IMMUNISATION: RIGHT TREATMENT FOR MARKETS?

IN AUSTRALIA, IT CAN'T KEEP ALL THE RISKS AT BAY

Many fixed-interest portfolios can be protected from interest-rate risk, and gain added value, through immunisation techniques. But in Australia, as RICHARD KEARY points out, the structural peculiarities of the fixed-interest market limit the opportunities to add value this way.

Immunisation is a key asset/liability management concept. When taught in Australian finance courses, it is based on the experience of the US fixed-interest market, where sectors such as mortgage-backed securities, corporate bonds and municipal bonds provide opportunities to use tools such as credit analysis and anomaly pricing (as against duration decisions) to add value to a liability benchmark.

Teaching classical immunisation generally fails to consider how the structure of the Australian fixed-interest market will affect outcomes. As a result, expectations of a classical immunisation strategy in Australia may be unrealistic.

F.M. Reddington, the actuary credited with pioneering immunisation, defined it as the investment of assets in such a way that the existing business is immune against a general change in the rate of interest (Reddington 1952). He maintained that if the duration of assets was set equal to the duration of liabilities, a change in interest rates would equally affect both sides, and the relative values of assets and liabilities would not change.

The concept of duration is critical to Reddington's conditions for immunisation. First formulated by Frederick Macaulay in 1938, duration is a weighted average term-to-maturity of cashflows. It is the point which balances interest-rate risk with reinvestment risk. If interest rates
rise, causing capital loss, interim cashflows can be reinvested at that higher rate to off-set the reduced value of the bond. Interest rate and reinvestment risks oppose each other. Immunisation is the strategy based on these two offsetting risks.

There are several aspects of duration which directly affect the outcome of classic immunisation strategies. Duration theory assumes that the market’s consensus about future interest rate movements is impounded in the initial term structure of interest rates, and that these rates are most likely to occur. Macaulay duration is consistent with the stochastic process (random changes in individual discount rates that follow a prescribed pattern are referred to as a stochastic process) in which a flat term structure changes so that the flatness is preserved.

This is clearly not realistic. To demonstrate, Figure 1 is constructed by plotting the difference between the ten-year and two-year bond yields. The assumption regarding parallel shifts in the yield curve is not supported by what we observe.

The correct duration for a classic immunisation program is a function of the stochastic process governing interest changes. Error is introduced into the duration selection by estimating the stochastic process. The error may result in the computed portfolio duration being longer than the duration required to immunise the portfolio against interest rate changes. This risk is referred to as stochastic process risk. The immunisation achieved is only against the assumed type of rate change.

Incorporating the stochastic change process is difficult because the actual processes governing changes in interest rates are generally not known. Academics have investigated a significant number of alternative stochastic processes, with varying degrees of success. The evidence suggests that the refinements to Macaulay show no significant benefits.

Regardless of how one refines duration to overcome stochastic process risk, the fact remains that duration is a proxy for price change only for relatively small changes in interest rates. The “estimated” price line represents the price changes estimated by duration.

The result is that the estimates of price change delivered by duration are reasonable only when changes are small. For large changes, there is an error in estimating the price change. In Figure 2, if yields fall from Y1 to Y2, duration estimates a price rise from P1 to P2, when in fact we observe a price rise from P1 to P3.

The error is P3 – P2.

Immunisation is not a riskless exercise. Duration, the key to immunisation, is an estimate for price change only for small changes in interest rates. For larger changes, we should also take convexity into consideration. Immunisation does not do this. Duration is based on assumptions about the yield curve that are clearly unrealistic, yet attempts to modify those assumption have not improved the accuracy of the duration measure.

The risk that the target rate of return will not be achieved at the planning horizon is called immunisation risk.

FORMATION OF THE FIXED-INTEREST MARKET

The discussion so far has concentrated on the risks associated with immunisation. The major structural differences between the Australian and other fixed-interest markets also affect the application of an immunisation strategy.
Immunisation means that managers must seek to add value to a benchmark (to justify a fee, at least) by means other than taking duration bets. A duration bet means setting the portfolio duration longer than the liability duration in times of falling interest rates and vice versa. This will add value to the benchmark. Of course, the risk is that the manager will not be able accurately to identify periods of rising and falling interest rates.

In other fixed-interest markets, particularly in the US, there are many opportunities to add value other than from making duration decisions. These stem from the depth and activity of different sectors such as agency, mortgage-backed, corporate, and municipal bonds. Figure 3 shows the structure of the US fixed-interest market.

The Australian fixed-interest market is dominated by commonwealth government and semi-government securities. Semi-government debt is limited to a handful of issuers, some enjoying near-sovereign rating.

The government and semi-government markets in Australia are essentially homogenous. The near-sovereign rating of semi-government debt is reflected in the spread, which is about 25 basis points over commonwealth issues. This narrow spread highlights the efficiency of the Australian fixed-interest market, which should not be surprising given the number of analysts following a small selection of semi-government issuers. Clearly it is hard to add value with such a narrow spread, taking management and administration fees into account.

In the US, the mortgage-backed securities (MBS) market has become increasingly complex, providing opportunities to add value by analysis of the structural characteristics of the securities as well as...
of the underlying mortgage collateral. As a market segment, it has surpassed the corporate market, with $US4 trillion of securities outstanding and a liquid and active secondary market.

The depth and activity of the US MBS market is not repeated in Australia. The Australian MBS market is still relatively small, with $5-6 billion of securities outstanding. Andrew Ang (JASSA, December 1995) gives a useful review of the limitations of the Australian MBS market.

The US has a large and liquid corporate debt market, with more than $US2 trillion of securities outstanding. Australian corporates, in contrast, have tended to use the swap market to access long-term funding, avoiding the need for long-term ratings.

The efficiency of the Australian fixed-interest market has important implications. Adding value other than by taking duration bets relies on superior analysis to identify mispriced assets.

The market’s efficiency and particular structure suggest that these mispriced opportunities are few and far between in Australia.

EXPERIENCE IN THE AUSTRALIAN FIXED-INTEREST MARKET

The fact that the Australian fixed-interest market is configured differently from most other bond markets does not mean immunisation does not work in Australia. However, the lack of choice compared with the US, the lack of liquidity in the choice that is offered and the homogenous nature of the bulk of Australian securities on issue suggest that opportunities to add value from other than duration decisions are limited.

To attempt to quantify this, it is necessary to look for evidence of how value is added in the Australian context. BRW magazine (29 January 1996) included an article titled “Super funds mix and match investment managers”, arguing the benefits of choosing managers with different styles. The article described the sources of added value delivered by BT Funds Management and Norwich Investment Management. SBC, a specialist fixed-interest manager, is said to add about 15% of its added value through security/sector selection decisions, with 60% attributable to duration decisions.

Table 1 shows the excess return delivered by the three managers over the three years to December 1995, and further allocates the excess return among the sources of added value.

The table suggests that there are very limited opportunities to profit from pricing anomalies. That is, these markets are relatively efficient.

CONCLUSION

In most bond markets, managers can use credit analysis to add value to a benchmark without taking a duration bet. However, the present structure of the Australian fixed-interest market provides few opportunities to do this.

Expectations of the outcome of an immunisation strategy should be modified to reflect the limitations imposed by the homogenous nature of the Australian fixed-interest market.

REFERENCES
