MBS risk premiums
— just an illusion?

Australia's mortgage-backed securities market has consistently provided yields above the "risk-free" rate offered on government bonds. Suzanne Barrett describes a quantitative study showing there is a premium paid on Fanmac MBSs and offers an explanation for this premium.

The Australian mortgage-backed securities (MBS) market is small compared with its United States counterpart which, in 1992, reached US$1.1 trillion. The first offering of a MBS in Australia was in 1978 but it was not until the first issue by Fanmac Limited in 1986, which had considerable NSW state government support by way of an exemption from stamp duty on mortgage transfers, that the Australian market learnt to crawl. The market has matured considerably, with around $A6.5 billion currently on issue, and is expected to offer strong competition in international markets by the mid-1990s (Evans 1991).

A MBS is a fixed-interest security with a bond-like payment structure, backed by a pool of mortgages and credit-enhanced (that is, supported or insured by a separate entity). MBSs can be generally classified into three basic types — pass-throughs, pay-throughs and collateralised mortgage obligations. Each issue is unique in terms of its combination of payment structure, the characteristics of the underlying pool of mortgages, and the level and quality of credit enhancement.

Little is known about the risk structure of these securities. This is not surprising, given the lack of quantitative studies on the Australian MBS market.

Yields on MBSs are consistently above government and semi-government securities, showing the existence of a premium. When the term structure is accounted for, the prevailing reason for the premium is to compensate holders for taking on risk. This study attempts to explain the existence and the significance of this premium over the "risk-free" rate. The variability of returns on MBSs is compared with a benchmark representative of a risk-free security and a market index, and the variance of returns is used as the measure of risk. The period of analysis is from December 1989 to November 1991. Because of the limitations of the comparisons made, bond-pricing principles were employed in the interpretation of the results.

The study
The analysis examines Fanmac Premier Trust issues, which represent about 60 per cent of the total face value of MBSs in Australia. The issues analysed include only Fanmac bonds issued during the period of analysis. These have a total face value of $2.2 billion and represent slightly less than 40 per cent of the total face value of Fanmacs on issue in June 1991. Details of these bonds are shown in Table 1. All Fanmacs on issue have an AAA rating.

The issues analysed have prepayments passed directly through to bondholders. Issue 15 has a coupon which is reset every four to five years to the prevailing market rate. Issues 17 and 18 have fixed coupons for the term of the bond. Issues 19 and 20 were each issued with three tranches — A, B and C; these are categorised as collateralised mortgage obligations (CMOs).

Suzanne Barrett is an associate lecturer in the Faculty of Commerce at the University of Southern Queensland. Ms Barrett can provide further information about the statistical analysis in this study. She is undertaking a lengthy study encompassing comparisons to overcome the shortcomings of this preliminary study. The author thanks SBC Dominguez Barry, Bain & Company, Coopers & Lybrand, Moody's Investors Service and NSW Treasury Corporation.

JASSA December 1994 19
Table 1: Fanmac Premier Trust issues

<table>
<thead>
<tr>
<th>Trust number</th>
<th>Issue date</th>
<th>Coupon %</th>
<th>Average traded life</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>November 1989</td>
<td>15.25</td>
<td>November 1995</td>
</tr>
<tr>
<td>17</td>
<td>April 1990</td>
<td>15.00</td>
<td>July 1999</td>
</tr>
<tr>
<td>18</td>
<td>August 1990</td>
<td>14.70</td>
<td>December 1997</td>
</tr>
<tr>
<td>19A</td>
<td>November 1990</td>
<td>13.25</td>
<td>May 1994</td>
</tr>
<tr>
<td>19B</td>
<td>November 1990</td>
<td>14.95</td>
<td>November 2000</td>
</tr>
<tr>
<td>19C</td>
<td>November 1990</td>
<td>13.80</td>
<td>May 2006</td>
</tr>
<tr>
<td>20A</td>
<td>May 1991</td>
<td>11.70</td>
<td>May 1995</td>
</tr>
<tr>
<td>20B</td>
<td>May 1991</td>
<td>12.50</td>
<td>November 2001</td>
</tr>
</tbody>
</table>

Prepayments on these CMOs are passed through sequentially to bondholders, with tranche A receiving all principal prepayments up to the amount issued in that tranche. All prepayments are then directed to tranche B bondholders until that bond class is retired, at which time tranche C begins to receive the remaining principal payments. (Details of the structure of Fanmac issues can be found in the relevant Fanmac Private Placement Memorandum.)

The Fanmac MBSs are compared with New South Wales Treasury Corporation (NSWTC) semi-government bonds as the risk-free security, and to SBC Dominguez Barry's Australian Composite Bond Index as the Australian fixed-interest securities market index. NSWTC bonds are an acceptable benchmark risk-free security, since they are used by Australian industry as the benchmark for MBSs. This is supported by the existence of Commonwealth budget surpluses in the mid-to-late 1980s, deregulation of the financial system and the activities of semi-government authorities (Credaro 1990). The resulting narrowing spreads between Commonwealth government bonds and NSWTC bonds, along with the low credit risk and high turnover of NSWTC bonds, show depth and liquidity in the NSWTC bond market.

Individual NSWTC bonds, shown in Table 2, are chosen from the NSWTC $12.5 billion Australian Benchmark Bond Program. These are coupon bullet bonds and are matched as closely as possible to the Fanmac bonds, although clearly they do not match exactly in term to maturity and coupon. This mismatch presents limitations in interpreting the variance of returns.

The SBC Dominguez Barry Composite Bond Index is the only comprehensive Australian bond index. It is a market-value-weighted accumulation index of government, semi-government, corporate and asset-backed bonds. The return of the composite index is the sum of the market-value-weighted returns of the individual sector indexes.

The downside risk will be greater for the bond with the higher coupon, which for most comparisons made is the Fanmac bond.

Risk structure
The risk structure of interest rates is focused on the risk differences between bonds of similar term to maturity and coupon rates. A premium or yield differential is paid to compensate bondholders for any additional risk taken on. This risk may arise from differences in the credit rating, liquidity or marketability of the bonds. Pass-through MBSs also include prepayment risk. In addition, all coupon bonds suffer from reinvestment risk as a result of the reinvestment implied in the general bond-pricing formula. These risks can be seen clearly by comparing Fanmac MBSs and NSWTC bonds.

Although the Fanmac MBSs are rated AAA, indicating a very low credit or default risk, they are less liquid and less marketable than NSWTC bonds. State governments have attempted to encourage depth in the Australian market by granting authorised trustee investment status to qualifying MBSs (Vann 1991). Nonetheless, the secondary market, which Curnow (1992) argues is limited to a small number of merchant banks as market-makers, is thinly traded. The MBS market in Australia has also faced impediments to its development which have decreased the securities' marketability, such as uncertainty by the Reserve Bank and accounting bodies about rules covering securitisation transactions (Treadwell 1990).

Both Fanmac and NSWTC bonds are exposed to reinvestment risk. This risk results from the receipt of periodic income such as coupons. The general bond-pricing formula assumes coupons can be reinvested at the rate implied by the yield used to calculate the price. The downside risk will be greater for the bond with the higher coupon, which for most comparisons made is...
the Fanmac bond.

A characteristic of MBSs, which is unique (in Australia) to Fanmac issues, is prepayment risk - the risk of unexpected early repayments of the underlying mortgages. This risk is closely related to reinvestment risk in that the receipt of proceeds sooner than expected, and presumably sooner than desired, forces the investor to reinvest in available alternatives. The choice of a truly predictive model for prepayments is not straightforward. The constant prepayment rate and the PSA standard prepayment model have been the most commonly used.

However, although econometrically fitted models have gained wide acceptance, they are not entirely predictive (Melumad and Weyns 1992). The option-adjusted spread approach adjusts for the time and level of potential prepayment, but no formal model currently provides a basis for decomposing this spread into compensation for risk and excess returns (Smith 1991). Thus, prepayment risk is critical to explaining the risk structure of Fanmac MBSs.

It becomes evident that Fanmac MBS carry greater risks than NSWTC bonds. Thus, prima facie, one would expect to observe a higher yield on MBSs than on NSWTC bonds. Also, consistent with the theory of risk structure of interest rates, the unconditional variance on MBS issues, when risk is measured as variance of returns, should be higher than that of the relevant NSWTC bond, representing a risk premium on a Fanmac MBS.

The composite bond market index represents a diversified bond portfolio and should exhibit only risk associated with general market behaviour - that is, the systematic risk component of the market. Therefore (using variance of returns as measure of risk) the variance of returns on the SBC Dominguez Barry composite bond index represents the systematic risk. The variance of returns on Fanmac MBSs has both systematic and unsystematic risk components, the latter relating to reinvestment, liquidity, marketability and prepayment risk. Therefore, we can expect a risk differential represented by the difference between the variance of returns on the composite bond index and that of Fanmac issues.

**Results of the study**

Individual comparisons of the market yields on NSWTC and Fanmac MBSs were made, as matched in Table 2 and paired by the date of observation, to test the significance of the yield premiums paid on Fanmac MBSs in Australia. The mean yields on Fanmac MBS issues are significantly higher than those of the relevant NSWTC benchmark stock. Given the differences in terms to maturity between most matched Fanmac and NSWTC securities, yields on each Fanmac MBS were compared (for the same time period) with NSWTC bonds of increasingly shorter maturities.

The yields on Fanmac MBS issues remain significantly higher than the benchmark stocks of increasingly shorter terms to maturity, although generally at decreasing levels. This comparison showed the yield premiums are apparently resilient to the term structure of interest rates. These significant yields, in most cases, could be attributed to higher coupons on Fanmacs. However, the significance persists when the NSWTC coupon is the same as, or higher than, that of the Fanmac issue with which it is compared — Fanmac trusts 20A, 20B and 20C are instances where this occurs. Thus, it would seem apparent that the yield premium on these Fanmac issues is only partially a function of term structure.

Comparisons were also made between individual weekly returns on Fanmacs and the relevant NSWTC bonds, and the composite bond index, for the same period. The only significant value that resulted is for the comparison between Fanmac 17 and the NSWTC benchmark. There is no significant difference in the mean returns across all other comparisons made. Given that these securities trade in high dollar values, a weekly return that is not statistically significant may represent a significant difference in practical terms. However, even if these small differences are relevant, the direction of the difference in mean returns is unexpected. The mean returns on the benchmark NSWTC stocks are higher than those for the relevant Fanmac bonds, except for

---

**Table 2: NSWTC issues matched to Fanmac issues**

<table>
<thead>
<tr>
<th>Fanmac Premier Trust number</th>
<th>NSWTC BENCHMARK Term to maturity</th>
<th>Coupon %</th>
<th>Difference in term to maturity</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>April 1995</td>
<td>12.10</td>
<td>- 7 months</td>
</tr>
<tr>
<td>17</td>
<td>July 1999</td>
<td>11.50</td>
<td>0</td>
</tr>
<tr>
<td>18</td>
<td>April 1997</td>
<td>12.50</td>
<td>- 8 months</td>
</tr>
<tr>
<td>19A</td>
<td>April 1995</td>
<td>12.10</td>
<td>+ 11 months</td>
</tr>
<tr>
<td>19B</td>
<td>July 1999</td>
<td>11.50</td>
<td>- 16 months</td>
</tr>
<tr>
<td>19C</td>
<td>May 2006</td>
<td>12.60</td>
<td>0</td>
</tr>
<tr>
<td>20A</td>
<td>April 1995</td>
<td>12.10</td>
<td>- 1 month</td>
</tr>
<tr>
<td>20B</td>
<td>December 2001</td>
<td>12.00</td>
<td>+ 1 month</td>
</tr>
<tr>
<td>20C</td>
<td>May 2006</td>
<td>12.60</td>
<td>- 12 months</td>
</tr>
</tbody>
</table>

---

**JASSA December 1994** 21
The variance of returns on Fanmacs, for the most part, is only significantly different from the variance of returns on the composite index. The variance of returns on Fanmacs 17, 18, 19B, 19C, 20B and 20C is greater than that of the composite index. These results should be considered in conjunction with the coefficient of variation of returns as a relative measure of risk, showing the variance per unit of return. These values show all Fanmacs, except 20B, have a higher coefficient of variation (that is, risk per unit of return) than the relevant NSWTC benchmark bond.

As mentioned earlier, interpreting the results is limited by the mismatch in coupons and some differences in term to maturity. The impact of the differences in coupons can be explained by applying bond-pricing principles. Malkiel (1962) has proved that bonds with lower coupon rates are more sensitive to changes in interest rates, as higher-coupon bonds return more of their value early in their lives. Therefore, in the comparisons made, the bond with the lower coupon can be expected to place upward pressure on the variance of returns on NSWTC bonds relative to Fanmacs. The exception is the comparisons made with Fanmac 20A and 20C, where the reverse would be expected.

It has been shown that Fanmacs are traded at significantly higher yields than NSWTC bonds. The effect of higher-yielding bonds, for a constant term to maturity, will be lower price sensitivity (Malkiel 1962). Thus downward pressure could be expected on the variance of returns for all the Fanmacs issues analysed.

Another limitation arises from the high turnover of NSWTC bonds compared with the thin trading of Fanmac MBS. Thin trading activity tends to reduce the volatility of prices, so downward pressure could be expected on Fanmac variance of returns and upward pressure on NSWTC variance of returns.

A longer-term-to-maturity bond is more sensitive to interest-rate changes (Malkiel 1962), and this is reflected in the term structure of interest rates. The differences in term-to-maturity on the bonds compared may be insufficient to place any real pressure on the variance of returns. Nonetheless, if any sensitivity were to arise as a result, 19B and 20C are the only Fanmacs where the difference is at least 12 months and could cause some increase in the variance of returns. In Fanmac 19A, the paired NSWTC bond has a term-to-maturity 11 months greater. The expected effect of this would be downward pressure on Fanmac 19A's variance of returns.

**Conclusions**

The discussion indicates that there will, in general, be downward pressure on the variance of returns on Fanmac stocks, and upward pressure on NSWTC bonds. This will result in convergence of the variances of these securities. These effects may explain why there appears to be no risk premium on Fanmacs above NSWTC benchmark bonds when risk is measured by variance, and may lead us to believe there should be a difference in the variance of returns (although the size of the impact on prices and the variance of returns is unknown).

Consideration should be given to the appropriateness of using variance of returns as a measure of risk. Variance will not accurately measure risk that is changing over time. Changing economic conditions, especially interest-rate movements, market perceptions and reduction of risk as the life of the bond decreases are all influences which could change risk over time. In addition, it is unlikely that either of these bonds will be held for a week, especially MBSs. Thus it would be useful to look at results obtained from measuring risk over various periods.

Industry's use of yield quotations to benchmark stock will be reflected in the variance of returns. Therefore, further comparisons based on duration-matched "risk-free" portfolios will help to overcome the effect. The question remains of whether prepayment risk will be adequately reflected in the variance of returns. As Fanmacs are the only MBSs in Australia with prepayment risk, a comparison with those without it would assist in explaining this component of risk.

The results of the study suggest there is no risk premium on Fanmac MBSs. However, several factors need to be considered before drawing this conclusion. The combination of Fanmac's thin trading, yield differences, the coupon mismatch, the use of weekly returns periods, and the possibility of changing risk over time may have distorted the variances on returns. Further, it seems reasonable to conclude that while there may be some risk premium on Fanmac MBSs, it may not be as great as the market perceives and as indicated by their significantly higher yields.

**REFERENCES**


