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# Deriving insights into derivatives



ROLAND ROUSSEAU  
Deutsche Securities

**W**ARREN BUFFETT has called them WMDs. In the hands of a rogue trader they can cause the collapse of large companies, some accuse them of contributing to bear markets, others of increasing risk rather than reducing it, and many pension funds just plain ignore them. They're very often represented in headlines as if they belong to a dark and devious underworld, but the only thing we can be completely certain about is what Sir William Osler once said: "The greater the ignorance the greater the dogmatism." In this edition of *Collective Insight*, we will try to dispel some of this ignorance and dogmatism towards derivatives.

As with most things in life, there's the good, the bad and the ugly...

For our readers who need a primer, we refer you to **Michael Tostee's** definitions on page 9. Given the diverse nature of derivatives, we also urge you to explore the articles by industry specialists not included in this edition but which are available on our website ([www.collectiveinsight.co.za](http://www.collectiveinsight.co.za)).

### Exploring derivatives

We open this edition with **Rowan Williams-Short** explaining how many investment professionals ignore the very useful benefits of derivatives and that simple derivatives aren't as complicated or inaccessible as we think.

**Sumesh Chetty** provides an insightful article on how the implementation of derivatives needs to be managed carefully:

"Not putting your foot in it."

The recent "sub-prime saga" is still fresh in everyone's mind, and the article submitted by **Willi Jonker** logically describes in a sequential manner how the sub-prime risks emerged and finally overflowed.

A growing area of application is for hedging a pension fund's liabilities, which are increasingly being marked to market. Unexpected changes in interest rates can therefore have a severe impact on the solvency of a pension fund, and **Tanja Tippett** looks at how "interest rate swaps" can help hedge these interest rate risks.

Derivatives are constantly evolving, and we conclude this edition with a forward-looking view into exciting new-age derivative strategies. Your guide into the "New wave in derivative innovations" is **Mark de Araújo**.

### They will survive, but keep it simple

There are probably three types of derivative users: those who know they don't know anything, those who think they know what they are doing and those who have learned from experience. It's the middle group that's the most dangerous.

If used correctly, derivatives can provide peace of mind through direct and immediate management of risks. ■

## IN THE NEXT ISSUE

**THE TOPIC** for our next issue of *Collective Insight* is: "Bonds – Licensed to thrill."

When equity markets become agitated, investors can lose sight of the critical role fixed income instruments – bonds – play in completing or fine-tuning an effective investment strategy. Our next issue puts the spotlight on the asset class and helps both retail and institutional investors understand just how much these instruments have evolved over the past few years.

Authors who want to contribute to the debate can choose to focus on any number

of bond-related topics ranging from the esoteric to the mundane.

Those wishing to contribute should vet their topic choices with us first to minimise overlap. Contact the Advisory Committee Convener – Anne Cabot-Alletzhauser, at (011) 575-4333 – with your topic ideas. Articles (approximately 1 200 words, plus illustrations) need to be submitted to [matsholom@collectiveinsight.co.za](mailto:matsholom@collectiveinsight.co.za) by 6 June 2008.

\* As this is a research publication, please no market commentary or marketing materials.

# Deriving a bit of a yawn

They're just handy and sometimes useful

**T**OO MANY EXPERIENCED fund managers claim there's no need for derivatives at all: too many impressive, usually quantitatively orientated, young analysts claim derivatives are indispensable. Both are wrong.

Derivatives based on rice have been around since Phoenician times and even financial futures have been traded since 1972. So it's tedious to hear of "new instruments" or to be quizzed in hushed tones by potential investors about your daring to venture into this territory. To antagonists, they're remote from "real" financial instruments and comprise some sort of skulduggery perpetrated by scheming mathematicians to embarrass non-quants.

Antagonists often go further and ignorantly lay the blame for sharply negative markets on derivatives when the root cause is inevitably behavioural and such events probably would have occurred any-

way, albeit through different transmission mechanisms. To protagonists, we're dinosaurs if we don't derive; miracles such as outperformance in all market conditions are supposedly achievable through deft usage of derivatives. We've all heard the daft propaganda before: "Capital guaranteed, plus one hundred and x% performance of the markets."

Starting with the anti camp, it's true that derivatives' pricing requires some mathematical skills. However, in the case of futures that's trivial and for vanilla options the formulae were cracked years ago, are statistically elementary and readily available. Exotic options, such as compounds (an option on an option, eg, ca-call, pu-put or that allegorical beauty, the ca-put) or Parisian barrier options are more difficult to price but that's largely irrelevant; they rarely trade and were more a pure mathematical exercise than a solution to a gap in the marketplace. But there's no excuse

for a fund manager to refuse to use common derivatives.

The pro camp tends to be self-serving. I know; I was once firmly in it. Suppose your boss in your first job inspects your shiny new maths degree and appoints you as derivatives analyst. Even mathe-

maticians know enough economics to see that job security in such a situation would be poorly served by declaring derivatives anything less than mandatory in the carrying out of portfolio managers' fiduciary duties. And they're imaginative enough to come up with a host of unique payoff diagrams that would be difficult to replicate with simple equities or bonds.

But here's the rub: not many of these unique and invariably non-linear payoffs accord very well with any rational ex-ante view on markets.

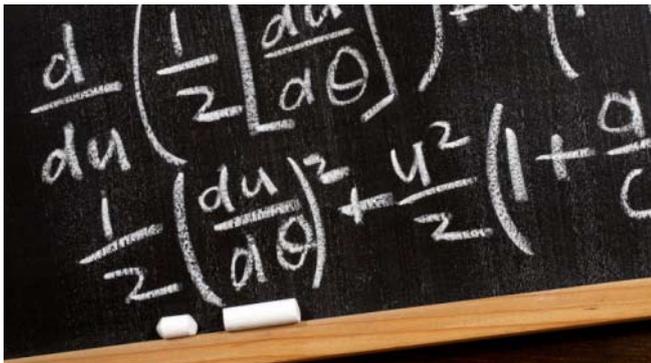
## Some perspectives on the history of derivatives in SA

Informal markets for single stock options have been traded for at least 25 years. Futures on equity indices began trading, albeit thinly, in 1987. A systematic, liquid and standardised but unlisted market in options on bonds was up and running by the Eighties (with no small thanks to Eskom's then forward looking treasury's market making activities and the endeavours of two nascent banks, RMB and Investec).

As such, we were far ahead of Australia, New Zealand, South-East Asia, Latin America and others. Many of us dashed to attend lectures by American professors

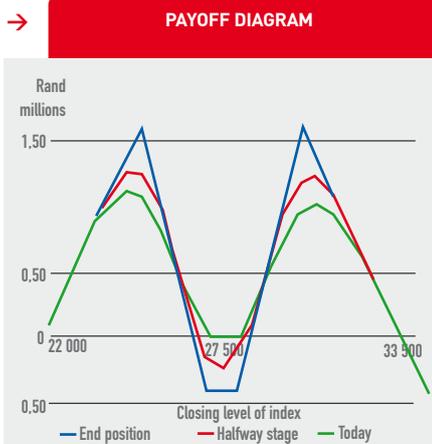


ROWAN WILLIAMS-SHORT  
*Orthogonal Investments*



▶ to learn how to price exotic options, but to this day that hasn't become a realistic requirement here or elsewhere.

But that didn't matter; ordinary futures and options offered dazzling arbitrage opportunities right up to the mid-Nineties. Sadly, those opportunities were limited to banks and life companies because, at the time, pension funds would not and unit



trusts could not use derivatives.

An innovative set of twin derivatives, the ELFI Bull and Bear, was issued by Transnet, the first such issue being in the late Eighties. The combination was a bond and therefore was Government guaranteed, as was the case with all Transnet bonds. In the early Nineties the Bull tranche traded at an annualised discount to fair value of 14%. That meant that a fund manager could enjoy a Government guarantee of outperforming the all-share (yes, equity) index by 14%/year. Most fund managers passed that opportunity by believing, in a spectacular case of self-delusion, that they could produce more than 14% alpha or taking the view that derivatives are inherently dangerous (for reasons unknown).

Nowadays, derivative markets are much more efficiently priced and therefore have lost some of their appeal. Some great qualities do remain. For example, if a fund converting from defined benefit to defined contribution wished to hold its value fairly steady while its members made their elec-

tions, there's no better solution than to hedge with futures. So a fund manager who chooses never to use derivatives is doing himself no favours – he diminishes the optimal achievable-point on the efficient frontier.

Conversely, purveyors of derivatives ought to stop pretending that derivatives are a fund manager's Holy Grail. The hard truth is that analysts and fund managers still need to get views and valuations on underlying instruments right. Then they might finesse implementation from time to time, using derivatives. In short, derivatives are neither necessary nor superfluous. They're just handy and sometimes useful. And so much talk of them is a tad soporific. ■

**ROWAN WILLIAMS-SHORT**

WILLIAMS-SHORT is CIO of Orthogonal Investments. He is a CFA with 18 years' investment experience. ■

# Not putting your foot in it

## The complexities of using put options

*PROTECTING YOUR OVERALL PORTFOLIO with derivatives is an emerging trend among investors. Unfortunately, the devil is in the detail and the implementation of such instruments isn't as simple as the promise of protection on offer. We look at the practical gaps of add-on protection strategies.*



SUMESH CHETTY

Investec Asset Management

**W**e recently closed out a put option for a client, locking in an 85% return on the position over six months. Naturally, we were pleased to have generated strong positive returns in current market conditions – even if it was on only a portion of the portfolio. However, the trade left us somewhat circumspect.

The magnitude of the return came as no surprise: equity options are highly geared instruments. What gave us pause was remembering that few investors employing put option overlays to hedge their portfolios actually implement them appropriately and realise any

profits generated.

A put option is a contract that gives buyers the right (but not the obligation) to sell a specific amount of an underlying asset at a specific price within a limited time. An investor that buys a put option at the current price of the underlying asset (ie, at the money) has effectively bought insurance against a fall in the price of the underlying asset.

### Building put options into an investment strategy

Most investors, in conjunction with their advisors or consultants, usually construct an investment portfolio appropriate to their risk profile and time horizon. Their aim is to maximise the probability of meeting their expected requirements at the end of their time horizon with a volatility of return that they can tolerate. That usually involves some sort of strategic, long-term asset allocation that may evolve over time. The intention is that the investor rides out any short-term volatility and keeps his strategic asset allocation constant, allowing the relevant investment manager to make tactical asset allocation decisions.

However, when

markets turn down, investors' fear of short-term negative returns may result in them finding it difficult to stick to their strategy. That could be exacerbated by choosing specialist managers for each asset class, where the tactical asset allocation decision then falls to the investor or advisor rather than the manager. In such instances an investor may ask that a manager use derivatives to protect an equity portfolio rather than force the manager to liquidate equity positions when conditions are poor.

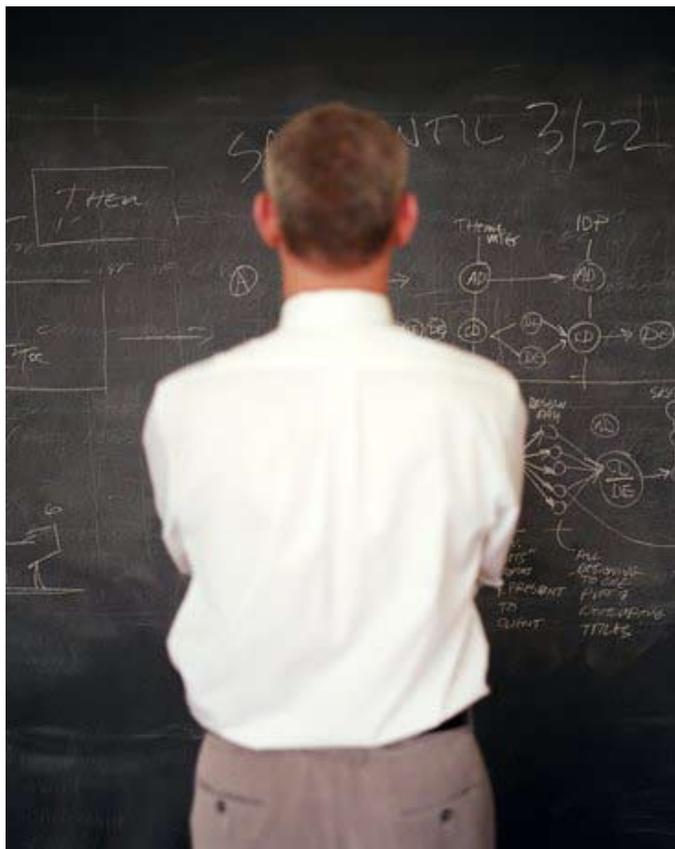
Rapidly changing a long-term strategy as a result of short-term market fluctuations is never a good idea. Insisting that your investment manager tack on an option strategy for the same reasons is an even worse idea.

The problem is that the behaviour and pricing of options can be far more complex than the assets on which they're based. Investors who merely add such instruments to an otherwise traditional market portfolio may alter its return signature in unexpected ways. In addition, market direction isn't the only consideration when it comes to buying or selling options. Investors also need to consider:

- The speed with which the market will move in a particular direction.
- The explicit costs of implementing the option position (a premium has to be paid).
- The degree of protection that will be provided by the strategy.
- The tracking error of the option position relative to the underlying portfolio.

### Put options behaviour and protection costs

When an investor considers a traditional asset (eg, equities) he needs to take a view on whether that asset is going up or down and then he buys or sells the



▶ 6 asset. If an investor believes that equities will produce a negative return he can sell equities and invest in cash. The investor can then wait for his view to materialise or change his view if new information comes to light.

The investor can take the same view by buying a put option and protecting himself against a fall in the market. That seems advantageous, as the investor appears to be protected from negative returns yet retains exposure to potential positive returns. However, put options are finite term contracts: they have an expiry date.

By using a put option, the investor has to take a view on the direction of the market and the speed with which the market will move in that direction. If the market moves down only after the expiry date the option will expire worthless and the investor will be exposed to negative equity returns (as well as having lost the premium paid), even though his view on the direction of the market was ultimately correct. The term of the option can be lengthened to increase the probability of profiting from a view – but at an increased cost to the investor.

Under normal market conditions and current interest rates, a three-month at-the-money put option could cost 3.7% of the amount protected. Increasing the term to nine months increases the cost to 5.2%. However, paying a higher premium for an option also means that an investor has more to lose if his view doesn't materialise and the option expires worthless.

Lengthening the term of an option introduces further problems. Prior to expiry, options and their underlying assets aren't perfectly correlated. If the asset falls 1%, a put option will protect the investor by less than 1%. The further away you are from the expiry date the lower the degree of protection. The closer you are to expiry the higher the degree of protection.

Using the example above, if the market falls 1% on day 1, the three-month put will immediately protect the investor by returning 0.41% on the portfolio, while the nine-month put will return 0.34% on the portfolio. On the actual date of expiry both options will return 1% for a 1% fall in the market, assuming the put option is still at the money.

Options with shorter terms will there-

fore be more effective hedges against market dips than options with longer terms. A longer term ensures that an investor has sufficient time for his view to emerge but, if it does, he may not reap the benefits provided by shorter dated options. Furthermore, an investor buying longer dated options also runs the risk that his directional view materialises and then ultimately reverses prior to expiry (like the markets we experienced in May 2006).

In addition to the headaches caused by the speed and direction of the markets, an investor wanting to use put options must consider the holdings in his equity portfolio. Buying put options on each share held can be more expensive and administratively intensive than buying a put option on the index.

However, the shares held in the portfolio may be very different from the index, especially if the portfolio is actively managed. Buying a put option on the index may therefore provide the investor with protection that's somewhat mismatched to what's required.

The above addresses only some of the basics that an investor must consider when introducing put options into a portfolio. The point is to illustrate that put options shouldn't be thought of as being a direct substitute for selling the asset in question and investing in cash. Put options can provide considerable protection – but sometimes not in the manner or level that traditional investors expect.

**So how can investors use put options more effectively?**

They can start by evaluating their long-term asset allocation and investment strategy to ensure that it continues to be appropriate to their needs. Given the time horizon of most investors they should be comfortable weathering short-term market volatility. The longer your time horizon the less you require protection in the form of options.

**If after evaluating their investment strategy investors feel the need to make use of put options, they must determine whether:**

- They want an additional investment tool to generate returns and provide a partial offset to negative markets, or
- They cannot afford losses, even over the short term.

An investor requiring an additional investment tool should mandate their multi-asset class investment manager to use options (but make sure that they're competent to do so). If an investor has specialist portfolios with several managers he should mandate his tactical asset allocator to implement option overlays (again checking for competence). Investors should avoid instructing a benchmark-relative equity manager to tack options on to his strategy.

Revisions to equity mandates may produce less than desirable returns, as the add-on is incongruent with a relative strategy. In all cases investors should avoid second-guessing the investment professional hired and insisting they buy specific protection for the portfolio.

As far as possible, investors should mandate the relevant professional to trade the options (as they would the underlying assets) rather than using them as invest-and-forget or static instruments. Don't expect put options to provide full protection – rather use them as a way of partially offsetting losses when the market falls.

Do trade them when the option is showing a profit, as profits can be quickly wiped out if the market unexpectedly recovers.

Alternatively, like any other asset, options should be bought when they're cheap and sold when they're expensive – eg, buy volatility when it's low and sell volatility when it's high (but remember the finite term of options and their decreasing values as they approach expiry).

If an investor can't afford to lose money but wants some of the upside exposure to a particular asset class and wants the security provided by options, then he should find a manager that uses put options permanently – a manager that doesn't use options only when needed.

By the time a portfolio needs put options they're already too expensive and it's usually too late. ■

**SUMESH CHETTY**

CHETTY is a portfolio manager with the Absolute Return team at Investec Asset Management. He's a Fellow of the Institute of Actuaries. ■

# The sub-prime saga

## Anatomy of an accident

**T**HE RECENT DECLINE in stock markets around the world is being blamed on the “sub-prime debacle” in the USA.

The sub-prime problem would have been isolated had it not been for the use of derivatives. Derivatives were used to amplify the problem and spread it around the world.

In this article, we try to analyse what this debacle really is and whether (or why) it's the cause of the stock market declines.

### What is sub-prime?

Sub-prime is the name given to mortgages extended to individuals who do not qualify for prime credit – ie individuals who have a higher likelihood of default.

### Banks contributed to the problem

Over the past five years or so, banks in America have extended more and more sub-prime mortgage loans. In 2006, 20% of all new mortgage loans were sub-prime.

The banks managed the higher risk of default in two ways. The first was to charge

a higher interest rate on the loans (to provide some extra money to cover those who did not repay). This method of risk management is healthy, as it provides a natural disincentive for people who should not be borrowing: the interest rate becomes prohibitive.

But, with interest rates in the US at record lows in the past five years, this form of risk management did not deter sub-prime borrowers from queuing up for credit. And banks circumvented their own risk management: to make it easier for people to borrow, banks introduced “Adjustable Rate Mortgages”. These mortgages start with a low interest rate in the first two years and then reset to the higher rate that would be applicable to a sub-prime customer for the rest of the term of the mortgage. The low initial interest payments allowed people to take out much larger bonds than they could afford to repay. They were counting on an increase in the value of their homes, so they could refinance (ie apply for a new loan) when the interest rate adjusted. The trouble began when many of these mortgages started to

reset to their higher rate and house prices in the US were no longer rising.

So, as far as the first method of risk management – matching the interest rate with the risk involved – is concerned, it's probably fair to say that banks were too slack.

But if this were the only problem, then we in South Africa would not be affected at all. A few American banks might go under – but so what? Enter derivatives in the form of “Asset Backed Securities”.

### Rating agencies contributed

The second way the American banks reduced their risk, was to sell the sub-prime loans to third parties. Loans were combined into parcels called Asset Backed Securities, and these parcels were sold off to investors.

Based on past experience (remember these words!) it was reasonable to assume that 80% of the sub-prime borrowers would repay. Therefore, typically 80% of each parcel of sub-prime debt was turned into “prime paper” because those who invested in ►► 10



WILLI JONKER  
Interneuron

### WHAT IS A DERIVATIVE?

Quite simply, a derivative is a financial product with a value that's derived from the value of some underlying asset, index or reference rate. These underlying assets range from listed stocks, market indices, agricultural products, interest rates and many other assets. Generally, derivatives fall into four categories – options, futures, forwards and swaps.

A derivative typically has two parties that take opposing positions over the same underlying asset. A long position will obligate the buyer to buy the assets at a certain price, while in the short position, the seller has the obligation to sell the asset at that price.

By MICHAEL TOSTEE  
Alpha Asset Management

**SINGLE STOCK AND INDEX FUTURES**

A futures contract is a contract whereby one party agrees to buy, and the counterparty to sell, a security at a specific price at a specific date. Futures contracts are highly standardised and are traded on an exchange, in the same way that equities trade on a stock exchange. A defining characteristic of these types of derivatives is that there's a daily settlement between parties in accordance with the direction and extent to which the underlying security's value has changed during the day. This process is called marking-to-market.

An example of a futures contract is a single stock futures contract.

The use of single stock futures contracts has increased significantly in South Africa as evidenced by the increasing volumes on the South African Futures Exchange (Safex). Safex has facilitated a market place where standardised instruments can be traded with an effective margining system to reduce the counterparty risk on the contract. Initial margins are set by Safex, but underlying brokerage houses may require higher margins depending on the liquidity of the underlying asset.

The initial margin allows investors to put down a much lower value of the asset (typically 10% to 20%) ▶▶ 12

▶ 9 the last-loss 80% tranche would only lose money if fewer than 80% of the borrowers repaid.

The rating agencies – the biggest in the world are Standard and Poor's, Moody's and Fitch – awarded these tranches an AAA rating. By comparison, fewer than 10 companies in the USA have AAA ratings!

The "past experience" on which the models of the rating agencies were based, was drawn from periods when the lending standards of the banks looked a lot different from those of the last few years.

**Investment banks contributed**

It gets worse. What happened to the remaining 20% of the sub-prime mortgage parcels? Through sheer financial alchemy, the large investment banks combined the next 16% of the remaining 20% into parcels that somehow also qualified as "Investment Grade" – including AAA-rated "securities"! (Notice how we, as investment professionals, can choose words to lull our clients into a false sense of "security".)

No wonder Warren Buffett calls derivatives "weapons of mass financial destruction".

**HEDGE FUNDS CONTRIBUTED**

**Who bought these investments?**

Because of the low-interest rate environment of the past few years, everyone was looking for a way to boost returns. And sub-prime appeared to be a low-risk way to do so. After all, one could buy investment-grade paper that yielded a higher return than cash

in the bank. So why not?

And why not borrow some money against the security of your investment-grade paper? If you earn 1%/year more on sub-prime debt than your cost of debt, then by borrowing up to nine times what you put in yourself, you increase your super-profit to 10% a year.

**The carry trade**

Borrowing in US dollars

¥103/\$ in the beginning of 2005 to around ¥124/\$ in June 2007. A weaker yen means one has to repay a smaller loan – meaning even more profit!

**What is happening now?**

By the middle of 2007, the sub-prime tranches started failing. Their prices were marked down.

Note: Most tranches did not "trade at a lower price" – because suddenly there were no buyers at all, and therefore no trade! Everyone got scared at the same time.

This caused some funds, which had to repay their investors and could not sell their tranches,

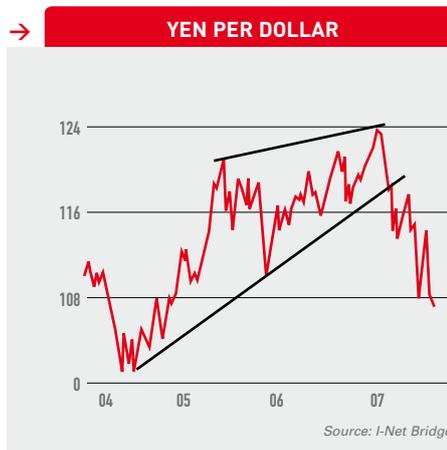
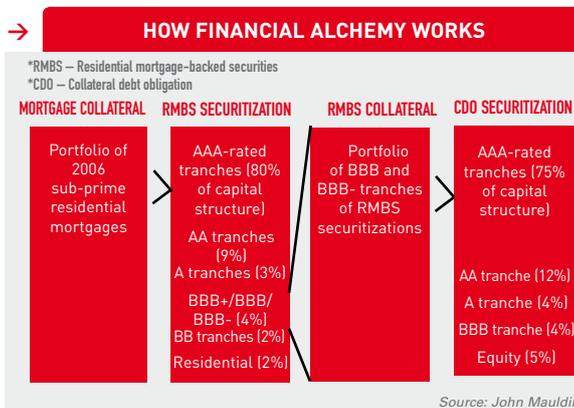
became more expensive over the past few years. But there was a cheaper alternative: borrow in Japanese yen! Due to the severe economic problems in Japan since 1989, interest rates were at zero. So investors such as hedge funds borrowed in yen. They would immediately sell the yen for dollars and buy sub-prime debt. All this selling of yen caused the yen to weaken – from around

to fail. The investment banks, which had until then accepted the sub-prime tranches as collateral for loans, suddenly decided they needed more collateral – just in case the sub-prime tranches were not worth their face value. This forced the borrowers – such as hedge funds – to sell their other assets – including shares such as shares on the JSE – in order to reduce their borrowings.

Hedge funds started to repay their loans. This meant they had to buy yen – as the loans were denominated in yen.

The buying of yen has caused it to strengthen from ¥124/\$ to near ¥108/\$ at the time of writing this article.

Of course, a stronger yen raises the spectre of a higher debt burden – causing even more people to head for the exit at the same time. ▶▶ 12



► 10 or more of the physical value) and effectively use leverage to gain greater exposure to the asset.

Single Stock Futures are listed for most companies and indices on the JSE, including the All-share index (Alsi), Resources index (Resi), Financials index (Fini) and the Gold Mining index (Goldi). The prices of these contracts track the underlying assets' move but will also include an interest rate and dividend factor. At expiration, the underlying stock price and the futures prices will converge to zero, when there's no longer an interest rate and dividend factor present.

The contracts are all standardised to expire on the third Thursday of March, June, September and December and on expiration are physically settled by the delivery of the actual script from the short position holder.

By **MICHAEL TOSTEE**  
Alpha Asset Management

► 10 **Did no one see the problems coming?**

Investment managers often think they have discovered a novel way of making money that no one else knows about. Perhaps many managers who took part in the trade described above thought they alone were on to a good thing.

However, it's more likely that pressure from clients for performance (and the managers' own greed) forced managers into the trade that was flavour of the day. Human beings – and some portfolio managers are merely human – find it very difficult to justify investing differently from the crowd when the crowd is doing well. Their clients get fed up with the poor per-

formance relative to managers who follow the favourite trades. Yet when everyone is invested in the same poor investment and wants to exit the investment at the same time, they cannot because there are no buyers.

It's then when one suffers large losses.

**Is the adjustment over?**

We do not think it's over yet. Neither does Ben Bernanke. The insurance companies that guarantee the debt of the municipalities in the US are currently in the firing line.

When one or more of them goes bankrupt, money market funds in the US will be in trouble. This is a classic situation in which the world's central banks have no choice but to use money from ordinary citizens to bail out the mavericks.

**Conclusion**

Banning derivatives would be as regressive as banning cars because people die from accidents.

The answer lies rather in better traffic control, ie better enforcement of the rules governing derivatives. ■

**WILLI JONKER**

JONKER FOUNDED Interneuron, an absolute return investment management firm, in 2001. He's a CA by training and a pioneer at heart. ■

# Interest rate swaps

## The Holy Grail for long-term liability portfolios?

**A**NYONE WHO HAS EVER managed a portfolio against a defined set of long-term liabilities will know that it's a challenging task at the best of times. In an investment environment like South Africa's – where traditional assets that hedge the interest rate risks of long-term liabilities are in short supply – the challenge can be even more daunting. Investment banks have been using interest rate swaps (IRS) for years to manage their liabilities. The question is: Can those instruments be used by other investors (non-banks) to manage their specific long-term liabilities effectively?

Defined benefit schemes and insurance companies typically have liabilities that easily extend out to 70 years, where the investment risks of movements in interest rates and inflation can be large.

Traditionally, those types of liabilities have been hedged by investing in a long-term nominal bond portfolio or a real bond portfolio (to hedge inflation), or a combination of both, depending on the exact risk profile of the liabilities. In an investment environment where there's ample supply of long-term nominal and inflation-linked bonds, that strategy works well. That isn't the case in SA. The yield curve (nominal and real) is sparsely populated beyond the 15-year point.

Given the available assets (nominal and real) it's reasonable to expect that the liabilities can be hedged on a duration basis – ie, hedging the liabilities to a parallel move in interest rates. Due to lack of supply of long-dated assets the funds tend to have less convexity than their corresponding liabilities, which

leads to underperformance of the funds relative to their respective liabilities – regardless of whether interest rates strengthen or weaken.

That also leads to surplus volatility, which has a direct impact on the company's income statement. Apart from the additional volatility that's experienced in the funds, the yield on the funds is typically also poor, due to a general lack of liquidity in those funds.

Very long-dated assets are trading at a premium to the rest of the yield curve due to supply:demand issues that exacerbate the low yield on these portfolios. One of the ways to address such shortcomings is approaching issu-



TANJA TIPPETT  
OMSFIN

ers to issue debt past the 15-year point or for banks to issue structured notes. However, the fund is exposed to credit risk in both instances. It's been our experience that the pricing of those debt/notes is seldom attractive, due to a scarcity premium demanded by the issuers for the lack of supply beyond 15 years.

Interest rate swaps are over-the-counter (OTC) contracts where a fixed interest rate payment is periodically exchanged for a floating rate interest payment based on a predetermined notional amount. The floating rate is typically the three-month Jibar rate.

Banks are the biggest players in the IRS market, either as traders or hedging their own or their clients' books.

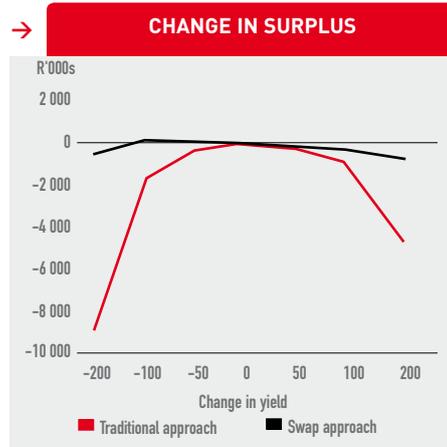
It's estimated that globally the IRS market is 4,6 times the size of the bond market which is US\$346 trillion in notional amount outstanding. (IRSs are traded under an International Swaps and Derivatives Agreement (ISDA) that governs the general terms and conditions of swaps traded between two counter-parties.<sup>1</sup>)

IRSs can be used to hedge the interest rate risk (nominal and real) of liabilities by receiving the fixed rate under the swap agreement and paying the floating rate. The result is a portfolio of inter-

est rate swaps that hedge the interest rate sensitivity of the liabilities. Due to the OTC nature of interest rate swaps it's possible to match the sensitivities of the liabilities very closely by specifying the maturity and cash flow profile of the swaps.

The graph illustrates the performance of the two different approaches for various instantaneous interest rate shocks. The scenario analysis was performed on a liability profile that has a current value of R1,8bn and duration of 7,1 years. The difference in performance is due to the convexity mismatch in the traditional bond portfolio compared to the liabilities.

In our experience, there are three very important considerations with the interest rate swap approach: credit risk, basis risk and fund manager skill. Under the traditional bond portfolio approach the portfolio is mostly exposed to SA Government credit risk. But under the swap approach the portfolio is exposed to the credit of investment banks in



## DIFFERENT APPROACHES

	TRADITIONAL APPROACH	INTEREST RATE SWAP APPROACH
Matching	The matching achieved is a function of the availability of bonds at the long end of the yield curve.	Due to OTC nature of interest rate swaps it's possible to match the liabilities across the term structure of the yield curve.
Asset allocation/liquidity management	Due to a big portion of the fund being invested in long-dated Government bonds, there's very little liquidity in the fund to take advantage of short-term opportunities.	Liquidity can be created by using interest rate swaps to hedge the interest rate risk and the liquidity can be used to target short-term opportunities yielding at least three-month Jibar.
Return target	Long-term risk-free rate.	The return target is a function of the asset allocation, which is determined by the fund surplus, risk appetite and collateral requirements.
Surplus volatility	Can be very volatile, due to negative convexity in the funds.	Surplus is less volatile and not driven by interest rate movements but rather by the performance of the assets relative to the Jibar obligation of the interest rate swap agreements.
Basis risk	Not applicable.	Liabilities should be valued off the swap curve if interest rate swaps are the primary instrument used to hedge interest rate risk in the portfolio.
Credit risk	Depends to what extent credit assets are used to hedge the liabilities, but for typical long-term liabilities credit risk is generally not an issue, due to the absence of long-dated credit assets.	The credit risk of the swap portfolio is managed through a CSA, which caps the portfolio's net exposure to any one counter party through collateral. That has implications for the return target of the portfolio.
Management skill	Bond fund management	Requires diversified management skill, with attention to detail.

► 13 terms of the interest rate swap agreements.

The credit risk of interest rate swaps is managed through a credit support annex (CSA), an annexure to the ISDA. In essence it's a collateral agreement based on the net exposure between the two counter-parties that entered into the ISDA. The collateral agreement (CSA) has implications for asset allocation, as collateral is typically cash or Government bonds. That in turn has implications for the return target of the asset portfolio.

There are various approaches to the asset allocation decision and the spectrum ranges from 100% cash allocation to a dynamic cash management solution, where the allocation to cash varies depending on the level of interest rates.

Basis movements, defined as the movement of the swap rates relative to the bond market rate, can also lead to unexpected surplus volatility if there's a discrepancy between the valuation basis of the liabilities and the primary instrument that's used to hedge the interest rate risk.

For example, if the valuation basis of the liabilities is the bond curve and interest rate swaps are the instruments of choice to hedge the interest rate risk of the liabilities, such an approach will introduce surplus volatility into the fund. It's therefore important to insist that the valuation basis is consistent with the primary hedging instrument if there's a low tolerance for surplus volatility (eg, with-profit funds) then the basis risk isn't a material issue.

Under the swap agreements the portfolio has a floating rate obligation, as it needs to make periodic floating rate payments determined by the three-month Jibar rate. Therefore, the return target for the asset allocation decision (sometimes referred to as liquidity management) is the three-month Jibar rate.

The asset allocation decision is primarily a function of

the fund surplus that determines the risk appetite of the fund and the collateral management approach (fixed versus dynamic). Assets that should be considered are those with a correlation to the three-month Jibar rate and that offer the ability to capture an "alternative" premium – eg, property and private equity (to capture the illiquidity premium), credit (to capture a credit premium) and hedge funds (to capture a skill premium).

These additional elements to traditional liability management (credit risk, basis risk, asset allocation) demand more skills from the fund manager. It's no longer sufficient for the fund manager to have only bond fund management skills. The manager now also needs the skills necessary to manage an interest rate swap portfolio, basis risk, collateral and the asset allocation decision.

The table summarises the key differences between the two approaches.

Are interest rate swaps the Holy Grail for long-term liability portfolios? We've found the use of interest rate swaps to hedge long-term liability portfolios superior to traditional bond fund management – despite the increased level of complexity.

It does require a significant increase in fund management skills; but the reward of a more predictable surplus with steady growth over the long term is significant.

### Notes

1. *BIS Quarterly Review, December 2007*

### TANJA TIPPETT

TIPPETT JOINED Old Mutual Specialised Finance in 2005 as head of Quantitative Research and Product Development, focusing predominantly on solutions for pensions and insurance liabilities. She started her investment career at BoE treasury after four years in the IT industry in systems development. She then worked at Old Mutual Asset Managers, starting as a quantitative analyst and progressing to a portfolio manager focusing on fixed rate annuity funds. ■

# The latest wave in derivative innovations

But vanilla is certainly the flavour of the day



MARK DE ARAÚJO  
Absa Capital

## AGRICULTURAL FUTURES

The agricultural products division of the JSE currently has listed futures for white maize (the most liquid), yellow maize, sunflower seeds, wheat and soya beans.

This allows for a range of investment and risk management strategies to protect against adverse price movements of the commodities or to take positions in pricing anomalies.

## CAN-DO OPTIONS

Can-do options, are listed derivatives that are created by investors to meet their specific requirements, such as selecting a basket of shares rather than using an index.

These derivative instruments are treated the same as any other single stock or index futures on Safex.

By MICHAEL TOSTEE  
Alpha Asset Management

THE DERIVATIVE industry in South Africa is comparable to a mature young adult rather than the spotty teenager that's most of the developing world. An assessment of the local derivative market would encompass a far broader subject matter than is typically presented in standard derivative textbooks.

And so there's much to talk about. Where and why are derivatives being used and what's the cutting edge of derivative use in SA?

Derivatives have become standard fare for most SA institutional investors, such as bank treasuries, pension funds and insurance companies. The same is true for traditional and alternative fund managers. And while we're far from being Switzerland in that regard, high net worth client and retail offerings are also becoming increasingly "derivatised".

Contrary to common perceptions, derivatives aren't only used for risk management and speculative trading. They're increasingly being used to provide market access, match investors' differing risk-return preferences, match liability profiles, provide principal protection or leverage, dissociate fund management from investor preferences and to provide for sometimes complex regulatory and accounting treatments.

There are few players in SA that lag behind. The industry has developed over time and everyone seems to have evolved at a similar pace – but vanilla is certainly the flavour

of the day. While exotic derivatives aren't as liquid here as their simpler counterparts, they're nonetheless being traded in billions of rand each year.

Derivative practitioners worldwide have advanced the industry at a rapid pace. You're excused for not being alone in having just come to terms with the entire standard derivative lingo, such as delta and gamma spikes, etc, only to have a barrage of new terms thrown at you. SA is fortunate though to have a proactive banking and broking community that goes out of its way to keep the financial markets informed of advancements in derivatives and associated research – "for the good of the industry" as an associate of mine often puts it.

The current trend in SA leans towards: formulaic derivative strategies, leveraged structures, structures providing access to new market segments or asset classes, advanced asset-liability matching and portable alpha strategies. Most of which would be impossible without the use of derivatives. These aren't new ideas but are certainly where most interest lies.

There are currently hundreds of derivative payoffs available for most asset classes: commodities, credit, currencies, equities and fixed income. These payoffs now span the asset classes in the form of hybrid derivatives. For example, some derivatives reference equity and inflation, proxied by the Consumer Price Index say, in a single

payoff that aims to provide a real return on capital with some exposure to positive performance of equities. Traditionally, derivative contracts referenced underlyings (such as tradeable indices), individual counters (such as single stocks), a particular Government bond or the US dollar/rand exchange rate. These underlying instruments are tangible and most often tradeable and are so-called explicit assets.

The new wave of derivative innovation is two-fold and focuses on different derivative underlyings: namely, funds (portfolios) and implicit assets. The first is easier to comprehend, as it's a natural extension of what we're already familiar with in derivatives land. The second is unique to equity derivatives and is an interesting evolution that isolates some of the factors inherent in equities trading. The good news is that with regard to these developments SA isn't far behind the rest of the world when it comes to understanding and appetite.

Fund-linked derivatives are contracts that reference an actively managed asset as the underlying. Examples of such underlyings include unit trusts, funds of hedge funds, single manager hedge funds, bespoke portfolios and even private equity funds. As funds often span several asset classes – and sometimes include illiquid or non-tradeable assets, such as private equity – these derivatives are

**FORWARD RATE AGREEMENTS (FRAs)**

A forward rate agreement is a contract in which two parties agree on the interest rate to be paid on a notional deposit with a specified maturity on a specific future date. The contract enables the purchaser to fix interest costs for a specific future period.

**INTEREST RATE SWAPS**

A plain vanilla interest rate swap is a swap between two counterparties of fixed and floating rates of interest. Interest rate swaps will typically occur between one party who can raise floating rate funds fairly cheaply but who wants fixed rate funds, and another party who can raise fixed rates but wants floating rate funds at the lowest possible cost. ■

By *MICHAEL TOSTEE*  
Alpha Asset Management

▶ 16 often more complex to trade.

Fund-based payoffs allow for a multitude of flexible structures to be produced, most of which centre on principal protection, gearing of

for an interesting diversifier: it's an asset that typically decreases in value when equity performs well and increases in value when equity takes a tumble. The investor wanting to capture any diversification

would typically have to buy or sell the underlying shares to realise their view. However, trading in shares has a capital implication that may not match the particular investment objective.

There are now various dividend option payoffs in existence and dividend swaps are a good example of isolating dividends from price. These simply swap the difference between an expected and realised dividend.

There are many standpoints on derivatives and their use. In the minds of many market participants, the word derivative probably conjures up no more than thoughts of futures contracts, put and call options, hedging and yield enhancement. Derivatives clearly have a wide range of applications and the nature

funds and access to markets where regulatory, liquidity or other constraints make direct investment impossible.

Implicit assets are underlyings that aren't physical assets but are tradeable in some form. Examples of implicit assets are dividends, volatility and correlation. It's understood that there are a variety of factors taken into account when trading equities and such fundamental and quantitative views often extend as considerations into equity derivative strategies.

When trading equity derivatives there are often implicit views embedded within an option trade, such as: when buying a put option the preference would be for implied volatility to be as low as possible, as low implied volatility equates to a low option premium, while when buying a put option for protection, there would be an uncertain view on the price of the underlying over the life of the option, which equates to an expectation that volatility will increase over the life of the option.

Now, whether volatility actually increases or decreases is usually not of much concern to an investor looking to protect the value of his assets as long as protection is in place.

However, volatility makes

benefit by way of such a "volatility asset" would typically be required to actively manage option positions and take advantage of increasing or decreasing volatility by means of delta trading.

Trading volatility in that manner is sometimes more work than many are willing

→ **THE EVOLVING PROCESS**

Fund Underlyings	Single Funds	Fund of Funds	Private Equity
Conventional Option Underlyings	Commodity	Credit	Currency
	Equity	Fixed Income	Hybrid
Implicit Underlyings	Volatility	Dividends	Correlation

Option payoffs have evolved from conventional asset class based underlyings to actively managed fund underlyings such as unit trusts and hedge funds and implicit assets such as volatility, dividends and correlation.

→ **IMPLICIT ASSET CLASSES**

VOLATILITY	DIVIDENDS	CORRELATION
Vanilla Strategies	Direct Equity	Direct Equity
Variance Swaps	Dividend Futures	Vanilla Strategies
Volatility Futures	Dividend Swaps	Variance Swaps
Investable Volatility Indices		Correlation Swaps
Forward Variance Swaps		
Conditional Variance Swaps		

Implicit assets may be traded via cash equity strategies, vanilla option strategies or exotic options that directly reference the implicit asset as the option underlying.

to undertake, but you can now trade volatility directly via derivatives called variance swaps. Variance swaps are derivative contracts that allow investors to exchange the difference between realised and implied volatility over a certain period. Although not currently available in SA, volatility futures are also another way of investing directly in volatility.

Dividends may now also be considered an implicit asset. Investors with a view on dividends

of those instruments is varied and sometimes complex. It does seem that the boundaries are endless in terms of what we can achieve with these instruments and that the SA market continues to see value in the latest wave of derivative innovations. ■

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