

BONDS: NEW DIMENSIONS

A SMORGASBORD OF STRATEGIES

by FRANK ASHE

Portfolio managers no longer need to choose only between active or passive investment strategies — a whole smorgasbord of options is open.

Various so-called “active / passive” strategies have been used by investors and managers in the fixed-income markets. These strategies are investment vehicles with specific risk-and-return characteristics, designed to meet the different needs and styles of investors.

Very high yields have been achieved recently in the equities markets. These attractive yields are not guaranteed for the future; the future rate of return is subject to a great deal of uncertainty. The same can be said for the rate of return in various other investments: overseas stock markets, overseas property, and commodities (including gold). The rate of return may be greater on a historical basis in these markets than in the fixed-interest market but is never guaranteed. Of course, the same is true for the bond market but the uncertainty is less.

There has been a wide variation in the rate of return in the stock market with more regular returns in the bond market. Admittedly, this regular return was for many years in a more regulated environment but even in recent years the variation in bond market return has not been as great as in the stock market.

The fixed-interest market provides a uniquely convenient tool for analysis — the yield curve and an underlying level of interest rates. No other domestic investment sector can be so neatly summarised. This gives a certain degree of homogeneity to the fixed-interest area. The underlying level of interest rates is determined by the sum of the desired real rate of interest, the

inflationary expectations, a risk premium, and cyclical factors. These are not cyclical factors that can be used in some kind of predictive way but are longer-term secular movements in the economy.

Another important aspect of the investment universe is the relative independence of the rate of return in the different sectors of the market. Under most macro asset allocation models, there will be some portion of the portfolio allocated to the fixed interest sector. Figure 1 shows the annual returns obtained in the bond market and the share market over the last 50 years. Each point represents one year and from its position we can read off the bond yield for that year and the share market return. It is important to note the different scales on this graph. The extremes for the bond's yields are from -5 per cent to +25 per cent while for shares the yield goes from -30 per cent to +80 per cent. The bond yields are concentrated in a very narrow range while the share yields are spread out over a much wider range. However the main point to be gained from this graph is that the returns for the bond market are uncorrelated with the returns from the share market.

Fixed-interest markets used to be boring. R Bookstaber, in *The Complete Investment Book* (1985), said: “It was not long ago that bond traders were drawn from the same personality group as medieval historians, morticians, and

Frank Ashe is a mathematician with Australian Gilt Securities. This article is adapted from a presentation in Sydney to the IIR First Australian Fixed Interest Conference.

monks.” This has now changed dramatically. Since the mid-1970s there has been considerable volatility in the fixed-interest markets. The deregulation of the global financial markets has increased the possible volatility to which the Australian markets are subject. This has been accentuated since the deregulation of the Australian currency. There has been volatility not only in the level of the interest rates but also in the shape of the yield curve. Towards the end of 1986 there was a world-wide decline in the volatility of interest rates which lasted about six months; this now seems to have disappeared with the rise in US interest rates.

The small size of the Australian economy exaggerates these effects; what is a small investment decision for the US and Japan may be huge for the Australian market.

There has also grown up a plethora of new securities and instruments within the market; markets in futures, options on physicals and options on futures have grown tremendously; indexed bonds, mortgage-backed securities, heaven and hell bonds, and zero coupons have all come into play. This has led to an increasing degree of sophistication in the management of fixed interest security portfolios.

The active/passive dichotomy is no longer sufficient (if it ever was) to classify the various investment strategies. There are a number of dimensions in which the various strategies can be measured and it would be best to discuss these first. This gives a framework in which to place the strategies.

A strategy can be classified in six ways:

Active	vs	Passive
Reactive	vs	Predictive
High risk	vs	Low risk
Informed	vs	Ignorant
Hi-tech	vs	Lo-tech
High yield	vs	Low yield

These attributes are not either/or things but are two extremes of a whole range of possibilities.

Active/passive: Twenty or thirty years ago people considered that an active portfolio was one in which there was any selling of bonds. This view needs modification. This axis will be used to measure the rate at which transactions occur within the portfolio. A passive portfolio has the minimum number of transactions necessary to meet the requirements of its beneficiaries regardless of the movements in the yield curve; an active portfolio seeks, by as many well-timed transactions as necessary, to

maximise the return on the portfolio.

Reactive/predictive: A reactive strategy is based only on what has happened in the market — there is no forward outlook. A portfolio insurance strategy is one example of this. A predictive strategy is based upon some forecast of the economy and yield curve. This prediction may be based on a full analysis of past movements; the categorisation depends only on where the manager has most recently looked when the decision was made.

*Every tick of the market
thrills your being, every
sustained trend is an
orgasmic rush . . . It's
you against the rest in a
dog-eat-dog world.*

High/low risk: Risk here refers to the uncertainty in achieving the desired rate of return for the portfolio and also the likelihood of suffering a loss of capital. There are too many ways in which the word “risk” is used by people in the market to hope that there is one way to summarise risk. Some strategies have a reasonably high certainty of achieving their desired rate of return (low risk); others have a large uncertainty in their rates of return (high risk).

Informed/ignorant: Some strategies may only be attempted by managers who are very knowledgeable of the market. This knowledge may consist of information on the price movements, economic factors and opinions of other participants. Other strategies may only rely on minimal information. The term “ignorant” may be a bit harsh — a manager may be well informed but not need the information to manage the fixed-interest portfolio adequately. It is the information needed, not the information at hand, which determines the position on this axis.

Hi/lo tech: The computer revolution has brought strategies which rely heavily on that computer. And the quantitative analysts have brought higher mathematics into portfolio management in a big way. The combination of the two is fearsome. Contrasted with this are the more traditional portfolio management techniques which rely on the unaugmented judgment of an experienced market operator.

High-yield/low yield: This dichotomy is not really a matter of conscious choice by the manager — intuitively everybody wants the highest return possible. Who would choose a low-return

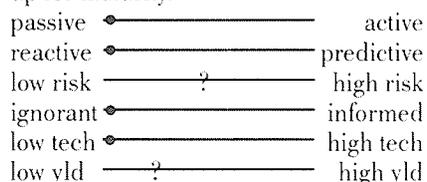
strategy? Unfortunately there are undesirable traits for some high-return strategies which make them unsuitable for some investors. A trade-off is made between the desired return and the undesirable properties. The obvious undesirable property that most people consider is an uncertainty of achieving a rate of return. The trade-off is to lower the expected rate of return in exchange for a greater certainty in achieving that rate.

STRATEGIES

Nine broadly defined strategies emerge from these six viewpoints. These are not the only strategies available but they do cover most options.

Buy and sit: In the days of the regulated markets and the 30/20 ratio this was a favourite strategy. Managers would make sure they had some pre-determined amount in their fixed interest portfolio and bought bonds at tender to hold to maturity. The strategy has medium risk because the market may move in such a way that the portfolio may not meet the objectives for which it was set up. Over many years the yield to maturity is uncertain with this portfolio strategy because of the changing yields at the time when money is available for investment.

If the portfolio has been in place for some time then it would be likely to include a curious mixture of low-coupon long-maturity bonds, high-coupon medium-dated and a mish-mash of bonds coming up for maturity.



Indexation: The portfolio may be set up to follow some index of performance. One such measure of performance would be one of the Commonwealth Bank bond indices.

The portfolio and the index need to be monitored periodically to ensure that they still maintain their relationship. Care must be taken when inflows and outflows occur from the fund that the restructured fund will track the index. Changes to the method of calculation of the index need to be checked and the portfolio may need to be readjusted. For example, if the index used is for high-coupon bonds then the composition of the index changes when it is judged, by the creator of the index, that the current definition of “high coupon” is no longer appropriate.

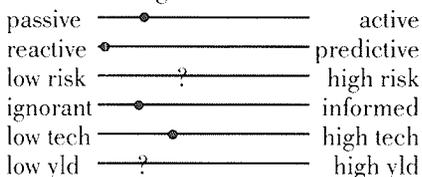
The strategy is of moderate risk because the portfolio may not be able to meet its liabilities. This will occur if the index return is not suitable for the liability

profile the fund is expected to meet. On the other hand, the risk of not tracking the index is very low for a well-constructed portfolio. The manager needs very little information on the market; only knowledge of the index is important.

Some hi-tech is needed for optimum performance of this technique. While there are many differently structured portfolios which can track the index successfully they have different number of bonds within them and hence different transaction costs.

This strategy is purely reactive because it follows the movement of the market. By definition the rate of return of these funds is the rate of return of the indices that they match.

A portfolio which tracked an All Market Index could be invested throughout the different issues in proportion to the amount on issue by the Commonwealth. An alternative portfolio would be concentrated in the major traders and the bonds with large amounts on issue.



Structured bond portfolios: The idea of structured portfolios has been around in a simple form since Frank Redington's original paper in 1952. More sophisticated applications had to await the ready availability of computers and appropriate software in the late 1960s. A structured bond portfolio is one where there are a number of constraints (perhaps voluntarily imposed) upon the portfolio and the portfolio is optimised (according to some objective) subject to those constraints.

Examples of structured bond portfolios are:

- The dedication of a portfolio to meet some known cash flow liabilities (e.g. for bond defeasance, or sinking funds). The minimum value portfolio that meets these future cash flows would be desired.

- A portfolio could be constructed with some minimum total value and duration and convexity close to that of the liabilities the portfolio is maintained to meet, i.e. an immunised portfolio.

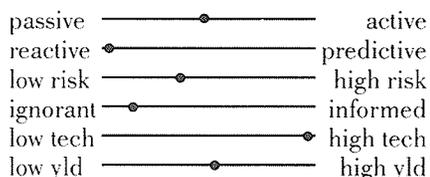
- Running yield could be maximised subject to some desire to keep the proportion of the portfolio within different classes of bonds within certain bands. For example, it may be desired to have at least 70 per cent of the portfolio in AAA bonds, between 25 per cent and 50 per cent in Government securities, and less than 5 per cent in bonds with ratings less than A.

- Constraints may arise for tax reasons

and/or because of objectives and policies which are stated in a prospectus for a managed fund. To take a case example, the Kleinwort Benson Australian Income Fund is for US investors interested in the Australian fixed-interest market. It has to satisfy diversification constraints in order to qualify as a "regulated investment company" under US tax law, and also has to satisfy constraints on minimum amounts invested in Australian Government securities which were stated as an investment policy in its US prospectus.

The risk of these strategies depends on the structure of the portfolio. Competently managed dedicated portfolios have very little risk of not meeting their objectives, but there is the risk that not all the constraints were recognised at the time of inception.

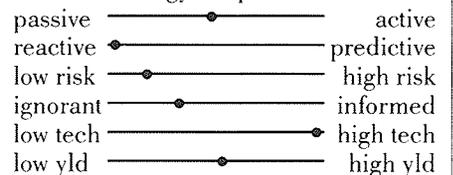
The activity within the portfolio depends on the structure taken and the volatility of the bond market. A dedicated portfolio may need almost no future transactions as the coupons and maturities meet all the liabilities. An immunised portfolio may need to be restructured at frequent intervals if the market is volatile; this will lead to a large number of transactions. A relatively quiet market may lead to no transactions for an extended period of time. There are such a large number of types of portfolios in this grouping that the yield could be anywhere on its axis.



Contingent immunisation: This strategy was originally put forward by Martin Liebowitz and Alfred Weinberger at Salomon Brothers in the early 1980s. A contingent immunisation strategy has two parts to the portfolio. A target value is set for the portfolio at some future date in such a way that it can be achieved easily if the portfolio is immunised at current interest rates. This safety margin is monitored closely. If interest rates change unfavourably the portfolio can be adjusted towards one which will guarantee that the target can be reached, i.e. it will be immunised. The level of immunisation depends on the safety margin. The smaller the safety margin the more the portfolio needs to be immunised. When our safety margin disappears we have an immunised portfolio and independent investment decisions are then not allowed. The portfolio can be managed by any technique available as long as the safety margin is available.

The characteristics of the portfolio as

a whole will be a blend of the characteristics of the active techniques and of any immunised part of the portfolio. The immunised part of the portfolio will have the characteristics of a structured portfolio described in the previous section; the active part may have any of the characteristics of the subsequent sections. As such it is difficult to say what these combined characteristics will be without knowing the "active" strategy adopted.



Portfolio insurance: Originally developed by Hayne Leland and Mark Rubinstein in the late 1970s, this is usually thought of as a management tool applied to portfolios in order to determine the proportion of assets allocated to various sectors, such as the domestic stock market, international stock markets, and fixed-interest markets. It is conceptually straightforward, but mathematically harrowing, to adapt portfolio insurance to allocate fixed-interest assets within a wholly fixed-interest portfolio between the different sectors of the fixed-interest market.

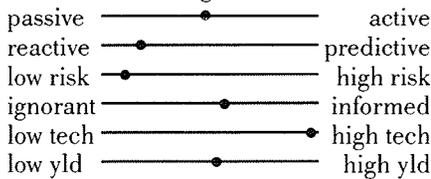
We now descend into a few technicalities. The strategy works by using a variant of the Black-Scholes option pricing model to construct a synthetic put option on the whole portfolio at some suitable exercise price. As the rates of return in the different market sectors change over time the assets are shifted to the better performing sectors according to the black-box formula. Alternatively, if a futures market exists in the appropriate sector then the number of open contracts held in the futures market is adjusted.

The risk of such a strategy is low in the sense that the minimum rate of return can be guaranteed with a high degree of confidence. However there may still be a large uncertainty in the rate of return which might be achieved above this minimum.

Data must be gained for this model on the likely volatility of the different market sectors and the correlation between the likely returns achieved. This requires a reasonable history of price fluctuations to be maintained. Such histories for fixed interest markets are readily obtainable using services such as Giltnet.

The rates of return on these strategies are likely to be higher than using some *ad hoc* strategy for limiting the downside risk. Of course the rate of return will be less than in those cases where the portfolio was invested completely in the riskier asset if

that asset had a high rate of return.



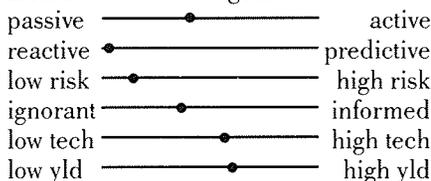
Constant proportion portfolio insurance: This is a new idea (late 1986) put forward independently by Andre Perold of Harvard and by Fischer Black and Robert Jones of Goldman Sachs. In its method of allocation it performs in a similar fashion to the usual portfolio insurance. However it is very much easier to understand, as there is no arcane black-box formula. It is simple enough for the fund manager to grasp the concept and perform the necessary mathematics within five minutes.

The mathematics consists mainly of this one formula:

$$e = mc$$

where e is the exposure of the portfolio to a risky asset (i.e. the amount held in the portfolio), m is a multiple, say 5, chosen by the portfolio manager, and c is the safety cushion, the amount by which the total fund exceeds some (manager set) desired minimum level at the particular time.

The information requirements are not as great as for ordinary portfolio insurance as no great account need be taken of the volatility. The value of the assets within each sector needs to be continually monitored as was necessary for portfolio insurance and contingent immunisation.



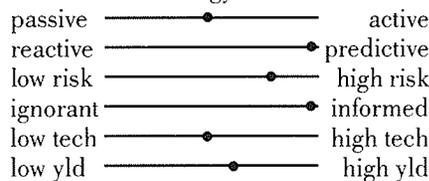
Interest rate forecasting: Different yield curve scenarios can be predicted for various times of the future and the portfolio can be set up to take advantage of the likely outcomes. The number of scenarios constructed and the risk averseness implicit in the positioning of the assets depends on the confidence of the forecaster.

The desirability of computer and theoretical technology depends on the tastes of the forecaster. There are some very complicated economic models and mathematically sophisticated risk management techniques which could be used. Alternatively, the approach could be based on gut feelings about the market place and the economic climate, with very little fine-tuning adopted.

This heading does not only cover

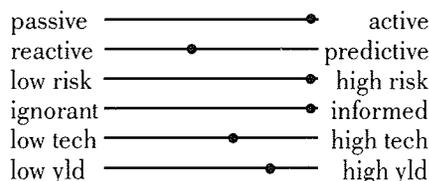
The computer revolution has brought strategies which rely heavily on that computer. And the quantitative analysts have brought higher mathematics into portfolio management in a big way.

fundamental economic analysis. Charting, Elliott wave analysis, Kondratieff cycles, and other technical analyses are included in this broad strategy.



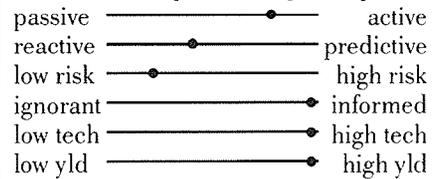
Seat-of-the-pants active trader:

You sit there in front of the Telerate, Reuters and Giltnet screens, telephones screaming bids and offers into your ears. Every tick of the market thrills your being, every sustained trend is an orgasmic rush. Your depth of knowledge of the market is matched only by the extent of the cold, calculating intellect you can bring to bear upon it. It's you against the rest in a dog-eat-dog world. The jet fighters have their Top Guns, the fixed interest market has you — Top Bond. The risks are high, but so are the rewards. Who dares wins! Portfolios are whatever you make them — short maturity one minute, all 10-year bonds the next.



Beyond 2000: Growing out of the new option and futures markets and the sophisticated mathematics are a whole new crop of strategies, most of which are relatively untried, or being kept under wraps at the moment, or are a gleam in some academic's eye. One example of such a strategy currently being examined is running a highly-leveraged portfolio of long bonds with a modicum of portfolio

insurance to stop a catastrophic wipeout.



Every time a strategy is touted around the marketplace, or the business schools, it comes complete with documentation proving that it outperforms some other strategy over some period. In contrast, recent years have seen the rise of indexed portfolios which seek only to emulate the performance of some market index. One of their selling points is that the managers of these portfolios have their own statistics to show that in the long run you can't outperform the market. So why not cut down on your management fees and make sure you don't underperform the market. What can be made of these arguments?

This is a great position to be in. We have left the days of the monks and morticians far behind. From these strategies, and the intellectual ferment surrounding them, we can choose the tools with which we can offer our clients far better service than they have ever received in the past. The whole fixed interest industry has raised its level of expertise and knowledge. The owners of funds have become more articulate with their desires and the managers must cast their eyes over a newly-created, wider range of possible ways of meeting those desires.

We live in dangerous, shifting times. We cannot guarantee that once having made a decision on a strategy we can forget about that problem — we must always be aware of the possibility that we will be proved to have been wrong (using 20/20 hindsight) in our choice of strategy or in

its application. There must be regular review of the strategy of the fund.

The price of continued good performance is eternal vigilance.

Here are some typical objectives for typical portfolio owners:

A **general insurance fund** may wish to match the cash flows of its estimated liabilities, most of which are due in the next two or three years but some of which straggle on for well over fifteen years.

A **semi-government authority** may have a project for which it wishes to ear-mark a certain amount of money. The future cash flows are known and must be met from the assets allocated to this task. The minimum amount of assets to meet the cashflows with certainty is to be allocated.

A **fixed-interest unit trust** may be set up to be targeted at those people who want maximum income to be achieved and disbursed regularly.

A **unit trust** may be set up which will endeavour to match the performance of a well-known fixed-interest index and have small management fees.

A varying part of a **well-diversified portfolio** could be kept in the fixed-interest area. The directives to the manager are "to maximise the overall rate of return in the long run". Beware the hidden constraints — what will happen if two consecutive quarters of bad results are posted because of short term hiccups in what may be a fundamentally sound long-term strategy?

A **company** may need a sinking fund to be set up to meet a liability. Because of prudential requirements the money must be kept in Government securities.

It is important not only to be guided by the stated objectives of the owner or beneficiaries of the portfolio but to discover, and to heed, the hidden objectives and constraints of the owners. These constraints may be unstated because the owners consider them so "obvious" that everybody should follow them, or the owners may be, in some way, embarrassed by their public expression.

Only when the objectives of the portfolio are known can the choice of strategy be made. But there is something else that may need to be compounded with the objectives of the fund — the risk-averseness of the owners. This may already be explicit as one of the objectives or it may just be some vague feeling that can be gained from discussions with the owners. Either way it must be taken into consideration when the choice of strategy is made.

The choice of strategy can be summarised in point form. Some steps are done subconsciously by the manager and may not be thought of as part of a formal process. Some of the steps may be com-

bined, especially if the manager of the fund has a well-known management style. They are there nevertheless.

- Determine the objectives and the risk averseness of the owners
- examine the strategies to see which are compatible with these objectives
- determine which of the compatible strategies will best suit the portfolio owner
- make sure the owners of the portfolio know the approach to be taken
- manage the funds using the adopted strategy (this is a very rubbery step — for some strategies there may be little to do, for others the workload is continuous)
- report regularly to the owner
- at regular intervals (depending on the strategy and the owner of the portfolio) check that the strategy is still suitable for the (possibly changed) objectives.

It is an almost unquestioned assumption of the literature on the various strategies for portfolio management that there is a trade-off between risk and return. In what is called a "rational" market it is quite reasonable to expect that if a strategy leads to greater uncertainty in its outcome then the follower of that strategy should be recompensed in some way, by gaining a greater expected rate of return.

To estimate the uncertainty of a future rate of return to be gained from a strategy using this theoretical framework the "standard deviation" of the distribution of likely returns is used. This measure of uncertainty is becoming less relevant as the number of new high technology strategies increases, and as the degree to which they can be fine-tuned using futures and options increases. The main historical reason for using the standard deviation is to simplify the theoretical and practical mathematics of calculation.

As an example to show how the standard deviation is becoming less suitable as a measure of uncertainty consider the

following two hypothetical strategies.

Strategy 1 - an ad-hoc "safe" strategy:

Chance of 0% return	1 in 10
Chance of 10% return	9 in 10
Expected rate of return	9%
Standard deviation	3%

Strategy 2 - some form of portfolio insurance:

Chance of 4% return	2 in 10
Chance of 9% return	7 in 10
Chance of 19% return	1 in 10
Expected rate of return	9%
Standard deviation	3.9%

In the long run the same rate of return is earned from both strategies. The two strategies have different standard deviations, so, according to received wisdom, the second strategy should have a higher expected rate of return for it to be preferred to the first. It doesn't, so it should never be selected in the "rational" world of some theoreticians. But the distributions of returns are quite different — the minimum return in the second strategy is 4 per cent higher than the first and its greatest possible return is 9 per cent higher. Comparing the two strategies is not quite comparing apples and oranges, it is more like comparing Granny Smiths with Golden Delicious — there is a difficulty in the comparison that comes down, ultimately, to a matter of personal preferences.

Certainly, though, what this shows is that the standard deviation is not a sufficient statistic to describe the risk of a strategy. So the usual risk/return framework is no longer suitable. A more suitable framework is to examine the distribution of expected outcomes. This is feasible with the current micro-computer technology. □

