

HEDGE FUNDS

THE VOICE OF THE ALTERNATIVE INVESTMENT INDUSTRY **REVIEW**

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Volatility Arbitrage: The non-correlated alternative

BEGINNER'S GUIDE:

From delta to gamma

Fimat's James Skeggs explains the terms, strategies and positions employed in volatility arbitrage – and how it can help diversify your portfolio



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FUND PROFILES:

Cream of the crop

Profiles of Shooter FM, ABC Square AM, Société Générale AM, and Titan Capital Group, as well as Acorn Derivatives.



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INTELLECTUAL PROPERTY:

R&D sharpens the edge

In volatility arbitrage are two kinds of funds: the adaptive with foresight, and the dead. The strategy's top managers explain how R&D hones their winning edge

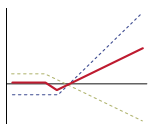


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PAY DAY:

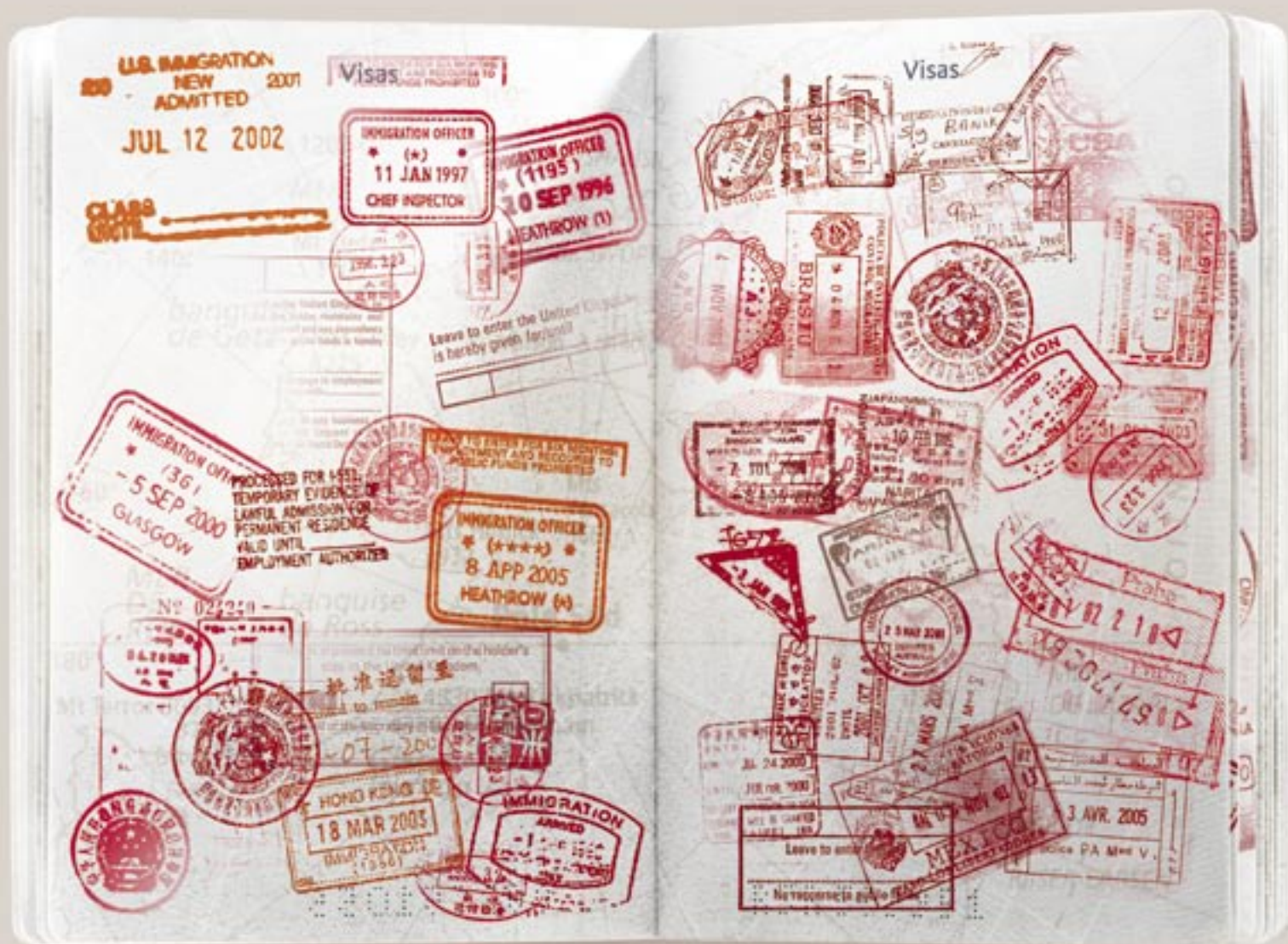
Option pay-offs

Fimat explains the pay-off profiles of the various positions volatility arbitrage fund managers can use, and explains which strategy works best in each environment



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Published by
Incisive Media Plc

Printed by
Heron

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Welcome turbulence – how to make money from it

Don't know your gamma from your theta, or your butterflies from your condors? James Skeggs from prime broker Fimat explains the terms of volatility arbitrage, and how the strategy's managers apply them to make money from a bumpy ride

The trading of volatility as an asset class is by no means a new phenomenon as proprietary traders within investment banks, and options market-makers have been trading volatility for many years.

However, the methods of trading this asset class have been slow to move out from the banks, and there are still a limited number of stand-alone funds trading pure volatility.

More recently, there has also been a shift in the way volatility programmes are perceived; from an insurance type of product to an absolute-return or portable-alpha product with outperformance being exhibited in times of market stress.

Historically, when investors wanted to buy volatility exposure, they would invest in convertible arbitrage managers, and there are significant similarities between convertible and volatility arbitrage.

However, there are also some important differences. Convertible securities first appeared in the US in the 1800s, and the notion of arbitrage (that is, profiting from the mispricing of convertibles by hedging long positions in convertible bonds with short positions in common stock) was introduced by Meyer Weinstein in 1931.

Convertible bonds can be regarded as a straight bond plus a warrant. It is the option component that causes comparisons with volatility strategies.

The differences, however, are due to the fact that the bond component also introduces issues with respect to credit risk. Managers trading volatility will seek to avoid this risk by only trading the option component.

Despite the recent growth in the number of funds trading volatility, barriers to entry still exist.

These include lack of options expertise, the complexity of positions and modelling volatility (lack of historical data), and the recent low-volatility market. Transaction costs are also relatively high for parties outside banks or market counterparties, though these costs have reduced markedly in recent years, leading to an opening up of this strategy through stand-alone funds, and as components of the large multi-strategy funds.

There has been much said about the recent decline in both implied and historical market volatilities – a trend particularly noticeable in equity indices¹, FX, and credit spreads. However, commodities markets have seen rising historical and implied volatilities, particularly in base metals.

WHAT IS VOLATILITY?

Before we explore the trading of volatility as a strategy in more detail, it is important to understand the concepts of volatility. The volatility of a security can be seen as the uncertainty (or riskiness) of the returns, or alternatively the degree of fluctuation about a price trend in that security.

Indeed, volatility is often referred to as a 'fear gauge,' as it tends to grow when uncertainty increases (for example, when the discounted value of future cash flows for an asset are harder to predict, uncertainty about the value of the asset increases, and greater, or more frequent, price movements are experienced).

When considering volatility, it is important that one looks both at forward (implied volatility) as well as at backward (historical or statistical volatility).

The historical volatility of a security is the actual volatility experienced over a given time frame, and is important when analysing hedge fund returns.

It can be easily calculated using one of two methods:

■ The standard deviation (σ) of the returns of the security over the time period:

$$u_i = \ln \left(\frac{S_i}{S_{i-1}} \right) \quad \sigma = \sqrt{\frac{1}{n-1} \sum_{i=1}^n (u_i - \bar{u})^2}$$

■ The average true range (ATR) of the prices of the security over the time period:

ATR = n-day average of the maximum of the absolute value of the following:

- Current high less current low
- Current high less previous close
- Current low less previous close

The forward-looking, or implied, volatility is somewhat more difficult to calculate, and represents the uncertainty about future prices.

It is one factor of the risk premium, and thus should also be considered when looking at actively managed portfolios.

Implied volatility is one of the parameters used when calculating the value of options, for example, using the Black-Scholes pricing model, and is the only one that cannot be directly observed.

Thus, if we know the price of an option (available through market) then we are capable of implying the market's expectation of future volatility by using iterative methods.

Black-Scholes Option-Pricing Model:

S = Current underlying price
X = Exercise price
T = Time to expiry
R = Interest rate
 σ = Volatility of underlying

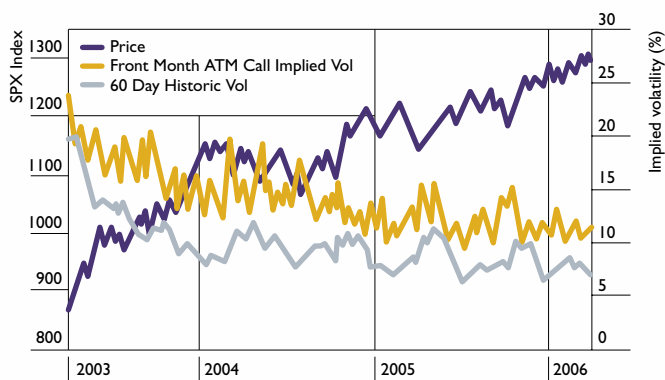
$$\text{Call price} = SN(d_1) - Xe^{-RT} N(d_2)$$

$$\text{where } d_1 = \frac{\ln(S/X) + \left(R + \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{T}}$$

$$\text{and } d_2 = d_1 - \sigma\sqrt{T}$$

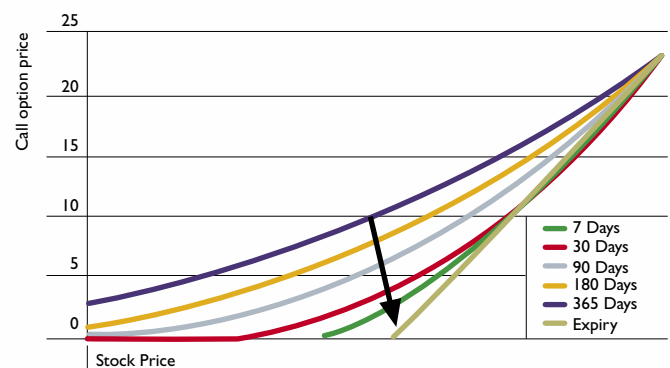
where $N(d_x)$ is the cumulative probability distribution function for the standard normal distribution.

PRICE vs FRONT MONTH ATM CALL IMPLIED VOL vs 60-DAY HISTORICAL VOL



10 April 2003 - 10 April 2006. Source: Fimat Alternative Investment Solutions

CHART 2: VODAFONE 130 CALL OPTIONS



Source: Fimat Alternative Investment Solutions

Make money from volatility arbitrage

AN INTRODUCTION

Having looked at the basic concepts behind volatility, we will now explore in some more detail the ways that fund managers trade volatility, and also how they aim to profit from this trading.

In a similar way to more traditional strategies, volatility traders can take a number of different positions from the following:

Directional views on volatility (for example, long or short)

■ Trade the implied volatility versus historical volatility on the same asset (gamma trading)

Across different strike prices

Across different maturities

Relative-value positions in volatility positions

■ Trade the implied volatility versus the implied volatility for the same asset (known as 'volatility-surface arbitrage')

■ Trade the implied volatility versus the implied volatility for a different asset

Long/short volatility

Dispersion trades

Traders taking directional positions on pure volatility are insensitive to the actual direction of the underlying market. Those taking a long position in volatility are expecting a rise in volatility, that is, they expect increased fluctuations in the price of the underlying security, rather than an increase in the price of the underlying security.

As in other markets, relative value positions aim to capture mispricings in volatility.

DIRECTIONAL VOL TRADING

The most popular method of trading volatility by institutional parties and hedge funds is by using options. A simple directional position using options (such as long volatility) would be a long position in a call-option contract, and short position in the actual underlying.

The position would initially be constructed to be delta-neutral (that is, by shorting a number of stocks equal to the delta² of the options held in the long position).

When considering the profitability of the above example, we need to include the premium that has to be paid when buying the option.

This has the effect of reducing the profitability by the cost of the option. In this scenario, the price needs to move by a certain amount in either direction in order for the position to be profitable – hence why this is a long position in volatility.

It is also necessary to consider other costs for holding options positions, particularly the concept of time decay for options, or 'theta'.

THETA

An option's theta is the rate of change of the value of the option with respect to the passage of time, assuming all else stays equal. The theta of an option tends to be negative, that is, the value of the option will fall over time, and theta becomes zero at maturity. It is this feature that leads to the term 'theta decay.' Near-the-money options tend to have the highest values for theta, and as you move further away from the exercise price, the effect of theta is smaller. (See chart 2, facing page). Theta is one of the features that managers

who are option-sellers (short volatility) are expecting to capture by selling the option then profiting as the theta falls to zero.

Managers long volatility talk of "bleeding through theta", as it represents a loss for holding the options if the price of the underlying security doesn't move.

DELTA AND GAMMA

The simple long vol example, however, is not a clean position in volatility as the delta is not a linear function of the underlying price.

The delta of an option also demonstrates some curvilinear properties (see chart 3, below), and thus traders will look to re-hedge their positions following a large move in the market, as a position that was initially delta-neutral will have ceased to be so.

The property of the option that is used to describe this is the Gamma of the option, and the continual re-hedging of the portfolio is called gamma trading. The aim of gamma trading is to capture sufficient trades to cover the theta (time decay) of the option – managers call this the 'gamma rent'. Options that are near the money, and have a short time period to expiry will tend to exhibit higher gamma's, and thus provide more re-hedging potential. However, these type of options also tend to exhibit high thetas.

It is therefore vital that the trader examines the size of the price movement in the underlying that will be required to enable the position to cover the loss through theta.

In an ideal world, a long volatility position would be continuously re-hedged, however in practice this is not always possible due to transaction

costs, lack of perfect knowledge about future volatility, and the fact that market movements are not smooth (this is one of the basic assumptions of the B-S option pricing model).

In reality, hedging is done on a discrete (disjointed) basis.

The ideal market conditions for a long volatility strategy are nervous ones with large price movements either up or down, but around the strike price, where gamma is maximised. These conditions give the trader the maximum opportunity to gamma trade, and therefore to try to offset the theta loss.

The long volatility trader will lose money if the realised volatility for the duration of the position is lower than the implied volatility when the position is initiated. The worst-case scenario is a market with no volatility.

STRADDLES AND STRANGLES, BUTTERFLIES AND CONDORS

Long directional positions on volatility can also be constructed through combinations of options. The simplest of these positions is a straddle position (see chart 5, overleaf), which involves buying a call and put option on the same underlying, at the same strike price, and at the same maturity.

This type of position would be used when the trader is expecting the market to move sharply, but doesn't have any particular view on the direction that the breakout will occur in.

Similar positions, known as strangles, are constructed by combining a long position in a call option and a put option on the same underlying, and the same maturity, but at different strike prices. These positions are cheaper to implement, as

CHART 3: STRIKE PRICE AND DELTA

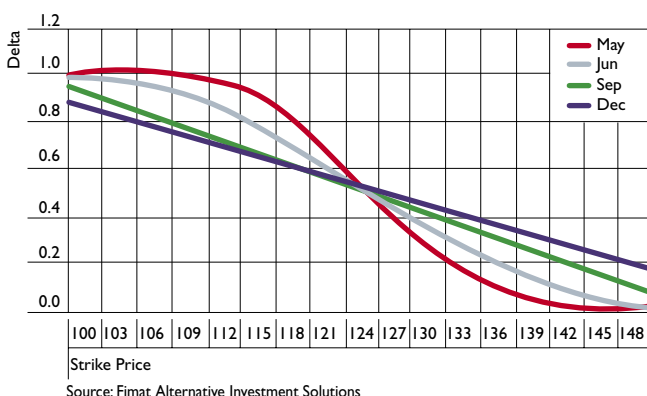
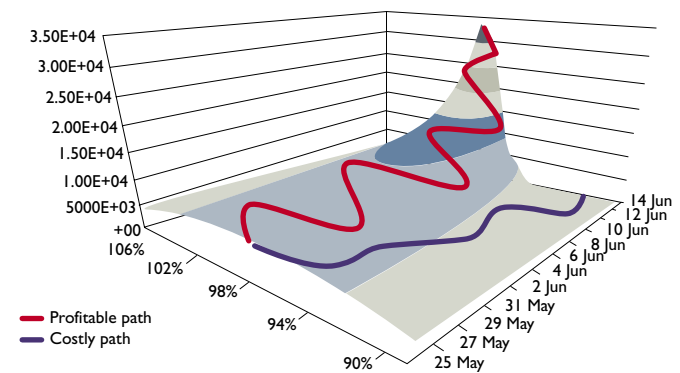
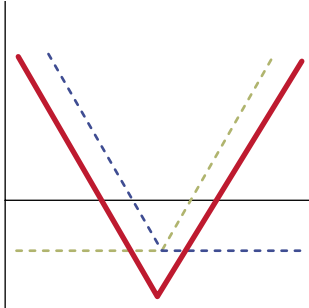


CHART 4: RWE 06/06 C 74 – GAMMA FOR 1000 LOTS (DATE = PRICING DATE, VERTICAL LEFT HAND AXIS IS GAMMA)

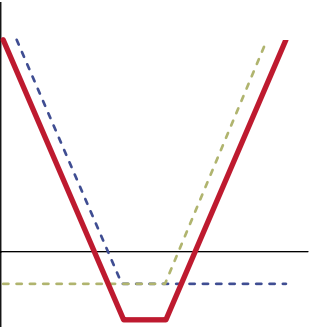


Welcome turbulence – how to make

CHART 5: LONG STRADDLE


the options with strikes further from the current underlying price will have a lower theta, however, they require larger moves in either direction to be profitable.”

If the trader has a view on which direction he thinks the market will break to – for example, he expects the market to move down following an overextended period of gains – he

CHART 6: A LONG STRANGLE


can structure positions that provide profits in that direction only.

These positions (for the same time periods) are cheaper again than the straddle or strangle positions.

However, they do not allow the trader to profit should the market move sharply in the unexpected direction. These positions are known as 1 by 2 spreads (or short ratio spreads), and they can be constructed using either put options (1 by 2 put spread) or call options (1 by 2 call spreads) depending on the direction the trader wants to gain exposure to.

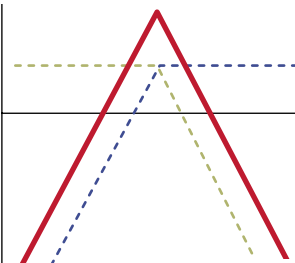
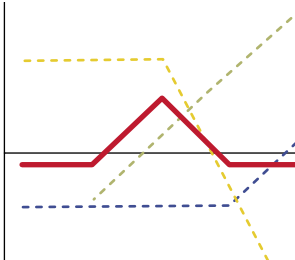
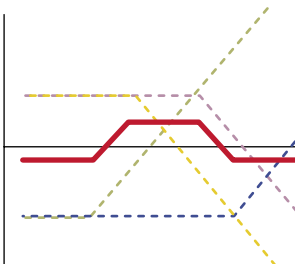
The options used to construct these positions will again preferably be the options with higher levels of gamma to enable active re-hedging should the deltas change rapidly (that is, through a market ramp or crash).

SHORT VOLATILITY TRADING

Due to the zero-sum nature of derivative instruments, other traders may believe that options are overpriced (implied volatilities are high), and will

be tempted to take the other side of the long volatility positions by writing (selling) options to capture the option premium. In this case, the trader is taking a short volatility position, that is expecting price movements to be small, and is looking to benefit from the time decay (theta) of the option.

Traders may also put on short volatility positions if they believe that prices of the underlying asset will stabilise going forward. These

CHART 7: A SHORT STRADDLE

CHART 8: BUTTERFLY POSITION

CHART 9: A CONDOR POSITION


positions will profit by selling high-implied volatility, and then subsequently realising low volatility.

Simple short volatility positions can be structured by selling straddles or strangles to the long volatility trader that is, selling a call option and a put option on the same underlying at the same strike price (in the case of a short straddle, or at different strike prices for the short strangle).

As mentioned previously, they

will aim to sell options that are near the money in order to maximise their potential profits though the theta decay, though there is more risk of exercise for the option (also known as ‘pin risk’). Short volatility positions such as the short straddle, have the potential for large losses should the underlying price move sharply in either direction. To limit these potential losses, the manager may like to cap the maximum downside risk, though these positions, called either butterflies or condors, are more expensive to initiate. A long butterfly position (chart 8) is constructed by buying two call options at different strikes, and also selling two call options at the same strike in the middle of the two long call strikes, with all options for the same expiry.

Condors (chart 9) are similar to butterflies but the two short call options at the centre are at different strikes as well.

RELATIVE-VALUE VOLATILITY TRADING

Volatility surface trading

Volatility surface arbitrage is the term used to describe the relative value trading of the implied volatilities of two options on the same underlying.

The opportunities for the strategy arise due to differences between the theoretical models used in options pricing, and the reality.

For example, the Black-Scholes Option-Pricing Model assumes that the returns of the underlying are distributed in a lognormal fashion, however in reality, this is not the case as extreme price movements occur more frequently than would be predicted by the normal distribution.

This type of distribution is usually called ‘fat-tailed’, or leptokurtic.

The effect of this is that options

that are either deeply in-the-money, or deeply out-of-the-money have higher volatilities than we would expect (due to their increased likelihood than would be predicted by the Black-Scholes model).

If we plot the implied volatility as a function of the underlying price, we can see a ‘smile’, which is known as vertical skew.³ (See chart 10, below).

A simple strategy that is traded when this smile exists is simultaneously to buy the cheaper option in volatility terms (that is, cheaper once the time value of the option has been discounted – this tends to be nearer the money), and sell the more expensive option in volatility terms (further out of the money) on the same underlying, and at the same expiry.

This type of spread trade can be constructed using either put or call options.

If the trader has a negative view on the underlying market, put options would be used (called a bear spread). If the trader is positive on the market, a bull spread would be implemented using call options.

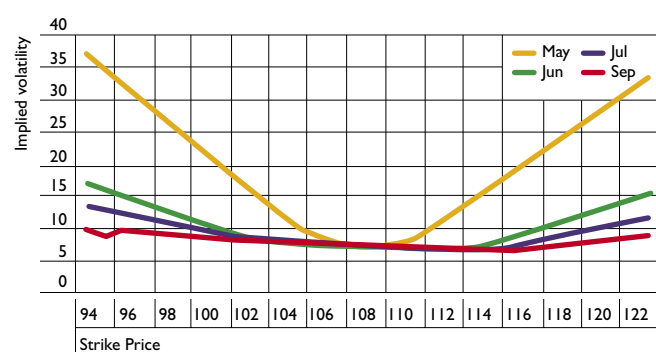
The other form of skew that exists for options in the horizontal skew, in which options further from expiry are cheaper in volatility terms than those near expiry.

In order to trade this skew, the trader can sell the expensive options in volatility terms (near to expiry) and buy the cheaper options (further from expiry).

This is called a calendar spread, and the trader aims to profit through time decay.

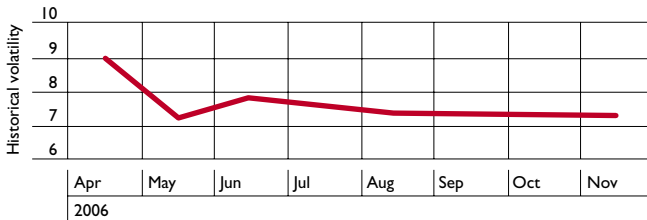
When the underlying markets experience a rapid fall, both the horizontal and vertical skew can become exaggerated, providing a good trading opportunity.

This position is called a back spread, and consists of a long position

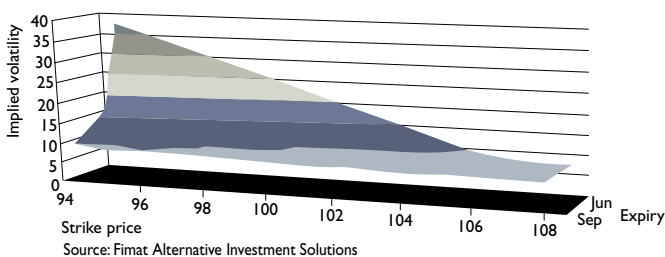
CHART 10: US LONG BOND 108 CALL AT 108-06


Source: Fimat Alternative Investment Solutions

Make money from volatility arbitrage

CHART 11: US LONG BOND 108, CALL AT 108-06


Source: Fimat Alternative Investment Solutions

CHART 12: US LONG BOND 108, CALL AT 108-06


Source: Fimat Alternative Investment Solutions

in an option far from expiry, with a high strike price; and short position in an option near expiry, and low strike price. (see chart 12 above). In order to remove the underlying market direction component from the profitability of the trade, the trader will construct the position so that it is delta-neutral.

If the position is initiated with options on the same futures underlying, the position can be delta hedged by buying and selling differing amounts of options because the options for different expiries will have differing deltas on the same futures contract.

If the position is initiated with options on different futures contracts, the trader will also need to incorporate futures contracts into their hedge for each leg. This, however, does lead to futures spread risk.

Cross-asset volatility trading

Options traders can also put on cross asset class volatility-based relative value positions in order to profit from mispricings in volatility. An example of this type of position would be to trade the volatility of a security against the volatility of a similar, but not identical security.

For example, one could trade the implied volatilities of the Japanese Yen versus the volatility of the Nikkei (see chart 13, right), or to trade the implied volatilities of gold versus single stock option on a gold producer (for example Newmont Mining) (see chart 14, right).

Irrespective of the reason for the

mispricing in volatility, the trader will buy the cheaper implied volatility, and sell the more expensive implied volatility relative to each other.

Dispersion trading

Dispersion trading is another form of relative-value volatility arbitrage that involves single stock options. This particular strategy involves trading the implied volatilities of single constituents of an index against the volatility of the actual index, and can be structured as either long or short volatility. A long volatility dispersion trade would be long options positions on individual constituents, and short option positions on an index, such as through the use of straddles for both the long and short legs. This should prove profitable, as the volatility of an index, being an average of its components, will tend to move by less than its individual constituents.

OTHER METHODS OF VOLATILITY EXPOSURE

There are a number of other basic methods to take directional trades in volatility. Probably the most simple is to buy futures or options contracts on the VIX Index.

The VIX index was introduced in 1993 by the Chicago Board Options Exchange (CBOE), and was originally based on at-the-money options on the S&P 100. In 2003, the CBOE introduced changes to the calculation method to include options at a wider range of strike prices, and the VIX is now derived from the prices of

options on the S&P500 Index.

The CBOE has also launched the VXN Index, which tracks the implied volatility of the Nasdaq 100 Index, and other exchanges have launched volatility indices, for example Deutsche Borse's VDAX and V2X Indices, which track the implied volatility of European equity market implied volatility.

Volatility exposure can also be easily gained through volatility and variance swaps.

Volatility swaps are over-the-counter contracts on future realised volatility, whereas variance swaps are based on the square of future realised volatility.

The payoff at expiration for a volatility swap is as follows:

Payoff = $(\sigma_R - K_{vol}) \times N$ where σ is the annualised realised stock volatility over the period of the swap, K_{vol} is the annualised delivery price, and N is the notional amount of the swap.

Variance swaps are more widely used in the equity space as the demand for put options leads to a very steep smile, in fact, often more like a slant. Dealers need to hedge this risk, and so they trade variance swaps, which are better hedging

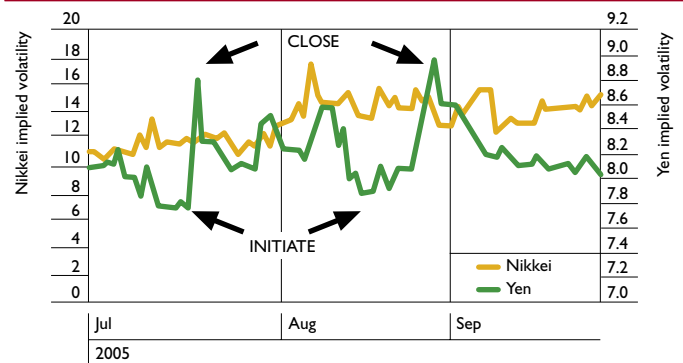
tools as they provide the purest volatility exposure. In the foreign exchange markets, however, the smile is slight, and volatility swaps can be used, as there is less of a requirement for a perfect hedge.

Variance swaps are also widely used by traders as speculative instruments on volatility.

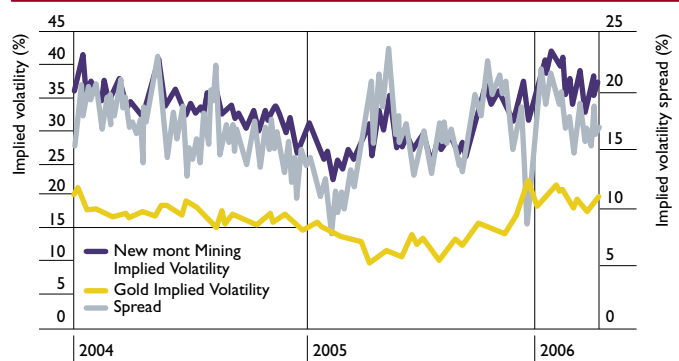
BENCHMARKING VOLATILITY

When looking at investments, we are often inclined to assign benchmarks to give indications of relative performance. In volatility, we would tend to use the following measures:

- Equity market implied volatilities: CBOE VIX (S&P500) and VXN (Nasdaq 100) Indices, Deutsche Borse V2X (DJ Euro Stoxx 50) and VDAX (Dax) Indices
- Historical volatilities: n-day standard deviation or price changes, or n-day average true-range measures
- Credit markets: credit spreads (spread, for example, between corporate bond and a benchmark, for example US Treasuries/Libor)
- Volatility-trading hedge funds (Fimat Volatility Arbitrage Median a non-investible index of volatility hedge fund managers.)

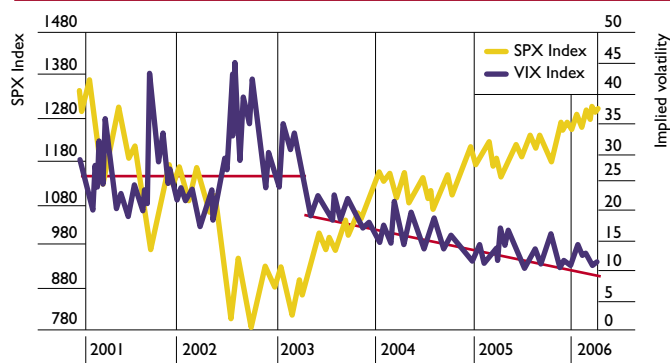
CHART 13: RELATIVE VALUE VOLATILITY POSITION – NIKKEI vs YEN


Source: Fimat Alternative Investment Solutions

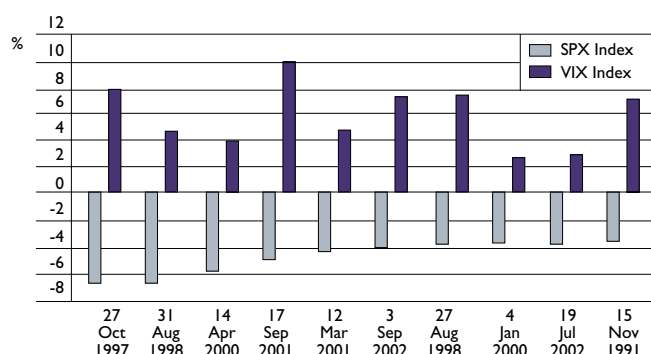
CHART 14: RELATIVE VALUE VOL POSITION – NEWMONT vs GOLD


Source: Fimat Alternative Investment Solutions

Welcome turbulence – how to make money from volatility arbitrage

CHART 15: S&P 500 INDEX AND VIX INDEX


Source: Fimat Alternative Investment Solutions

CHART 16: S&P'S 10 WORST DAYS SINCE JANUARY 1990


Source: Fimat Alternative Investment Solutions

VOLATILITY IN A PORTFOLIO

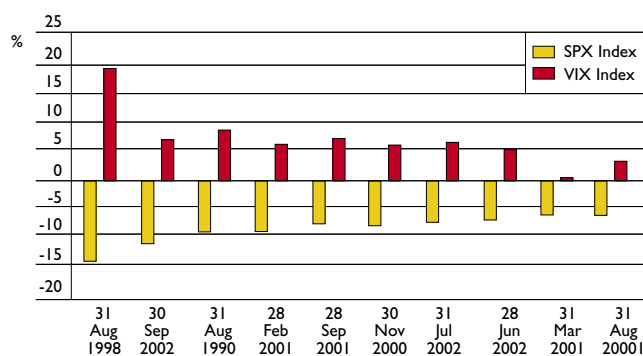
Volatility has a number of attractive characteristics (particularly on the long side) that lead to it being traded. Firstly, it increases when uncertainty increases, and is independent of the direction of the underlying

price movement (indeed, it tends to go up when other assets go down (see chart 16 and 17, below)).

Volatility is also seen as mean-reverting, which can also be seen by the red lines on chart 15, left. Volatility positions can also provide an impor-

TABLE 1: CORRELATION ANALYSIS SINCE 1990

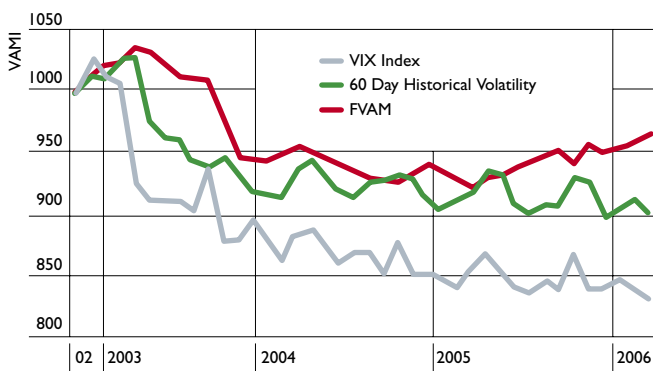
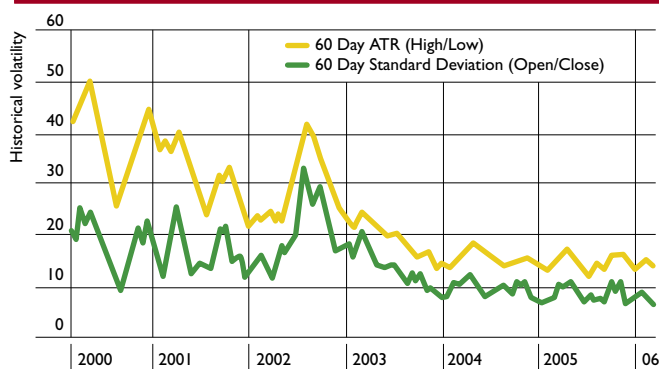
All markets			Up markets			Down markets		
	S&P 500	VIX Index		S&P 500	VIX Index		S&P 500	VIX Index
S&P 500	1		S&P 500	1		S&P 500	1	
VIX Index	-0.65463	1	VIX Index	-0.32629	1	VIX Index	-0.69219	1

CHART 17: S&P'S 10 WORST MONTHS SINCE JANUARY 1990


Source: Fimat Alternative Investment Solutions

TABLE 2: CORRELATION ANALYSIS JAN 2003 - MARCH 2006 INCLUSIVE. MEASURES RELATIONSHIP BETWEEN VARIOUS RETURNS OVER A COMMON PERIOD OF TIME.

Correlation analysis from Jan 2003 to Mar 2006 inclusive Measures the relationship between the fund performance and the performance of another fund over a common period of time R = +1 indicates that the performance move similarly R = 0 indicates no relationship R = -1 indicates an inverse relationship	FVAM	VIX Index	Barclay CTA Index	Barclay/GHS Conv Arb Index	Dow Jones Euro Stoxx Index – total rtn	Lehman ABIX	MSCI World Index	RICI	S&P 500	S&P/Citigroup BMI World Property (\$)	US dollar index
Fimat Volatility Arbitrage Median	1.000	0.007	0.297	0.132	-0.080	0.233	-0.022	-0.122	-0.028	0.075	0.001
VIX Index	0.007	1.000	-0.168	-0.130	0.672	0.104	-0.587	0.005	-0.668	-0.218	-0.118
Barclay CTA Index	0.297	-0.168	1.000	0.333	0.164	0.299	0.430	0.515	0.376	0.462	-0.407
Barclay/GHS Convertible Arb Index	0.132	-0.130	0.333	1.000	0.068	0.015	0.274	0.244	0.201	0.190	-0.361
Dow Jones Euro Stoxx Index – total rtn	-0.080	-0.672	0.164	0.068	1.000	-0.242	0.772	0.016	0.775	0.280	0.145
Lehman Aggregate Bond Index	0.233	0.104	0.299	0.015	-0.242	1.000	0.004	0.014	-0.040	0.321	-0.399
MSCI World Index	-0.022	-0.587	0.430	0.274	0.772	0.004	1.000	0.092	0.955	0.629	-0.409
Rogers International Commodities Index	-0.122	0.005	0.515	0.244	0.016	0.014	0.092	1.000	-0.017	0.090	-0.153
S&P 500 Price Index	-0.028	-0.668	0.376	0.201	0.775	-0.040	0.955	-0.017	1.000	0.562	-0.293
S&P/Citigroup BMI World Property (\$)	0.075	-0.218	0.462	0.190	0.280	0.321	0.629	-0.090	0.562	1.000	-0.502
US dollar index	0.001	-0.118	-0.407	-0.361	0.145	-0.399	-0.409	-0.153	-0.293	-0.502	1.000

CHART 18: PERFORMANCE COMPARISON SINCE JANUARY 2003**CHART 19: S&P HISTORICAL VOLATILITY ANALYSIS**

tant hedge against other positions in a portfolio, for example to hedge the implicit short volatility position of a long/short equity manager.

From the correlation analysis below, we can see that the correlation over the entire period since January 1990 is -0.65463 , (see table 1, top right of facing page) indicating that the VIX index tends to increase when markets decline, it is important to note, however, that the correlation during periods when the S&P 500 index was up is lower at -0.32629 meaning that volatility doesn't decline proportionately to

the increase in the S&P 500 index (see table at bottom of facing page.)

CHOICE OF EXPOSURE

The important question for the investor is how to best capture the benefits of a position in volatility; be it through futures and options on the VIX index (or other indices); volatility or variance swaps; or an investment with a hedge fund trading volatility. We will consider the period since January 2003, a difficult period for all forms of volatility, and use the following proxies:

- Implied volatility: VIX Index

- Historical volatility: 60-day standard deviation of price changes for the S&P 500 Index

- Volatility traders: FVAMTM.

From chart 18 (to the left of this page), we can see that since January 2003, an investment in a manager trading volatility would have outperformed a long position in futures or options on the VIX (excluding cost of rolling), and would also have outperformed the realised (historical) volatility (the dependent factor for the payoff of a variance or volatility swap).

Some of the main reasons for this outperformance are managers' expertise and managers' ability to capture intra-day volatility not captured through the other measures.

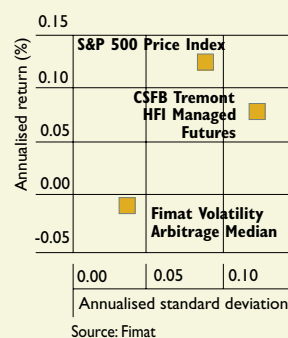
To show this, we take the 60-day ATR using high and low prices (rather

than just opening/closing prices), and compare it against the volatility as shown by the 60-day standard deviation of returns.

In chart 19, we can see there is an additional (intra-day) volatility active managers can also capture, which cannot be captured through passive volatility investments (for example, VIX futures, variance/volatility swaps). Trading volatility as an asset class is still relatively new as a hedge fund strategy, although the number of hedge funds engaged in volatility-trading strategies is on the increase.

Investors' interest is shown by the growth in assets under management in the strategy, and this should continue rising, particularly if levels of volatility rise from their current, low levels.

FIMAT VOLATILITY ARBITRAGE MEDIAN (FVAMTM) PERFORMANCE



In April, the Fimat Volatility Arbitrage Median rose by an estimated 0.73%, bringing its 12-month performance to 4.71%. Market volatility has come boldly into the spotlight over the last few weeks across all asset classes as the upward trending markets, experienced for the early part of the year, corrected sharply. The global equity markets have seen sharp sell offs, (S&P 500: -6.15% , FTSE 100: -8.57% , Nikkei -15.36% since 30 April), and both historical and implied equity market volatilities have risen dramatically over the same period (VIX: 12.22% to 23.81%, S&P 500: 60 day historical volatility: 3.67% to 10.47%, V2X: 11.98% to 26.69%). Credit spreads have also widened since the beginning of May as shown by the iTraxx HiVol Index (33.09%, 15.23) and iTraxx Europe Index (26.41%, 7.19). In FX, implied volatilities rose to their highest level in three years as the dollar weakened to near 12-month lows versus the euro, GBP, and Swiss franc, though volatilities have fallen back with the strengthening of the dollar over the last couple of weeks. The FVAM consists of ABC Square Asset Management – Sigma Square, Estlander & Ronnlund Global Volatility, KPG Investments – Asia Gamma Fund, Lynx Arbitrage Fund, SGAM Global Volatility Fund, Shooter Multi-Strategy Fund, Titan Global Volatility Fund and Turtle Fund. Figures are as at 14/06/2006.

FOOTNOTES

- 1 Though Japanese equities have gone against this recent trend and have seen rising implied and historical volatilities since last summer.
- 2 The delta of an option is the ratio in change in price of the option with respect to the change in the price of the underlying security.
- 3 In the case of equity options the shape of this skew is more like a slant, than a smile.

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AUTHOR: JAMES SKEGGS



James Skeggs is head of statistical reporting for Fimat's Alternative Investment Solutions (AIS) team in London. Fimat AIS teams offer a global range of prime brokerage activities on a wide range of asset classes, including equities, bonds, currencies, commodities, and their related listed & OTC derivative products. The teams also provide dedicated account-management, cross-margining, hedge fund start-up services, quantitative information and capital-introductions services.

From little acorns... a \$900m business grows

Acorn Derivatives has garnered around \$900m for its business on the reputation – and performance – of its volatility arbitrage experts. David Walker investigated.

What is the history of your firm?

Acorn is now 16 years old. We started Acorn to specialise in options strategies which at that time were traditional call writing strategies for large corporate and public retirement funds. Over the years, we've had as clients some of the largest corporate and public funds in the country.

We have been an SEC-registered investment adviser since our inception. We launched our domestic fund in July 2001, and our offshore in December 2001.

We currently manage about \$900m in assets. About half of that is in hedge funds and SMAs which use the same strategy and the other half is in overlay strategies that we are running for corporate retirement plans and one large state fund.

Could you explain the philosophy of your fund's strategy?

The fund focuses on the fact that index options generally sell at a higher level of time premium than is warranted based upon their historic volatility. This difference is captured by simultaneously buying and selling a four-piece unit of S&P 500 index options which, when combined, create a market-neutral position.

Specifically, the fund sells two options short at the current market level and buys two options of the same expiration, equidistant above and below the market.

Because of the higher time premium in the options that are at-the-money, the portfolio will benefit from the time decay of the options.

Positions are continuously monitored, and rebalanced as needed when conditions warrant to maintain the market-neutrality of the portfolio.

What is the focus of your firm?

We only use S&P500 index call options in a combination of long and short options with identical expirations. Historically, we have managed option strategies on European and Asian indices. Right now, the Europe and Asia markets have such a high correlation with the US market that there is no real diversification benefit to using those indices.

When searching for additional markets, the key is to find another market that generates this same price discrepancy where the options are generating implied volatility that's greater than the realised volatility of the underlying instrument for a consistent period of time. Then you have an opportunity to roll out our strategy into that market. When the environment changes and there is some diversification benefit, we will start using them again.

Where does your firm's competitive edge lie?

One main competitive edge derives from our initial client base (that is, large ERISA plans) which demanded us to follow extremely tight and disciplined risk-control techniques.

Those were embedded in everything we did from the day we opened our doors. These risk-control techniques were designed to avoid periods of significant loss when the envi-

ronment went significantly against our strategy. That served us well since our competitors – who were much larger – didn't have similar air-tight risk-control procedures.

So, when the markets made strong (July 2002) or erratic moves (September 2001), they weren't able to deal with it. In our case, when we experienced losses, they were small losses. That continues to separate us from our competition.

From time to time, people come into the market with a new idea or new approach, people think it makes sense. Then a one-in-a-hundred-year event upsets their thinking. It has been our experience that one-in-a-hundred-year events occur about every 10 years. This is why we only use trade structures with a pre-defined risk.

All our clients have an opportunity to have 100% transparency and we monitor the positions on an on-line basis. Several of our clients look at them every evening.

They are all listed and marked to market every night, so clients know the prices they are looking at are current and accurate. Since all the options we trade are listed, there is no marked-to-market risk, as would be found with OTC options or other less liquid investments.

We feel our 16-year history and over 60 years of option-trading experience add significant value.

What are the ideal market conditions for your strategy?

The key to our strategy is making sure the positions are pretty close

to market-neutral so that if there is a significant move up or down, it doesn't cut significantly into the P&L. So we're constantly rebalancing to keep neutrality.

Because of that, we are able to avoid significant losses and capture significant profits when the market stabilises. The ideal environment is when implied volatility is at a high level and realized volatility is low.

A good example of this would be the first quarter of 2003, in the days leading into the invasion of Iraq.

During this time period, implied volatility averaged approximately 30%, while realised levels averaged 22%, a spread of approximately 8%.

What do you see as the risks of the strategy?

The risks are strong directional moves, either up or down, which require frequent rebalancing. A September 11 2001-type of situation where you have a discontinuous market and can't rebalance because the markets aren't open is another big risk.

How have you done in down equity markets?

The market traded lower in two years (2001 and 2002) since we launched our funds. We were profitable in both of those years. Since our launch, the S&P500 index has traded lower in 23 months and our option strategy was positive in 20 of those 23 occurrences. We feel that weak markets provide greater opportunity for us to add value to our core option strategy.

So would you say you have low correlation to the market?

It does diversify a lot of different types of investments. It is uncorrelated to the S&P, bond markets, commodities, and most importantly other alternative investment strategies. It is attractive as an addition to an existing portfolio because of its non-correlated characteristics.

We feel that a low correlation is becoming extremely important as alpha generating portfolios are being combined with passive beta approaches to create portable-alpha strategies.

What markets and instruments do you trade?

We bundle together spreads of index

CORRELATION MATRIX

Measure	ADMC Ltd	SPX	GSCI	CSFB Tremont Main	CSFB Tremont Conv arbitrage	CSFB Tremont Long/short equity
ADMC Ltd	1.00	-0.37	-0.01	-0.20	0.08	-0.26
SPX	--	1.00	-0.15	0.49	0.17	0.60
GSCI	--	--	1.00	0.21	0.05	0.16
CS Main	--	--	--	1.00	0.62	0.95
CS Conv arb	--	--	--	--	1.00	0.47
CS L/S equity	--	--	--	--	--	1.00

Note: Recent Merrill Lynch study indicates large increase in hedge fund correlation to the S&P 500 index over the past five years. Data through May 2006.

options to create a market-neutral position that have a short volatility exposure.

We often use a butterfly transaction. If the index is trading at 1000, to initiate a very basic combination, we would buy one 950 strike call on the S&P500, sell two at-the-money 1000 strike calls and buy one out-of-the-money 1050 strike calls, all on the same expiring month so there is no term-structure risk in the strategy at all. When we put it on, all four legs are in the front month or all four legs are in the second month. It is probably the most conservative approach to arbitraging the inefficiencies in the implied volatility of index options.

How do you analyse the environment in order to initiate a portfolio? Our focus is to identify and analyse sources of volatility. We have a disciplined investment process which we continuously optimise.

Each week, we go through 60 different monetary, fundamental and technical factors trying to determine

where potential sources of volatility could be developing.

We evaluate the factors within our investment process, then gauge their influence and weight their impact. What we found, over time, was that these three factors tend to dominate volatility.

If you go back to 1999-2000, it was mostly monetary conditions. In 2001, it was mostly fundamental conditions. In 2002/early 2003, it was mostly technical conditions.

Since mid-2003, the cycle run which had been 12-18 months, has shortened significantly.

It is unusual but it has happened in the past.

It caused us to shift our focus quite frequently and as a result, the returns have been disappointing because rather than looking at one of the sources for six to 18 months as the market has traditionally done, it tended to shift in the last year in increments of months, rather than years. It has made it very difficult to properly evaluate the impact.

How does volatility affect your funds' investment strategies?

As a general benchmark for implied volatility, we use what most people use – the VIX index which is disseminated by CBOE. Throughout most of 2005, the VIX remained stable at a low level.

Recently, the VIX index has spiked higher and become more volatile as the safety net of global liquidity is beginning to be reduced. Historically, through active management of the portfolio, we have done well when the volatility of volatility is high.

From a trading perspective, we are also looking at implied volatility on the individual strikes and analysing constituent effects on index volatility.

Our strategy is based on the condition that implied volatility is greater than realised or historical volatility. That is the spread that we're focused on.

As long as that spread is positive, our strategy can be profitable in all environments.

Despite the low levels of volatility witnessed in 2005, implied volatility remained greater than realised volatility. Currently, the spread is about average, at 4%.

One thing that could be affecting the environment now is the large percentage of institutional dominance in the marketplace.

The percentage of program trading on the New York Stock Exchange as a percent of total trading has risen to 60%. There aren't a lot of retail players, resulting in one hedge fund trading against another.

Describe some good years and some bad years.

Years like 2001 and 2002, when the volatility was high and variable, are among the best environments for our strategy.

Conversely, a market with a strong trend, such as in the final three quarters of 2003, are among the most difficult of environments, requiring constant rebalancing to keep up with the movements in the underlying index.

When we're in an environment where we're not making much money, we feel our investment process is not working 100% effectively. As a result, we cut back the size of our positions significantly.

So, if we're in a low-return environment, then our volatility of returns will probably be half of what it would be like in a higher-return environment, such as 2001 and 2002.

In 2002, if we weren't adhering rigorously to strong risk-control procedures, it could have been a devastating year.

We were presented with a lot of opportunity because we avoided the spikes in volatility and we really could take advantage of the enormous spreads that existed after the spike.

The best environment was the early 1990s. We were coming out of the huge spike of volatility in 1987. The institutional market place for options strategies hadn't developed, so we sort of had the marketplace to ourselves.

That won't happen again because we have more participants in the options market. Currently, with the VIX index at higher levels, we believe the markets will be returning to a more attractive environment for our strategy.

BIOGRAPHIES:

William O Melvin Jr, president

William O. Melvin, Jr. is responsible for the management of the option portfolios. He has more than 45 years' experience in the investment business, beginning as a security analyst in 1960 with RW Pressprich. From 1962–1974, he was an institutional equity salesman and sales manager for FS Smithers. From 1974–1979, he was first an institutional salesman, then fixed-income



William O Melvin (right), and Andrew Greeley

sales manager for Paine Webber. Melvin began his investment management career with Cigna Investment Management as a portfolio manager and director of marketing in 1979.

In 1982, he joined Bankers Trust Co. as the managing director of their investment management group

where he began working with option strategies to improve clients' risk/return results.

In 1985, he founded the institutional investment management unit of Kidder Peabody, Webster Capital Management, and developed a full range of risk control strategies that focused on tactical asset allocation, portfolio insurance and options writing.

In 1989, he founded Acorn to specialise in using equity index, fixed income and international equity index options to enhance client returns.

He has also functioned in the futures market as Acorn is a CTA. Melvin studied civil engineering at Brown University, and after service in the US army as a missile specialist, studied business and finance at New York University. He is Treasurer of the Donald R. Reed Speech and Hearing Center, a member of the Board of directors, and Chairman of the finance committee of the Phelps Memorial Hospital and Kendal-on-Hudson

Andrew Greeley, CFA, vice- president

Andrew Greeley is responsible for the management of the option portfolios. He also oversees trading activities. In 1992 he worked at Tradition UK, in London, where he was a junior trader. In 1993 he worked on the floor of the Chicago Board Options Exchange. In 1994 Greeley joined Acorn to assist in broadening its option strategies.

He is a member of the Market Technicians Association and a third-level Chartered Market Technician (CMT) candidate. Greeley achieved his MBA in finance from the New York University Stern School of Business and a BS from New Hampshire College.

FUNDAMENTALS

Name of managers:	Acorn Derivatives Management Corp
Full name of funds:	ADMC Absolute Return Strategies LP ADMC Absolute Return Strategies Offshore Ltd
Address of manager:	50 Main Street, White Plains, NY, 10606, USA
Phone contact:	+1 914 949 3516
Launch date of fund:	1/07/01 (ADMC LP) 1/12/01 (ADMC Ltd)
Firm assets:	\$900m
Target annualised volatility:	8%-12%
Prime broker:	UBS Securities LLC
Auditor:	Ernst & Young
Management fee:	1%
Performance fee:	20%
Domicile:	New York (onshore LP), Cayman Islands (offshore Ltd)
Share classes/currencies:	US\$
Minimum investment:	\$1m
Liquidity:	Monthly, 45 days' notice

Sigma Square – making money on b

Sigma Square has not needed trending volatility to provide its investors with healthy returns of 4.80% in 2006 to 31 May, the firm tells David Walker

Could you explain the philosophy of your fund's strategy?

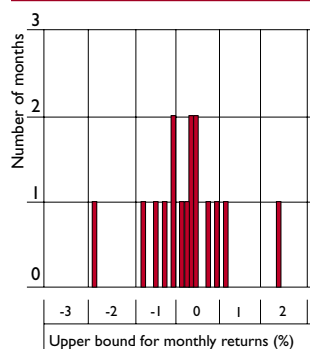
Sigma Square treats volatility as an asset class, which means the fund does not have a systematic long bias.

Directional views can be taken on the volatility itself but our approach also combines strategies that are not exposed to the absolute level of the volatility (for example, spread positions or arbitrage of the volatility surface).

However, the convexity of the portfolio ensures it captures returns on large market movements. In effect, Sigma Square is an absolute-return fund that can provide insurance in case of dramatic movements.

The aim was to adapt into the hedge fund world a successful strategy that has generated constant and large returns over the years for investment banks.

MONTHLY RETURN DISPERSION



Source: ABC Square AM LLP

You note you have a minimum 80% in volatility-based strategies and 20% maximum in delta-based. Why is this, and could you explain the difference between the two?

Volatility strategies are not exposed to market direction and therefore have little correlation to equity market returns. They are exposed to market movements instead.

This is the core business of the fund and represents 80%-100% of our value-at-risk (VaR) limits.

However, because options trading implies a lot of research on the underlying (via fundamentals, technical or graphical analysis), we wanted to have a separated and limited exposure to market directions, to be able to take advantage of this research. There is also an evident synergy between the two activities as a delta approach enhances options' gamma hedging, for example, and, on the other hand, options offer very interesting ratio for pure directional trades because of their leverage. This is especially the case when volatility is low as it makes premium even cheaper and provides a comfortable risk management and a natural stop-loss.

What markets and instruments do you trade?

We focus mainly on derivatives on European equities and indices, although we are trading opportunistically in the US and in Asia, as well

as fixed income, currencies or commodities. A further step for us could probably be the set-up of investment vehicles dedicated to each market region and underlying.

Could you explain the specific strategies, starting with dispersion

In very simple terms, a dispersion trade is a bet on how different the evolution of an index will be compared to its components. It is effectively a correlation position. A dispersion strategy, by usually being long volatility on the individual components and short the index volatility, provides returns when stocks are uncorrelated and move on large scales but in opposite directions, that is, with an overall offsetting effect that leaves the index close to unchanged. You are, therefore, capturing all the movements on the stocks while not paying away too much on the index. So it is a relative-value trade and, in theory, doesn't have a great exposure to pure volatility direction.

And volatility-spread positions?

Again, this is a relative-value trade, consisting of a bet on the volatility spread between two securities.

The basics are similar to a long/short equity position, for example, as you are playing the outperformance of one against another. The difference is that the performance is measured on the volatility rather than on the price. As for an equity spread position, one can use econometrical and statistical techniques (for example, mean reversion), to try to assess better the attractiveness of these trades.

And calendar positions?

A calendar position is a long/short position in volatility terms, through derivatives that have different maturities. They can be useful if one wants to play in isolation a specific event in time (for example company earnings, takeover announcements and so forth) and the consequences it can have on the company's shares during a certain period, without taking the outright volatility risk.

Skew positions?

The skew is the name given to the implied volatility curve when going from strike to strike on a same maturity. It translates the market anticipations in terms of volatility as the

security moves. A skew position is a long/short position on volatility instruments such as options having the same maturity but with different strikes. The most basic skew strategies are puts or calls spreads.

And theta arbitrage?

The theta is the effect of the time on an option and represents the small fraction of its price the option loses every day toward its maturity, everything else being equal. Sometimes, the market presents you with theta arbitrage opportunities or opportunities to collect the theta rather than paying it, especially over long periods of market breaks like week-ends or holidays.

What does your firm's competitive 'edge' lie?

We have developed in-house proprietary software that helps detect and analyse trading opportunities in all the strategies explained above.

This tool is completely tailored to our needs and we can easily evolve it over time to suit the demands of our managers.

It allows us to have a systematic approach to these strategies with a constant monitoring system on these aspects of the market. On a daily basis, the software automatically scans our whole trading universe then ranks and highlights the best opportunities it has detected.

However, we do not rely purely on these statistical facts and apply a second filter by checking the fundamentals, for instance, and using our market expertise that may provide an explanation as to why something is suddenly trading 'out of way'.

Therefore, the experience of our managers, who have more than 10 years' experience each in equity derivatives trading, is also an important factor.

One could also observe that the current situation in terms of volatility, although extreme, is not so dissimilar to Japan in the 1990s.

It is interesting to point out that most of our managers were actually working there at that time. But they have also seen the extremely volatile environment in Europe in the years 1998-2002.

When it comes to our investment procedure, we have a global approach as volatility on a stock can be affected by external factors beyond just share price movement.



ALAIN BUENOS – PARTNER AND CEO

Alain Buenos has 10 years' experience in equity derivatives trading. From 1998-2003, he was at Commerzbank London where he developed the pan-European equity derivatives trading desk and became deputy head of European equity derivatives trading. In addition to risk managing 10 proprietary traders, he was one of the main market participants in France, Spain and Italy. From 1997 to 1998 he was at Commerz Financial Products in Paris where he was an equity derivative proprietary trader.

From 1993-1997 he worked for Société Générale in Paris where he traded all the main European equity derivatives markets, and in Tokyo where he traded the Nikkei extensively. Alain Buenos graduated from Ecole Centrale de Lyon, one of the leading Engineering Schools in France. He also holds a Master in International Finance from H.E.C. (Hautes Etudes Commerciales).

Both sides of volatility's golden coin

The impact of structured products emission or redemptions, or the effect that other markets can have needs to be taken into account when trading volatility. For example, credit default swaps (CDS) can offer attractive returns but, at the same time, they can present you with a bankruptcy risk on a given company. Therefore, people would be prepared to pay more for downside protection, reshaping the skew structure in the process. So, this impact is an 'import' from another market and not necessarily justified by the price movement. The combination of these factors allows us to have a high-quality judgement on the implied volatility.

Could you provide a case study of where you have made money? Trades we are doing frequently at the moment are implied volatility pairs, using one of the functionalities of our software.

As explained, our model, being fed with data daily, provides a ranking of volatility pairs, based on constraints imposed by the managers; for example, sectors, countries or clusters filter. The most attractive ones are usually pairs where implied volatility is trading at least two standard deviations away from the historic volatility mean.

We then proceed with fundamentals and graphical analysis checks to confirm the results of the model before putting the trade on.

From then on, there are two ways to capture the profit from this trade. Either the market realises that this spread has been trading out of its normal range and then reverts it closer to its usual levels (in which case, the profit will appear in the mark-to-market of the position), or

the carry of the position, until its maturity, will provide the return via daily gamma management.

What turnover do you have?

We have a rather fast turnover for an option strategy but the timeframe of a trade can vary from a couple of days to a couple of months. On average, a position is kept for four weeks. Trading options also requires you to re-hedge your position theoretically daily, although some people prefer shorter or longer horizons.

Are there liquidity issues you must be mindful of, and how does ABC Square Asset Management's trading model take these issues into account?

Liquidity is paramount in our risk management and, *de facto*, has an impact on our trading universe.

We focus on blue chips or major indices and on short-term maturities (of less than one year) as this is where you will find highly liquid listed options. This is to ensure we have no liquidity problems to keep our ability to switch quickly from one position to another and to adapt instantly to a changing environment. As a matter of fact, we have set up the hard close of the fund to be at \$300m.

What risk-control policies are in place, including stop-losses?

We have several levels of risk control. The first is at the position level, where each trade is monitored in accordance with the pre-defined target gain. Intermediary and definitive stop-losses are set up as a percentage of the target gain and with precise exit procedures in each case, should they be reached. This is first to ensure a positive gain/loss ratio.

(Obviously, if a trade doesn't look attractive anymore, it can be closed before it reaches its stop-losses.)

At the portfolio level, we have a maximum acceptable drawdown set at 3% on net asset value per month, where the portfolio has either to be liquidated or at least complete gamma immunisation can alternatively be considered should we be in a fast market position, which does not always allow a quick exit.

We also have tailored stress scenarios to cover overnight gap risk, like our "seven-square" scenario where the whole portfolio is stretched with a 7% fall on the equities market and a 7% hike on volatility.

The resulting return has to be within the 3% loss that is explained above and the portfolio long vega at these levels.

Overall, although we allow ourselves to be locally short volatility, the general idea is to ensure we have long tails that will capture returns on large market movements.

How many positions do you typically have at any one time, and what's the maximum and minimum?

We have a diversification criteria where, at any given time, the portfolio has a minimum of 15 open positions. We do not set any maximum numbers.

What are the ideal market conditions for your strategy and what is the greatest threat it faces in making money?

The speed of change of the volatility (or 'volatility of the volatility') is an important factor as it will create more opportunities for our style of trading.

A trending market with no specific company or economical news, on the other hand, could provide less ground for volatility directional plays. This kind of environment usually takes away a lot of interest and liquidity from the market and arbitrage opportunities tend to dry out. If this is happening after a hectic period where absolute levels of volatility have reached important levels, one could still play the fact that volatility

could get crushed in the future.

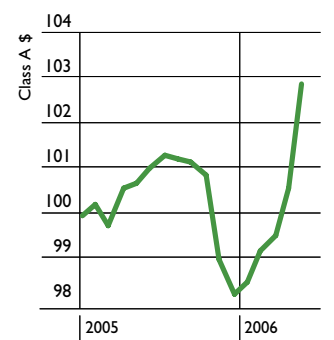
Could you explain how much of the fund's returns have come from short volatility trading?

Some of our strategies are based on relative value (volatility pairs or dispersion), so there is always by definition a short leg. In the current environment, outright short volatility is, however, not negligible as over the last few years, volatility has gone more down than up.

Because we are not long-only and because we are looking at the volatility curve as a whole, we can actually have a range of strategies with locally opposite directions.

Overall, probably some 30% is attributable, one way or the other, to a short position.

PERFORMANCE



FUNDAMENTALS

Investment advisor:	ABC Square AM LLP
Full name of fund:	Sigma Square Ltd
Address of manager:	5 Ludgate Hill, London EC4M 7AA United Kingdom +44 (0)20 7248 0020
Phone contact:	1 February 2005
Launch date:	10%-12%
Target annualised return:	5%-8%
Target volatility:	Fimat, Citigroup
Prime broker:	Pricewaterhouse-Coopers
Auditor:	2%
Annual fee:	20% (with watermark)
Performance fee:	Dublin/Cayman Isles
Listing/domicile:	Euro, USD
Share classes/currencies:	\$/€1m
Minimum investment:	Monthly
Redemption terms:	
Please note:	2006 return to 31 May in introduction paragraph is estimated.

PENG TANG — PARTNER AND COO

Peng Tang has eight years' experience in index and statistical arbitrage trading. From 1998-2004, he was at Commerzbank Securities London, where he built



up statistical trading and enhanced index arbitrage in Europe and the US alongside the index arbitrage business, and integrated both into the newly-created Global Arbitrage Group. Peng was global head of the business and managed a team of up to 11 individuals ranging from traders to quantitative and IT developers, based in New York, London, Tokyo and Frankfurt. From July 1996 to July 1998, he was at Dynabourse in Paris and Dyna Option in Frankfurt (which is now part of Calyon Group). Peng Tang graduated from

University of Paris I Panthéon Sorbonne and he holds a DEA (Diplôme d'Etudes Appliquées: Post Graduate Studies) in Monnaie-Finance-Banque, a 'Magistère d'Economie', and an MSc degree in Econometrics.

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Keeping pace: the R&D imperative



Sit back, relax... and you're relegated to the also-rans at best, to history more likely, when it comes to volatility arbitrage, leading traders tell David Walker

If you don't evolve your system and trading approach in volatility arbitrage, two things can happen.

Your competitors will branch into new instruments and markets, leaving you with lagging returns. Or the markets you trade in may change, leaving your program less robust to deal with shocks. A third thing then would presumably also happen – redemptions.

The leading volatility arbitrage managers concur 'constant improvement' is rarely more relevant than in volatility arbitrage.

Martin Estlander, chief executive officer of Finland's Estlander & Ronnlund notes simply: "a manager's edge consists of being able to operate, update and refine the programs so that they are able to extract what they are meant to extract in changing market conditions."

Peng Tang, partner and COO at ABC Square AM, adds, while broad fundamental underpinning's of a system may remain constant ("our model aims to adapt to market conditions by analysing market movements and flows"), there always remains "a certain amount of fine tuning involved."

"If you look at the volatility behavior over the past few years," he adds, "you would realise that we have been through some extreme levels, from the very high levels in the year 1998-2002 to the rock bottom situation up until the start of 2006. So, although the pricing part of the model does not require important changes, fine tuning is necessary to ensure the data sample is homogeneous."

Estlander notes the underlying markets can undergo sufficiently seismic changes – where the assumptions that have underpinned volatility arbitrage's ranks are sufficiently shaken – to catch out those not investing enough in innovation.

"One example is the stock crash in October 1987 when the skew in implied volatilities prior to the crash were less distinct," he notes. "After the crash, out-of-the money put options have been priced at higher implied volatilities than at-the-money options. This is one example of changing conditions that a volatility arbitrage program needs to consider." Portfolio manager at Titan Capital Group Russell Abrams adds another, US example to Estlander's. "In April/May 2001,

there was a structural change in the US markets. Specifically before this point in time, there would be general agreement among option traders that volatility would spike higher on some event, but then would trend lower over a period of time as the market normalised," he adds.

"One did not see volatility collapse over a very short period of time. Beginning in April/May 2001 this changed, in that we started seeing volatility gap lower as frequently as gapping higher.

"This sea change made trading a long volatility book, in our opinion, not a compelling strategy. I think its taken some of our colleagues who trade a bit of time to come around to our view, however I think those that were able to stay in business during 2002-2004 would agree."

WHEN TO CHANGE?

Estlander adds it makes sense to consider modifying or updating a system, as it could prove profitable to do so, in "changing environments and structural breaks. This can, for example, be volatility levels on different time horizons, central bank policy (and) volatility skews."

However, he adds change should not be made for change's sake alone: "We aim at updating systems as it becomes necessary but also to leave systems unchanged when there is a good reason for that. It should be emphasised our strategy is very long-term oriented. For example, our Global Markets program has been run successfully now for 15 years."

Russell Abrams concurs volatility arbitrage can be a case of the adaptive, and the dead: "history's shown in pretty much every area that nothing left static is effective over time. Trading systems and methodology are no different. The times and markets change and evolve, and one has to as well."

DANGER LURKING

However, volatility arbitrage managers will also need to conduct broadly-based R&D, keeping lookout for other, developing areas of the capital markets whose growth may impact their own portfolios and models.

Tang continues: "There is a constant product innovation on what we call 'exotic' instruments that may have an impact on volatility levels. These products are designed and sold by large investment banks to retail and institutional investors.

"As we are focusing mainly on plain vanilla options, the nature of the instruments we trade does not change as *per se*, but we make sure we take into account impacts and distortions generated on the volatility behavior by structured products."

NEW INSTRUMENTS

Further afield again, the leading volatility arbitrage managers are also looking keen-eyed at new instruments and markets to which their models can profitably be applied.

Shooter Fund Management, for example, says the firm is "very excited about commodity strategies for the fund" in the future, actively pursuing the addition of this to the portfolio.

Do specific markets require more intensive R&D to tackle successfully? Martin Estlander thinks not as a general rule, but notes occasionally extra attention needs to be paid to specific niches: "There are certainly markets that attend more focus from time to time," he explains.

"If the crude oil rallies, you will have a lot of investors and traders focusing on the price level and this will naturally have an increased impact on other markets as well.

"In terms of the volatility arbitrage strategies that we run, you need a liquid enough option market and therefore financials instruments play a central role. ABC Square AM's Peng Tang adds, "the methodology (of R&D) is pretty much the same for every market, as we would analyse flows and fundamentals and compare historical volatility to implied volatility.

"However," Tang says, "each market may be different as data gathering for instance could be more difficult on some occasions than others, with liquidity playing a substantial role in order to have enough significant information for research and development. Given our trading style, highly liquid options are a condition to any trading taking place, together with affordable trading costs on both the derivatives and the underlying."

Titan's Abrams believes R&D, and a committed focus on whichever market one trades, is so paramount to volatility arbitrage as a hedge fund strategy, that the "intensive concentration" required is "the principal reason Titan Capital Group is a single-strategy shop and only trades volatility."

Multiplying the sources of healthy return



David Beddington at Shooter Fund Management explains to David Walker the firm's Shooter Multi-Strategy Fund has few days when all positions in all its books profit. However its diversification policy consciously aims to produce the best times for some positions precisely when markets are difficult for others.

What do you see as the case for trading volatility and why is this case sustainable?

Volatility can be traded as an asset class. This is a valuable diversification, particularly as more mainstream trading strategies and asset

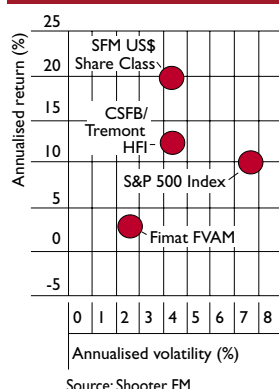
classes have recently shown an increased correlation of returns.

Vanilla and exchange option markets have very high levels of liquidity with a wide range of participants (unlike convertible bond markets.) The range of participants ensures a diversity of interests which allows traders to participate in a healthy market environment.

Volatility markets are not a zero-sum game, unlike futures, which CTAs use.

Volatility markets have participants that are looking to hedge and buy insurance, take directional exposure to the underlying asset class for profit, trade directional volatility (short and long) relative value, arbitrage, macro, technical and fundamental positions. This makes them one of the most dynamic asset classes to trade with a wide range of opportunities present to a team with the appropriate skill set.

SHOOTER FM RISK/RETURN PROFILE



SHOOTER FUND MANAGEMENT



L-R: Ari Andricopoulos, Charles Phan, David Beddington, John Goodridge, Mark Shooter, Stefan Boor

What do your calculations show volatility arbitrage's correlation to the traditional asset classes/other hedge funds has been historically?

Volatility trading styles are so flexible that it is important to focus on the strategy and not just the asset class. Our trading style has historically been uncorrelated to traditional asset classes, particularly during periods of market stress, which is when a lack of correlation within a portfolio matters.

What is the experience of the team on the fund?

The principal, Mark Shooter, was a qualified actuary who traded volatility at SBC O'Connor during the 1990s before starting his own proprietary trading firm.

The rest of the team has a range of experience from trading volatility in banks and hedge funds. We have a number of PhDs on staff who contribute to our quantitative research team.

Could you explain the philosophy behind the fund's allocation between different markets?

We diversify across a range of asset classes in order to broaden our opportunity set. As an absolute return fund we never have the excuse of blaming market action (or lack of action) for a disappointing return. So we focus on a range of asset classes and a range of uncorrelated strategies.

Could you give some idea on how the opportunities in different markets correlate in time (or not) and how diversification can aid a total portfolio?

The reason diversification is important is, diversification of risk means

diversification of returns. You need to be careful that diversification adds value and doesn't water down profits unnecessarily. We diversify across asset classes to broaden our opportunities and increase our long term alpha.

We run each asset class as a separate book with a diversification of strategies within each asset class.

Some positions we implement are long-term and expected to produce sizeable returns during periods when our more regular relative value positions will potentially experience volatility.

The best days for some of our trades are designed to coincide with difficult market environments for other positions. We rarely have days when all strategies in all books generate profits.

However, we have a very consistent daily, weekly and monthly net performance due to the mixture and balancing of these positions. This is our multi-strategy approach to volatility trading.

Your fund trades both 'equity volatility relative value' and 'equity put protection strategy'. Could you explain these terms?

We have the majority of our risk in relative value trades that are broadly market neutral.

As a volatility trading firm we naturally run a delta-neutral book using futures to hedge this exposure. So our relative value trading is more focused on the options risk.

Our core relative value positions leave us broadly neutral on a net basis when considering gamma, vega and theta. Additionally we buy downside puts to provide sizeable returns during periods of increased volatility.



We made about 5% in April of 2005 when many other hedge funds faltered. As a fund we generate our alpha from relative value trading however we do tend to pay a small amount of decay monthly and hold a long out-of-the-money put position which leaves us with a long volatility exposure after a large move in the futures market.

Could you give some flavour as to how the different markets have contributed to the fund returns in different economic conditions?

We seek to take advantage of any inter-correlation in market movements. By trading in a range of asset classes, we increase our information flow from financial markets. So while a particular market movement may not benefit one book we may be able to capitalise on it elsewhere in the fund.

However, our strategies themselves are not dependant on underlying market conditions. We are tactically and not structurally concerned with the direction of movement, whether in volatility or cash

markets. Therefore our strategies are sustainable in a range of economic conditions.

That said, as traders, we need movement in the market, a sustained higher volatility environment by definition would provide this and increase trading opportunities. Higher interest rates have historically been associated with periods of increased volatility.

What other diversification is important to the strategy?

We are short cycle traders with an aggressive trading style. Our average position lasts for approximately four weeks. We trade in option expiry contracts that have high liquidity. To achieve this we limit our trading to options within the front two years to expiry.

Does your strategy rely on market turbulence, or high volatility?

Our relative value strategies are not dependent on a high volatility environment. This is shown by the strong performance of the equity book over 2005 when volatility levels hit 20-year lows.

We have strategies that historically perform well in high as well as in low volatility environments. Our put protection will naturally perform in a higher volatility environment, particularly during the transition movement.

We have noted convertible managers moving into volatility arbitrage last year. Is there a danger of overcrowding and diminishing returns? 'Volatility arbitrage' is a term, similar to the term 'hedge funds,' that is used to describe a very wide range of trading styles.

We are very close to our markets and do not believe that any new entrants such as convertible managers are crowding our trades.

What instruments and markets for trading do you see as opening up in the future to aid the strategy generally, or your fund specifically?

We are very excited about commodity strategies for the fund. We are working toward adding this as a fourth asset class.

Given the huge increase in exchange contract volume in Europe with the advent of electronic markets it would be great to see a commitment from United States exchanges to adopt a modern business model and embrace screen-based trading. However, due to vested interests this may not occur soon.

There is also the potential in SWAP markets for a more stand-

ardised settlement market to develop. Companies like swapswire are leading the way. There is no reason why these products can't be exchange-traded as well. The resulting advantage for counterparty credit risk, market transparency and liquidity will be a boon to all market participants on the buy- and sell-side. But again, this may not occur soon.

You made 4.83% in April 2005. What went right?

In a word – puts. We had some skew positions that produced a very high payout during the sell-off in mid April. The cash market lost 4% in three days, which was beneficial to our positions.

There was a minor drawdown (1.33%) in October 2005. Why?

This was the only monthly loss for the fund since inception. We had, arguably, a reasonable but not excellent position and we suffered a market-to-market loss due to temporarily adverse conditions.

This will inevitably occur from time to time. As the fundamentals of the trade were still justified we maintained the bias of the position over October and November, regaining much of the lost ground.

Our long put position did not perform in October due to the flattening of skew (the premium puts carry against calls of the same delta) that occurred in October.

This was a trend that persisted consistently over the second half of 2005 and is reflective of the quest for yield in a world of low numbers.

The risk premium of downside protection in equity markets was eroded as the market built a geared long position heading into 2006.

This aggressive trading stance

held by many is reflected in other areas such as the high level of new assets committed to emerging markets in the fourth quarter of 2005 and first quarter of 2006. Increasingly the risk being taken to generate a decreasing rate of return will prove a challenge to some of the current market trends.

What risk management tools/techniques do you employ?

We run a range of stress tests and value-at-risk (VaR) models on the portfolio.

You focus on front-month, more liquid contracts. Are there also opportunities further out?

We prefer to trade in liquid and transparent markets. The structure of long-term volatility markets makes them less attractive for us at this point.

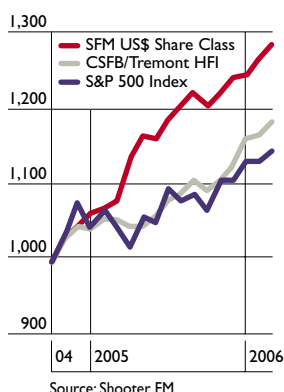
Indices can be traded in volatility arbitrage, but can volatility arbitrage be sensibly applied to single names?

Of course, there is a healthy market in a range of single-stock options. These can be traded through an arbitrage approach, statistically, fundamentally and a range of other strategies.

The higher volatility levels in single names can present opportunities for those with an information advantage and an efficient execution and position management system. There are inherent risks in building too large a holding in the outstanding interest but it is no different from an equity long/short strategy, which may encounter similar issues.

A conservative approach to writing single stock options (if there is one!) would require a deep fundamental as well as statistical understanding of the target company.

FUND RETURNS ON \$1000



FUNDAMENTAL FACTS

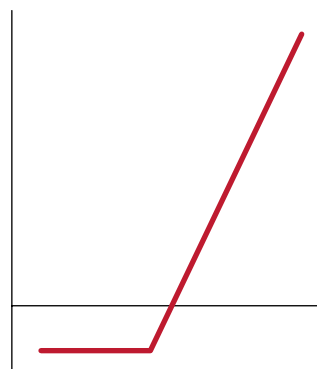
Manager's name:	Shooter Fund Management LLP
Full name of fund:	Shooter Multi-Strategy Fund Ltd
Address of manager:	Unit 206, Business Design Centre, 52 Upper St, London N1 0QH
Launch date:	November 2004
Size of portfolio:	\$500m
Target annualised return:	15%-18%
Average annualised rtn:	19.61% (as at 01/04/06)
Target (& actual) annualised volatility:	8 (4.4)
Administrator:	JP Morgan Tranaut
Prime broker:	Deutsche Bank Fimat, Lehman
Annual/performance fee:	2% / 20%
Listing/domicile:	Dublin/Bermuda
Share classes/currencies:	Euro, dollar
Minimum investment:	\$1m
Envisioned capacity:	\$800m target (for Dec 2006)

Traders' toolkit: options pay-offs

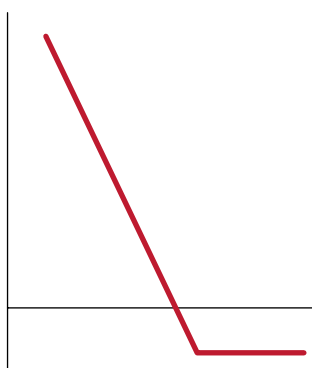
Volatility arbitrage is not just about knowing the instruments and trading strategies – as James Skeggs from Fimat explains, an understanding of various option payoff possibilities, and what trades work best in given environments from a return and price perspective is also crucial.

BASIC TOOLS

LONG CALL OPTION

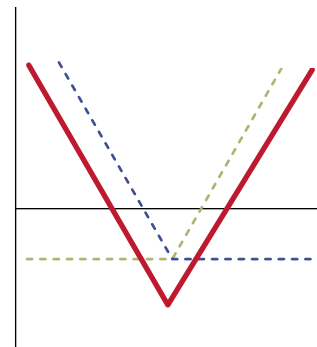


LONG PUT OPTION



LONG VOLATILITY POSITIONS

LONG STRADDLE



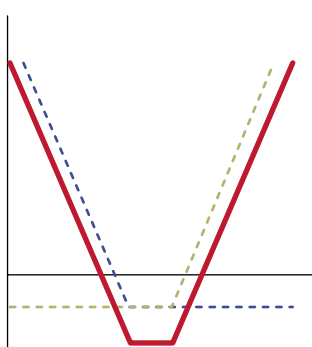
Long 1 call and 1 put on the same underlying at the same strike

The rationale

The trader here feels that options are relatively inexpensive and he expects the market will move sharply, but the trader does not have a clear idea in which direction the market will move.

Both of these positions directly above

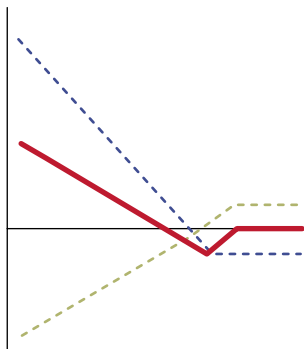
LONG STRANGLE



Long 1 call and 1 put on the same underlying at different strikes

will allow the trader to profit, although while the strangle position will be cheaper for the trader to implement (this because the strikes are further away from the underlying), larger price movements will be required by the trader to make the single position profitable.

SHORT RATIO PUT SPREAD



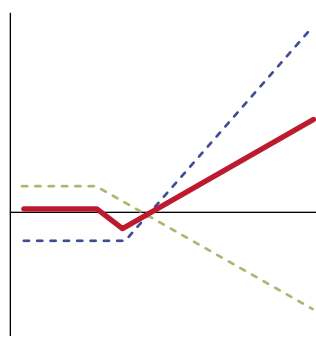
Short 1 put and long 2 puts at a different strike on the same underlying

The rationale

The trader feels that options are relatively inexpensive and expects that the market will move sharply.

In addition, he has also noticed that OTM options have a lower skew. He has

SHORT RATIO CALL SPREAD

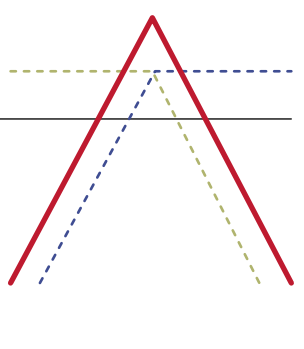


Short 1 call and long 2 calls at a different strike on the same underlying

an idea about which direction he expects the market to move in, but doesn't want to participate if the market goes in the other direction. These strategies are cheaper to implement than the straddle or strangle positions to the left.

SHORT VOLATILITY POSITION

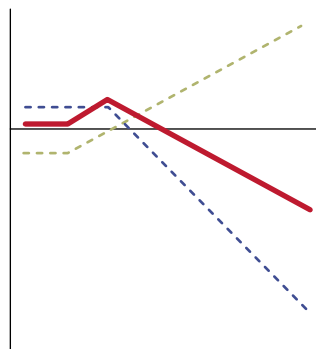
SHORT STRADDLE



The rationale

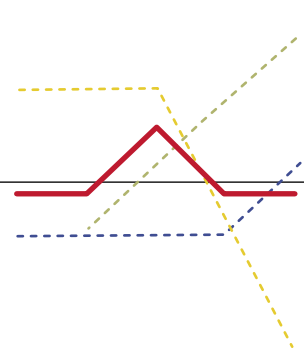
The trader feels that options are overpriced, that is, implied volatility is high, and expects prices to remain fairly constant in the future. He also notices that the OTM

LONG RATIO CALL SPREAD



options are highly skewed. The trader is aiming to capture the time decay (theta) of the options. With a long ratio call spread, the trader is looking to protect himself should the market move down sharply.

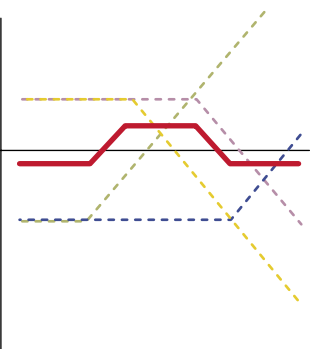
LONG BUTTERFLY



The rationale

The trader feels options are overpriced (that is, implied volatility is high) and expects prices to stay fairly constant in the future, though wants to cap losses should

LONG CONDOR



the market move sharply in either direction. The trader is aiming to capture the options' time decay (theta). A condor position is cheaper to implement but leaves some of the potential profits on the table.

Stop loss: how volatility arbitrage can act as portfolio insurance

Volatility arbitrage should diversify risk, not simply aggregate it, but how are allocators to assess which managers will help do the former? David Walker went in search of some answers...

Volatility is meant to be friendly to hedge funds, so it is little wonder funds of hedge funds are increasingly using volatility arbitrage funds to provide a cushion to more 'traditional' hedge fund strategies in choppy markets.

Arbitrage strategies typically do not fit into the GAM philosophy – the firm prefers investments in what it regards as more scaleable strategies – however, Jennifer Drake, manager of GAM's Multi-Arbitrage Hedge Fund says volatility-based strategies remain worth investing in, nevertheless.

She says many investors view volatility as a type of "portfolio insurance," and allocations are made with this firmly in mind.

As many traditional market shocks in the past have shown, hedge fund strategies can often share factor exposures common to different markets, leading the 'alternative' portion of what a manager believes to be a well-diversified portfolio to correlate at just the wrong time.

Using volatility arbitrage to cushion a portfolio in these high stress moments is a strategy advocated by many of the volatility arbitrage managers themselves.

Drake notes there are numerous ways to play volatility arbitrage, each variation displaying different characteristics, and each likely to make money in different markets.

Volatility managers must consider the trade-off to be made in different markets between liquidity and inefficiency, she says, both of which are desirable but inversely correlated.

Where a manager trades in relation to these factors dictates the type of fund it is, she adds.

The relative value, equity option traders are limited in which markets they can trade by liquidity constraints, Drake says, and are less often found in Asia, where oppor-

tunities for trading single-name options are limited.

Coupled with their higher transaction costs and lack of scalability, they typically make smaller funds, whose assets rarely exceed \$100m, she says.

The liquidity providers, which thrive on inefficiency but do not require high liquidity, do well in Asia, by way of contrast, she notes.

They are limited to electronic markets, found in Asia, as well as those in the United States and in the United Kingdom.

Increasingly, volatility funds have taken on a diversified mandate, she says, becoming volatility-orientated shops, playing

the convertibles markets as well as volatility, and GAM's fund has its largest volatility allocation to funds that trade both strategies.

"It's a natural evolution of the strategy," she says, utilising both probability-weighted views on the movements of the underlying asset, just using different instruments.

Volatility managers do tend to share a quantitative mentality driven by probability and derivatives, "a very upside-downside mentality," Drake says.

"They might be more conservative, by nature, than a typical equity long/short manager, for example."

Within this group, however, and as with any strategy, there are managers with very different attitudes towards risk, which provides a spectrum of possible fund characteristics and risk-return profiles.

GAM allocates between 15%-30% to volatility and convertible arbitrage funds. Drake says, while the strategy has had difficult times in recent years, and although it has picked up somewhat in 2006, it has still lagged some of the more directional strategies.



Jennifer Drake,
GAM

TRACKING ERROR – ARE VIX AND VDAX GOOD PROXIES?

Fund of funds managers may be tempted to see the best-known volatility benchmarks – the Chicago Board of Option Exchange (CBoE) VIX Index and related VDax, off Germany's DAX Index – as simple and quite accurate proxies for market volatility, and hence the size of opportunity sets for volatility arbitrage managers. But are they?

One volatility arbitrage manager *Hedge Funds Review* spoke to about the appropriateness of volatility benchmarks answered simply: "At present I don't know of any good benchmarks."

GAM's Jennifer Drake believes the the Vix and the VDax volatility indices are "bad proxies" for opportunities in the strategy as a whole, and one manager noted while "these would be good benchmarks for directional volatility players they would not be for arbitrageurs."

However, she adds, such broad benchmarks could be regarded in a similar light to credit spreads – "The higher they are the better the opportunities."

The most oft-used benchmarks "can give an approximate view of the market," she says, "but might be misleading, as the opportunity-set for volatility managers is much bigger than the indexes imply."

To an extent Drake's sceptical view is shared by Martin Estlander, CEO of Estlander & Ronnlund. He adds that the accuracy and relevance of the VIX/VDax benchmarks "depends on what kind of volatility arbitrage program one is running."

"If one only focuses on equities then VIX might be a good benchmark, but if one has a bigger trading universe then of course one also needs a wider benchmark," he says. "The relevant benchmark can only be determined when the investment strategy is known."

Drake notes that much of the opportunity for the strategy is governed more by dispersion – or the 'volatility of volatility' (the volatility within an index) – than by the volatility displayed by the index itself. Thus, if volatility increases, but all moves uniformly in the same direction, the opportunity for managers has actually reduced, Drake says.

So if simply looking at a broad volatility benchmark is insufficient to gauge the strategy's opportunity set, and if Fimat's FVAM™ is viewed as a good starting point for conducting top-down due diligence, before further investigation of specific single managers, what are the sine qua non questions allocators should put to a volatility arbitrage manager during their rigorous assessment?

Estlander & Ronnlund's Martin Estlander notes assessing a manager's edge – and its sustainability – is not necessarily that different to assessing other strategies. "As with any manager it is important to understand what he is doing and whether it seems to be likely he will perform in the future," Estlander explains.

He adds allocators can discover whether a manager can still generate profits in low-volatility climates by "seeking to understanding the manager's program and its characteristics in different environments."

Portfolio manager at Titan Capital Group, Russell Abrams adds: "I would suggest back-testing their returns in your portfolio and seeing whether they add value, or just add risk. Also I would look at their ability to make money during 2002-2005 as those have been incredibly difficult years for the strategy."

"I would also ask for exposure transparency," Abrams says, "in other words have them provide market scenarios and how their book will perform, this should be very easy for a good portfolio manager."

He adds, as a pointer for what prospective allocators might look for in an underlying volatility arbitrage hedge fund manager, "we believe our edge is not identifying good trades, but combining them into a portfolio. What matters is what one loses the 30% of the time you are wrong, and are your positions aggregating risk or diversifying it?"

Select the right manager and the answer should be very much the latter.



Martin Estlander,
Estlander & Ronnlund



Russell Abrams,
Titan Capital Group

Plus ça change – how Société Générale



Bernard Kalfon, fund manager of Société Générale AM AI's Global Volatility Fund tells David Walker why volatility arbitrage will remain as a strategy, and keep SGAM's clients happy, in a risk-adjusted kind of way

Why do you feel volatility arbitrage has sustainability as a strategy?

Volatility must be considered as an asset class. Indeed, the volatility market is deep and liquid with average daily trading volume over \$1trn and only \$5bn of assets are invested by hedge funds in this area.

Besides, volatility represents a measure of return fluctuations of underlying over a period of time. On one hand, implied volatility is determined by the market and measures the *expected* volatility of the underlying during the option's life.

On the other hand, realised volatility is the volatility of the underlying observed during the life of the option, and is known *at the expiry* of the option. To understand the volatility market, we can compare it to the insurance market.

If you buy a car and want to buy insurance against any eventual damage, you pay a premium to get rid of that risk. The insurer will be rewarded by a premium to take this risk, a premium valued through statistical models. Similarly, on financial markets, some investors are eager to buy protection against the evolution of a specific underlying price in the future, then buy protection called an option (with maturity corresponding to the horizon of their risk) to avoid this risk. But doing so, they must pay a premium (cost of the option) directly linked to the level of implied volatility.

Thus, as in insurance where the insurer is rewarded by the premium minus cost of the damages until the end of the insurance contract, sellers of an option on the volatility market are rewarded by a risk premium corresponding to the difference between the implied and realised volatility.

This difference is usually called the bias and is statistically positive for many underlying assets.

The volatility arbitrage strategy seeks to profit from this structural bias in option markets, which serve primarily as an 'insurance' market.

Chart 1, below left, illustrates, over the last decade, the reward (positive bias) for selling volatility (implied volatility) in the S&P 500 index options market.

Actually, implied volatility has tended to be 'overvalued' as compared with "realised volatility": simply stated, like an insurance market, the options market offers a premium to sellers of volatility. The overvaluation of the implied, compared to realised, volatility has tended to be the natural market equilibrium across all three asset classes.

In practice, options often trade at prices assuming an implied volatility with a significant discount or premium to the theoretical price based on observed historic volatility. By combining option positions and hedging tools, attractive risk/reward scenarios can be created.

Our sophisticated and proprietary quantitative methods of

market analysis allow us to identify the best times to execute trading strategies that capture the risk premium. Having identified this source of profit, we need to build a strong investment process giving recurrent returns, low volatility for returns and a controlled risk. Our investment process rests on four steps:

- Allocation process;
- Investment opportunities;
- Trading and execution; and
- Risk management.

What is the history of SGAM's involvement in volatility arbitrage? SG Group is one of the pioneers in derivatives-based investment and SGAM has had a large research team dedicated to volatility analysis since 2001, developing proprietary tools to analyse volatility on each asset class and underlying market.

The incubation period for the main ideas behind SGAM's first volatility-based fund was 18 months before the first launch.

It is under Arie Assayag, the global head of hedge funds at SGAM, his leadership and vision for the potentiation of the volatility and market, that we started the volatility arbitrage venture at SGAM, his involvement and commitment has really been a driving force for us in this field.

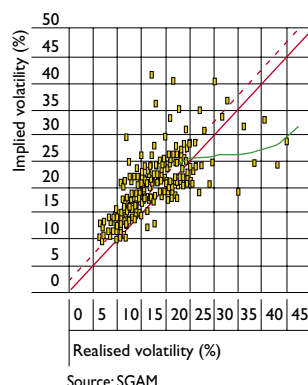
SGAM management is comfortable with quantitative techniques and very familiar with treating volatility as a separate asset class, in addition to understanding the associated risk.

In many ways, the SGAM AI Global Volatility Fund is the culmination of the group's efforts over the last five years. Signals have been improved and managers have looked for new, permanent opportunities.

During this development period we offered some clients an overlay program on fixed income and equities (\$350m AuM) using the same quantitative technology.

The SGAM AI Global Volatility Fund benefits from being part of a large organisation with dedicated risk control and derivatives experience. Launched in June 2005, the fund seeks to generate returns by capturing the risk premium of options traded in the major stock market indices, interest rates and foreign exchange. The fund trades listed options on major global equity indices (US, Europe, Asia), govern-

CHART 1: S&P 500 (03/03/94–19/05/04)



Source: SGAM

Large AM profits from option volatility

ment bonds and over the counter options on major global currencies.

The strategy seeks to profit in the option markets by selling the most 'overvalued' protection (short volatility book), buying the most 'undervalued' protection (long volatility book), while simultaneously hedging out market risk through 'delta hedging'. Given the structural bias in the options markets, over time the fund will have a net short volatility bias.

What is your team's experience? The Global Volatility Fund is run by two highly experienced managers.

Bernard Kalfon, hedge fund manager, is a derivatives expert with more than 12 years' experience in derivative products, working in FX for Salomon Brothers, Citibank and Bear Stearns in London. He ran multi-billion-dollar derivatives portfolios (vanilla and exotics) in major currencies and developed strong



skills in risk management and proprietary trading.

Bernard Kalfon joined SGAM AI in April 2000 as a senior hedge fund manager

and has been involved, since the beginning in developing the volatility arbitrage program. He is a post graduate in finance & economics (La Sorbonne University) and has a Masters in maths.

Daniel Mantini, hedge fund manager, has 20 years' experience in the financial markets and joined SGAM AI in February 2005 as a senior hedge fund manager. He has managed the global foreign exchange options trading groups for Bear Stearns, Salomon Brothers and PaineWebber.

He started his trading career with Shearson Lehman Brothers in 1987 and moved to Tokyo in 1988 to establish the Asian foreign exchange options desk.

More recently, he has successfully traded foreign exchange, equity and commodity derivatives at several hedge funds.

He has a BSc in Mechanical Engineering from the University of Pittsburgh and an MBA from the University of Chicago with a

specialisation in Finance.

In addition, our research team is a key resource in such a fund. It has five people with a high profile and strong expertise in quantitative analysis, and the team is 100% committed to the volatility program. The research team has great interaction with the fund managers in order to model all the ideas and trading techniques.

Risk Control

The fund benefits from an independent risk control team of 23 members. SGAM has an independent risk department reporting to the parent SG Group Risk Control Department. Of the 23 members, three are dedicated full-time to alternative assets and monitor the SGAM AI Global Volatility Fund.

What is SGAM AI Global Volatility Fund's investment universe?

We only use very liquid underlyings and instruments including all listed derivative positions. We do not invest in single stocks, emerging markets foreign exchange or illiquid bond futures, thus providing us with a low sensitivity to specific events. There is usually a bias in options markets linked to:

- Asymmetry of the supply and demand profile
- Insurance value
- Intraday volatility
- Local market characteristics

Our investment policy is based on this observed bias. Our managers identify periods when selling or buying short-term options and buying long-term options is profitable. We seek to capture value from the inefficiency of various options markets. Based on quantitative techniques, we analyse the markets within each asset class, then build a portfolio which extracts the value of volatility while maintaining a market neutral position. We invest in the volatility of three asset classes: foreign exchange (major FX currencies), interest rates (US, Japan, Europe and UK bonds), and equity (US, Europe and Japan indices).

How have you seen the universe for investment by funds evolve over the years?

The universe of investment has grown since our program's launch. We are more and more interested in Asian options markets (equity

indices and interest rates) as they are very liquid and offer the same kind of structural bias as European and US markets. As we have a trading centre in Tokyo with a senior hedge fund manager dedicated to the SGAM Global Volatility Fund, we can trade new underlyings and add value and diversification to the global portfolio. In the future, the commodities markets could offer opportunities for the strategy if liquidity on their options markets becomes sufficient for arbitrage and if a strong long-term structural bias is identified.

Are you not involved in some markets because appropriate instruments do not exist, or the market itself does not have favourable characteristics?

If we are not involved in a market, it is very often because of a lack of liquidity or because the corresponding options market doesn't exist. We also need to identify a long-term bias between levels of implied and historical volatility before thinking about investing in this market. We will increase market instruments only if we identify good opportunities on a specific liquid underlying.

You trade locally but manage risk globally. Why?

Fund managers' expertise and location (Paris, New York and Tokyo) ensure best liquidity access, optimal execution, and global full-time risk management coverage.

What filters/controls help minimise the effects of exogenous shocks?

The combination of the fund managers' expertise and dynamic risk management techniques allow the fund to preserve at best the investors' capital in critical market conditions. Fund managers will always build

positions optimising risk utilisation. For example, no short position on options with small delta will stay in the portfolio, as premium (reward) is minimal and loss unlimited; for the same risk there are better options to sell giving a higher reward. They also helped model and build intraday risk management techniques allowing the fund to reduce its risk exposure during extreme market conditions: options buy-back, proactive intraday delta hedging.

Do you employ stop losses?

We do not employ pure stop losses in the cash or futures markets, but we do utilise dynamic hedging algorithms in markets where we are short volatility to limit our losses on trading days when sharp movements well beyond one standard deviation occur.

We have determined concerning levels at which we should initiate dynamic hedging – levels are determined through statistical studies that define where the possibility of retracement to the opening level is negligible and probability of continued movement well past the first standard deviation is quite high. We dynamically hedge, buying the cheapest gamma options available. These are determined daily in all markets we actively trade.

What conditions favour your strategy and which make life difficult?

We should perform well in all types of market. However, because of the long-term bias observed in the option market, we will have in general more selling strategies than long ones. Our models help us avoid adverse market configuration, but of course will not be able to predict exogenous impacts (terrorist attack, for example) like many others strategies in the market.

FUNDAMENTAL FACTS

Management company's name:	SGAM
Full name of fund:	SGAM AI Global Volatility Fund
Investment manager:	SGAM Alternative Investments
Custodian:	Societe Generale
Annual fee:	2%
Performance fee:	20%
Fund type:	Unit trust
Domicile:	Ireland
Share classes/currencies:	Euro, GB£ Yen US\$
Minimum investment:	\$250,000

Titan Capital Group – a universal volatility

Titan Capital Group offers investors a global volatility fund – Titan Global – and Asian and US variations. David Walker examined the range and philosophy at the group

What is the case for the sustainability of volatility arbitrage?

Volatility arbitrage has become quite a broad category, encompassing both directional volatility players, mostly on the long side, and relative value, meaning long and short options thus making your volatility exposure, long or short, depend on the market level.

We trade a relative value strategy, which we believe is very sustainable, primarily because the vast majority of options are traded as either yield enhancement strategies or as a form of insurance on one's portfolio, and thus each particular strike or expiration option will trade on its own supply and demand resulting in options on the same underlying trading at different implied volatilities. Our strategy then takes advantage of these differentials. Although these differentials are much greater in high or increasing volatility environments, they are also available in low volatility environments.

Which funds do you run in the strategy?

All our funds utilise the same trading strategy. The difference between the funds is in the markets they trade and underlying assets. Titan Global M trades volatility on equity and fixed income and can expand into new underlying assets. Our other funds trade solely equity volatility.

Could you explain the different classes and Titan Global, and give insight into the different returns and volatility of the classes?

Titan Global has two share classes. Titan M trades volatility across various assets with the focus on fixed income and equity, while the other share class exclusively trades equity volatility. As Titan M is more diversified it will have more consistent returns. However, because it is more diversified than the equity-volatility-only funds if there is a problem in the equity markets but not in the others its upside potential will be less.

How do the regions differ from the global universe in their manifestation of volatility, cycles of volatility and opportunities for trading?

Regardless of the market, opportunities are driven by directional option trading. The vast majority of option

trading is directional, with equity options traded for yield enhancement and index options primarily for insurance. Irrespective of which purpose the options are used for, supply and demand by directional players dictate the price and thus assign different implied volatilities for different options.

The level of opportunities in any market is a function of option trading volume and the sentiment of investors – meaning whether there is panic or mania occurring versus a boring, stable market.

The best environment for the strategy is one where investors panic and begin buying options to protect their portfolio. During these “panic environments” buyers become least price-sensitive and will pay significant premiums to buy certain strikes or expiration options. Similarly in a mania environment speculators want to gain quick exposure to a market run-up and thus are less price-sensitive in their decisions to buy call options on the market, thus making these options trade at a significant premium to other options with different strikes and expirations.

The greater the differential between implied volatilities between options – or the higher the fear or euphoria in the market – the greater the opportunities for the strategy. In a low volatility, stable environment opportunities are fewer. Interest rates also affect opportunities, in that a low volatility, low interest rate environment is the most difficult for the strategy. Low interest rates foster yield enhancement strategies, such as covered call writing, which lead options to be sold down significantly as investors do not have opportunities to gain yield through other avenues. The past few years have marked the most difficult trading environment for volatility arbitrage, fortunately with interest rates now at more normal levels, 2006 looks like a very promising year.

Could you explain for example the differences in cumulative returns, in 2002 for Titan US, and in 2004 for Titan Asia?

2002 was a very good year for our US strategy. The first one and half quarters marked a period of declining volatility and then we saw a market dislocation occur in July.

This led to panic buying of options such as the December index puts. The large disparity among implied volatilities created good opportunities. The sell-off in May 2006 is a similar event which has also created very good opportunities. In Asia in 2004 performance was mainly driven by a mania in Japan. With that market run-up you saw many foreign investors who had been historically underweight Japan, and making money taking on the basis risk, needing to gain quick exposure. They did this by buying call options on the market, leading to great disparities between the implied volatilities on the sought-after strike and expiration call options and other options.

What markets does Titan Global trade?

We focus on the US, Japanese, Korea, Hong Kong, and we intend also to add Europe, though we would trade in any market with sufficient opportunities and liquidity. For underlying assets – we focus on equity and fixed income.

What capacity do your funds have? \$2bn

And performance of Titan Global, and Global M?

Titan Global M was up over 5% through 31 May and Titan Global around 4.75% through 31 May. Global M began, effectively, on 1 February 2006, while Titan Global began in August 2001.

You note in US, Europe and Asia there's been “dramatic growth in option volume” – does this mean capacity has grown, and how does volume growth affect growth in products?

Opportunities are clearly a function of option trading volumes. If we were to try to trade some exotic OTC option we would probably come up with the same price as the dealer we called. Where supply and demand push the market price away from the theoretical creates opportunities for us.

Is any region you're active in generally more correlated to traditional asset classes and/or other hedge fund strategies?

Our strategy is completely non-cor-

related to any market or hedge fund strategy. Using data from the CSFB Tremont index, our global product since inception to the present has had a correlation of -0.15 and posted positive returns 100% of those months where the index was negative. This is the real value we suggest people examine – that as a true portfolio diversifier that adds value when other strategies perform worst.

Where some of your funds are more focused, how do you maintain a diversified portfolio?

Diversification is a central theme to our strategy as we are statistically driven. In terms of obtaining proper diversification there are thousands of different strikes and expiration options between the different underliers from the indices to single stocks to choose from.

Could you explain the difference between relative-value positions and long volatility insurance positions, and how you use each?

Relative-value positions refer to long and short option positions on the same underlying. Relative-value positions are the engine to the portfolio. These trades can be broken into three groups: skew, forward volatility and dispersion trades.

Like all relative-value strategies, there are certain risks that cannot be diversified away. These “path” and “tail” risks we acknowledge, and use “long-volatility insurance” positions to hedge out and bring our risk to acceptable levels. These positions are not put into the portfolio to generate returns, but always to be able to control risks, including those perceived as improbably or even impossible, but that do happen.

What ‘supporting evidence’ is there that Titan “when added to a portfolio, reduces variance of returns while increasing expected returns”? The best evidence is the numbers.

If one takes the CSFB Tremont Hedge Fund index and runs the normal statistics and then runs the same with an allocation of 12% in Titan for example, you find over the past four years the index alone has a standard deviation of 3.07 – however with Titan included it would have a standard deviation of 2.76. Just looking at downside standard

Volatility remit with a regional twist

deviation, it goes from 1.4 to 1.11. One's maximum down month would decrease from -1.35 to -1.07. The Sharpe ratio would increase from 1.74 to 1.83 and the Sortino from 4.44 to 5.27. Returns would either increase or remain the same depending on which Titan product is used. This is the real value that we provide to an investor, we make their portfolio more stable while at the least not hurting performance and most often increasing it.

How have Titan's products generated positive returns 77% of the months the CSFB-Tremont HFI fell? Most hedge fund strategies have an embedded short volatility component, in that the strategy's success relies on assets moving as they are expected and are hurt by dramatic increases in volatility, which typically accompany market dislocations. Most people would agree, if one measured correlation between the various hedge fund strategies during tail events it would clearly show they become correlated at exactly the worst times. If one accepts my position, then our performance makes complete sense in light of the index performance – this is a key reason why every hedge fund portfolio should include some volatility exposure.

You mention 'quantifiable downside exposure' in your funds. With how much precision can this be predicted? Our risk management is based on scenario analysis and stress tests that have always been extremely accurate. This is because we are focused on short-dated options which, similar to bonds, have a fair value, reached at expiration. Our weekly risk reports to our investors show all our exposures.

How and when are gains from the funds locked in for investors? Gains are locked in by rehedging the position. To hedge out the option's directional component, stock is always bought or sold against it.

A simple example is if we were long an ATM call option we would be short .50 shares of stock. When the stock moves we would buy or sell stock for the position to remain delta neutral. At this point gains have been locked in.

You mention 'superior execution capabilities' – how does execution add value at Titan?

Given the large spreads in trading options – especially in percentage terms – where you get executed at can often mean the difference between profit and loss. We have over 50 years' combined trading experience and relationships with all the option trading desks.

You stick to short-dated, liquid instruments – what are the dangers of investing more in longer-dated or illiquid instruments?

Our edge is not in predicting supply and demand, it is valuing options and constructing an overall option portfolio with a very good risk reward. What we do is very similar to fixed income arbitrage – one way of explaining it is, if you are trading a five-year bond, you are concerned with both default risk and interest rates, however trading a bond with two months to expiration you can be much more comfortable focusing on only default risk.

Similarly with a long term option your P/L is more a function of what the market values that option – meaning supply and demand for that particular strike and/or expiration, and a lot less to do with

what the option will be worth over its term. The main reason we only trade volatility is we like to stick with where we feel we have a true

edge. The average duration of our portfolio is two to three months, but we will trade options up to a year out.

OVERALL PORTFOLIO

Daily movement	1%	1.19%	1.37%	1.56%	1.88%	2.5%	3.12%
Realised volatility	16%	19%	22%	25%	30%	40%	50%
-50%	30.9%	35%	37.6%	39.6%	42.4%	49.2%	52.7%
-25%	6.8%	10.9%	13.7%	15.9%	18.5%	23.2%	26.2%
-15%	-1.5%	2.7%	5.4%	7.2%	9.1%	12.3%	15.3%
-10%	-5.8%	-1.1%	1.5%	3%	4.4%	6.3%	8.9%
-5%	-2.8%	0.1%	1%	1.3%	1.3%	0.7%	2.4%
Index unchanged	5.1%	3%	1.5%	0.5%	-1%	-3.7%	-3.1%
5%	7.9%	4.1%	1.9%	0.3%	-1.6%	-5%	-5.1%
10%	7.4%	4.2%	2.1%	0.6%	-1.1%	-4.5%	-4.9%
15%	10.9%	6.8%	4.5%	2.9%	1.2%	-2.1%	-2.6%
25%	11.5%	7.4%	5.1%	3.1%	1.2%	-2.1%	-2.6%

RELATIVE VALUE POSITIONS

Daily movement	1%	1.19%	1.37%	1.56%	1.88%	2.5%	3.12%
Realised volatility	16%	19%	22%	25%	30%	40%	50%
-50%	-10.1%	-6%	-3.4%	-1.4%	1.4%	8.2%	11.7%
-25%	-10.2%	-6.1%	-3.3%	-1.1%	1.5%	6.2%	9.2%
-15%	-9.5%	-5.3%	-2.6%	-0.8%	1.1%	4.3%	7.3%
-10%	-9.2%	-4.5%	-1.9%	-0.4%	1%	2.9%	5.5%
-5%	-3.8%	-0.9%	0%	0.3%	0.3%	0.3%	-0.3%
Index unchanged	5.5%	3.4%	1.9%	0.9%	-0.6%	-3.3%	-2.7%
5%	8.5%	4.7%	2.5%	0.9%	-1%	-4.4%	-4.5%
10%	7.4%	4.2%	2.1%	0.6%	-1.1%	-4.5%	-4.9%
15%	8.3%	4.2%	1.9%	0.3%	-1.4%	-4.7%	-5.2%
25%	8.5%	4.4%	2.1%	0.1%	-1.8%	-5.1%	-5.6%

NB: The most-likely scenarios are in **redline bold**

MANAGER/TRADER BIOGRAPHIES



Russell Abrams, portfolio manager, has extensive experience managing options portfolios and trading index and single stock options. Before forming Titan, he was co-head of US equity derivative trading and convertible arbitrage at Merrill Lynch (1997-2000). He spent the previous five years at Bank Paribas, then CSFB. During 1992-1993, Abrams worked with Fischer Black researching derivative strategies at GSAM. He graduated from Boston University in 1988 with a computer science degree and received his MBA in Finance in 1993 from NY University Stern School of Business.

Senior traders

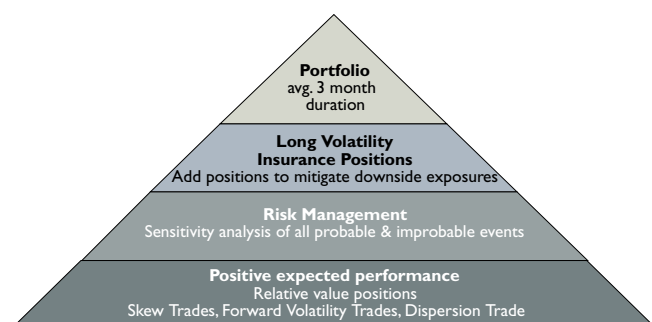


Mark Neuberger focuses on trading single stock options and identifying new single stock option opportunities. He spent 23 years at Morgan Stanley, where as a managing director he ran US equity option trading (top derivative desk for more than 10 years by McLagan Partners). As the most senior trader in the equity division, he represented it in risk meetings and on the risk committee helped set risk levels for the trading division. He graduated from Boston University (1981) with a degree in finance.



James Y. Xu focuses on trading volatility on fixed income products. Before Titan, Xu worked in fixed income for over 12 years as head of interest rate derivatives research at JP Morgan Chase (1993-1997) developing many of the quant models. In 1998, he became head of interest rate exotic option trading. He has successfully traded interest rate options for several years focusing on volatility arbitrage. He has PhD in numerical modelling of combustion from Yale University where he won the Best PhD award (Becton Prize) in engineering and applied science.

INVESTMENT PROCESS



Source: Titan Capital Group LLC

Accelerate

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At your service: pro-activity, immediate feedback, the ability to respond quickly and to develop personal solutions. 24 hour a day availability, worldwide. Your performance is backed by the best products and services we can offer, **from brokerage through to the most sophisticated types of financial services. Be impatient.**

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