff would also become exceedingly expensive if brokerage on each trade is also considered.
- Additionally, markets are not open 24 hours so newsflow while markets are closed (and sometimes those intra-day too) can cause significant price gaps that would be impossible to trade around. Option prices include this possibility.



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Myth 5: Derivatives are “weapons of financial mass destruction” (Buffet) and serve to increase market volatility

FALSE – Options can be less risky than stock. Feedback effects can reduce stock volatility

Fact: Leverage in derivatives is the same as leverage anywhere else. Option positions *at expiry* and *ex-leverage* (1 option per share comparison judged on notional performance) are lower risk instruments than stock in nearly all circumstances. Mid-life however, other factors like time decay, dividends, volatility and interest rates can complicate comparison. Hedging activity around option positions can increase or reduce market volatility depending on the strategy and the investment trends of derivative users.

- It is true that options embed substantial leverage potential. However the leverage available in options is no different to an investor borrowing money from a bank to invest in equities.
- Excluding the leverage (trading one option per share exposure expected) options can be LESS risky than stock investment.
 - Buying options have limited risk by nature (maximum loss is the option premium).
 - Selling a put option has risk from the strike price (usually out-of-the-money) to zero.
 - Selling a call option has unlimited risk from the strike (usually out-of-the-money) higher.
- On derivatives increasing market volatility, it is true that the feedback effects of options trading can impact the flow of the underlying equity. Option market-makers actively adjust their stock position to maintain a close to zero market exposure when the stock and option are considered together.
- Sometimes option positions can be so significant however, that this trading activity can become a significant percentage of average daily volume. The effect can be to reduce volatility (the market-maker sells rallies and buys dips in the stock) and it can be to increase volatility (to sell dips and buy rallies). The significance of the effect is impacted by the size and maturity of the derivatives exposure but only if the intention of the directional vs volatility investors is unbalanced.

Myth 6: Closing out my derivative exposure might be hardest at the worst time

FALSE – The ability to close a derivative position depends on the liquidity of the underlying

Fact: Sometimes derivative contracts appear illiquid but are effectively as liquid as the underlying security. As a stand-alone security options may sometimes not trade in large volumes and this leads to fear of not being able to close out a position when required. If needed however, a stock position can be implemented to effectively close down the exposure. The ability to do this will depend on the liquidity of the underlying stock rather than the derivative market.

- This relates to Myth 4. Actively trading a security in a perfect world could replicate an option payoff so by definition, the liquidity of an option is equal to that of the underlying security at least. Of course the same issues of the real world as discussed in Myth 4 apply so there is no perfect hedge for gap risk and there may be some transaction costs involved.
- Most times when investors are concerned about their ability to trade out of a derivative product there will always be an ability to implement a simple stock position that will negate the vast majority of the option exposure. For this reason, derivative market liquidity is generally of a much lesser concern than most people believe.

Mythbusters: Equity Derivatives

Option pricing theory

How to assess whether an option could be considered cheap or expensive

An option price requires a variety of inputs:

- stock price,
- strike price,
- maturity,
- dividends,
- interest rates and
- implied volatility.

As discussed above, a view on the appropriate level of implied volatility contributes significantly to the risk-adjusted returns of using options in portfolio management.

The derivatives markets have become accustomed to assessing the appropriate implied volatility level by comparing it to:

- 1) the stock's history of implied volatility for a similar structure,
- 2) realised volatility of the stock and
- 3) potential upcoming events that help determine if the past under or overestimates the future volatility.

In studying realised volatility there have been many variations of the standard calculation considered and used at different times:

- 1) OHLC realised volatility
- 2) Absolute differences realised volatility
- 3) Exponentially smoothed realised volatility
- 4) Maximum move cap realised volatility

Each has its merits at times but we tend to believe that each of these calculations introduces a new set of assumptions that progressively serve to reduce their predictive power.

We believe the simplest measure that helps assess option value is a history of realised volatility of a similar maturity as the potential trade. Sometimes for long-dated trades, reference to a shorter calculation window is warranted.

Bloomberg has several tools that new derivative investors may find useful when looking at option prices.

1) OMON – Option Monitor

- This screen shows option prices for all strikes and expiries for a security.
- One output is the Bloomberg computed implied volatility priced into the option. This can then be used to compare to realised volatility.
- In the example below you can see the 4100 strike SX5E call option to Dec 07 is being priced at 15.51% implied volatility.

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GRAB Index OMON

At 16:39 Op 4002.28 Hi 4008.67 Lo 3986.41 Prev 3999.89

Option Monitor: DJ EURO STOXX 50 € Pr
Center 3999.07 Number of Strikes 18 -or- % from Center Exchange C (Composite)

CALLS										PUTS									
Ticker	Strike	OInt	Volume	BSize	Bid	Ask	ASize	RTIA		Ticker	Strike	OInt	Volume	BSize	Bid	Ask	ASize	RTIA	
1) SEZ7C	3550	9719								10) SEZ7P	3550	5439			116.1	126.4		19.38	
2) SEZ7C	3600	179119								20) SEZ7P	3600	126029			127.4	137.8		19.10	
3) SEZ7C	3650	12176			495.9	509.3		17.80		21) SEZ7P	3650	16288			139.6	147.8		18.66	
4) SEZ7C	3700	130110			464.0	474.6		17.56		22) SEZ7P	3700	140566			152.6	160.8		18.37	
5) SEZ7C	3750	8990			432.6	440.9		17.32		23) SEZ7P	3750	9015			170.2	173.8		18.03	
6) SEZ7C	3800	219616			401.5	408.2		17.08		24) SEZ7P	3800	182478	588		185.5	189.1		17.77	
7) SEZ7C	3850	20936			369.8	376.7		16.84		25) SEZ7P	3850	2647			201.6	205.6		17.52	
8) SEZ7C	3900	55564			339.3	346.4		16.60		26) SEZ7P	3900	63408			219.1	222.1		17.21	
9) SEZ7C	3950	4161			310.1	317.3		16.37		27) SEZ7P	3950	2072			237.7	240.7		16.95	
10) SEZ7C	4000	119905	7108		282.8	286.8		15.98		28) SEZ7P	4000	36250	4055		257.6	260.5		16.70	
11) SEZ7C	4050	153			256.2	260.1		15.74		29) SEZ7P	4050	150			278.7	281.6		16.45	
12) SEZ7C	4100	13370			231.0	234.9		15.51		30) SEZ7P	4100	450			297.4	304.4		16.22	
13) SEZ7C	4150	2595	1000		207.3	211.3		15.30		31) SEZ7P	4150	255			320.7	328.4		16.00	
14) SEZ7C	4200	86079	20		185.4	189.0		15.08		32) SEZ7P	4200	9350			346.2	354.1		15.79	
15) SEZ7C	4250	349			164.9	168.5		14.88		33) SEZ7P	4250				370.1	383.5		15.73	
16) SEZ7C	4300	16031	50		146.2	149.1		14.67		34) SEZ7P	4300				398.7	412.1		15.54	
17) SEZ7C	4350	597			125.3	135.7		14.75		35) SEZ7P	4350				428.8	442.2		15.36	
18) SEZ7C	4400	70850			110.5	118.9		14.53		36) SEZ7P	4400	2150							

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Source: Bloomberg

2) HVG – Historic Volatility Graph

- The historic volatility graph can show implied and realised historical time series for a chosen underlying and maturity.
- In the case below the 10 and 50 day realised volatility has fallen below the current implied. For this reason the options would be considered “rich”.
- Implied is already near its lows and realised has been unusually low however so while selling options looks most attractive, buying options on the expectation of higher volatility in the future may not be inappropriate.

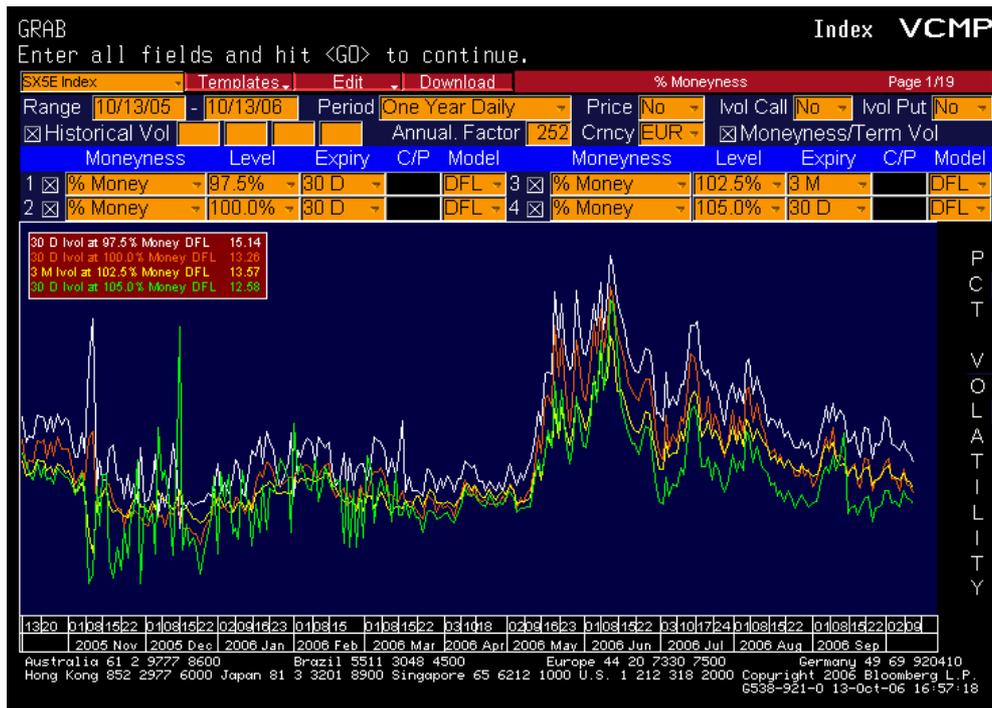


Source: Bloomberg

Mythbusters: Equity Derivatives

3) VCMP – Volatility Comparison

- This chart can be used like HVG to display volatility time series but is more versatile in that differing strikes can be chosen for the implied and more series can be compared.
- The chart below shows that options with 97.5% strikes have been priced at a greater premium than usual to the 105% options reflecting a steeper skew and therefore more implied downside risks recently.



Source: Bloomberg

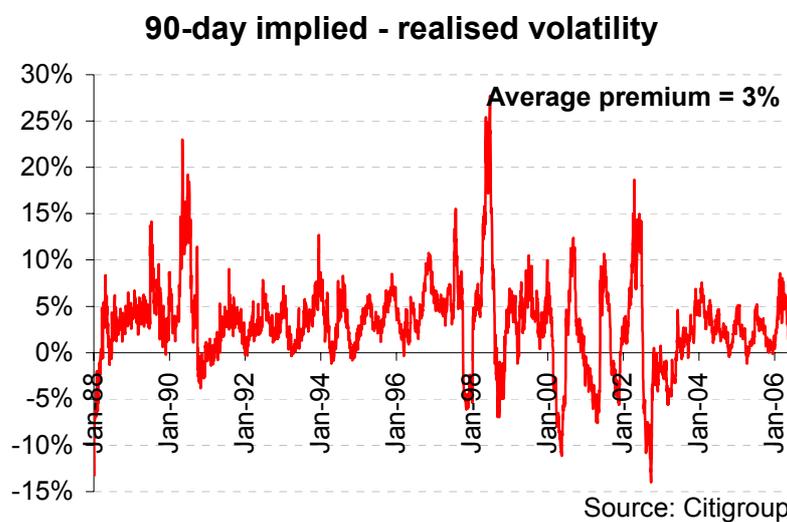
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Consistent derivative market inefficiencies

Where do they come from? How many people know? Can I profit from this?

Index volatility is consistently “rich” in Europe, UK and US.

- There is usually a greater level of demand for short-dated options than supply. Initially this was from warrants but continues to be mostly from structured product flows buying index volatility (correlation related) and risk averse institutions buying put options.
- Historically, this has kept implied volatility at roughly a 3% premium to the realised volatility over the option period.



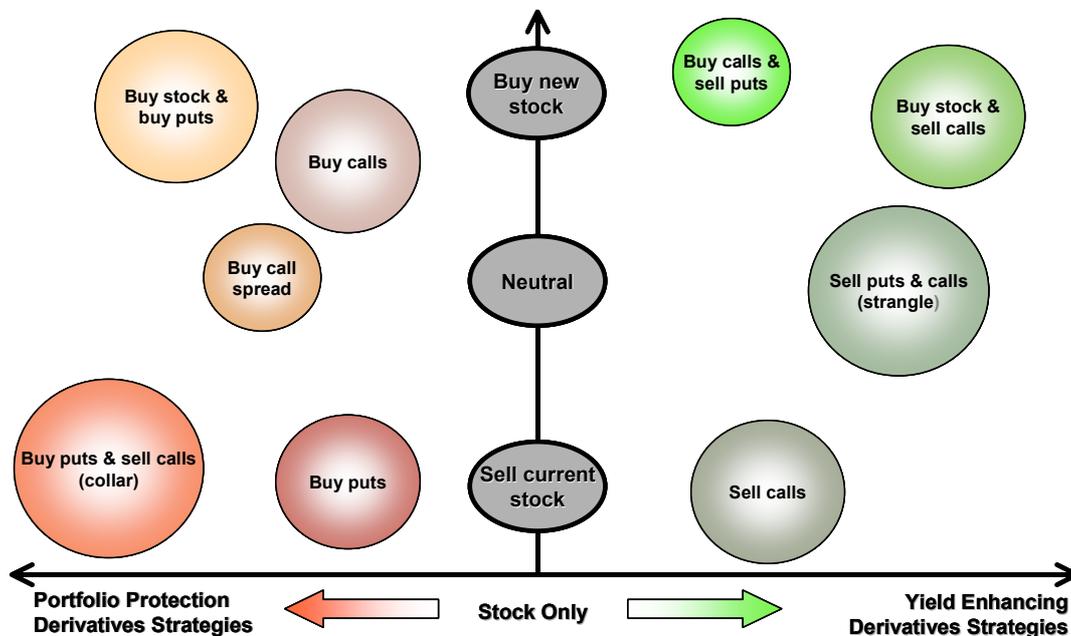
- In the long run this has meant selling options has produced an attractive risk-return edge over equity investment alone.
- The mechanism for taking advantage of this inefficiency has been selling call options over an index-benchmarked portfolio of equities. i.e The premium received for selling the call options has in the long-run been excessively priced based on the upside risk realised by the market.
- Up to €20b is now in managed funds in Europe and another \$20b in the US that replicate this strategy in a variety of forms.
- Both Europe and the US now have indices that calculate the return from a “blind” overwriting strategy. www.cboe.com/bxm
- The strategy still seems to be performing however as the inefficiency has not evaporated. Changes in approach may be required to avoid congestion on some strikes and maturities though.

Mythbusters: Equity Derivatives

Conclusions

In deciding upon the genuine merits of derivatives within a portfolio, we suggest the following considerations:

- Do I view the risk in achieving my expected investment return as being over or underpriced in the derivatives market? If this view is correct, a derivatives strategy will improve risk-adjusted returns.
- Are there consistent inefficiencies in the derivatives markets that will give me a positive expected return? We believe the demand for retail structured products does create these.
- Do derivatives give me something I can't do with equity? The most important benefit is against gap risk and other benefits include the ability to express specific directional views. Options therefore are particularly useful for event trading.
- The diagram below shows that derivatives should be considered an overlay in the investment decision making process. The first decision is on the direction of the underlying and the second on the potential merits of a derivative to enhance the risk/return tradeoff with options.



- The table below turns this into a trading decision. That is, buy options when they are cheap and sell options when they are expensive. When fairly priced, options may still be useful if leverage or gap risk issues are relevant.

		Second dimension: Equity risk view		
		Risk underpriced	Risk fairly priced	Risk overpriced
First dimension: Equity return view	Bullish	Buying call options will improved risk-adjusted returns	Options may offer secondary advantages	Selling put options will improved risk-adjusted returns
	Neutral	Buying puts and calls will improved risk-adjusted returns	Options may offer secondary advantages	Selling puts and calls will improved risk-adjusted returns
	Bearish	Buying put options will improved risk-adjusted returns	Options may offer secondary advantages	Selling call options will improved risk-adjusted returns

Mythbusters: Equity Derivatives

Investors who buy options may lose the premium if the stock does not move beyond the strike price. If they delta hedge, they may lose money if realised volatility is less than implied volatility paid in the option. In addition, they are exposed to path-dependent risk.

Investors who buy options may lose their entire premium. Investors who sell options have unlimited risk.

Options involve risk and may not be suitable for all investors. For information on the uses and risks of options, you can obtain a copy of Characteristics and Risks of Standardized Options from Citigroup Global Markets, Options Department, 390 Greenwich Street, New York, NY 10013.

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