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The Performance of Active Australian Bond Funds[*]

by

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Abstract:

This paper examines the investment performance of active Australian bond funds and the impact of investor fund flows on portfolio returns. Security selection and market timing performance is evaluated using both unconditional models and conditional performance evaluation techniques that account for public information and the time-variation in risk. Overall, the results of this paper are consistent with the U.S. and international evidence, documenting that performance is consistent with an efficient market. While actively managed institutional funds perform broadly in line with the index before expenses, the paper documents significant underperformance for retail Australian bond funds after fees. The study also documents that retail fund flows negatively impact on market timing coefficients when flow is not accounted for in unconditional models.

***Keywords*:**

MANAGED FUNDS; CONDITIONAL PERFORMANCE EVALUATION; ACTIVE PORTFOLIO MANAGEMENT; FUND FLOW

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1. INTRODUCTION

The performance evaluation literature concerning managed funds has been extensively addressed internationally, where the empirical evidence widely documents the inability of active funds to outperform market indices (Jensen 1968; Cumby and Glen 1990; Elton *et al.* 1993; Malkiel 1995; Gruber 1996; Cai *et al*. 1997; Blake and Timmerman 1998; Blake, Lehmann and Timmerman 1999). Australian research supports the international evidence (Bird, Chin and McCrae 1983; Robson 1986; Hallahan and Faff 1999, Sawicki and Ong 2000). However, almost all of the empirical research conducted internationally has investigated the investment performance of equity funds or funds that invest in diversified portfolios comprising both equity and non-equity securities. In Australia, published research concerning the investment performance of domestic bond funds is largely non-existent. While Hallahan (1999) investigates performance persistence of rollover funds in Australia (including fixed interest funds), investment performance measurement was not the objective of the study. This gap in the Australian literature is surprising, given that Australian bond securities managed by investment managers, either as specialist mandates or as part of balanced or multi-sector funds, represented more than $A110 billion or around 20 per cent of total assets under management at 30 September 1999.[1] This represents the second largest of all asset classes managed by institutional fund managers in Australia. Given the fixed interest sector's size as a proportion of the total market and the absence of empirical investigation, this study fills a gap in the performance evaluation literature through the analysis of actively managed domestic bond funds. The paper also provides a performance comparison between the two segments of the funds management market in the Australian bonds sector- actively managed institutional and retail products.

The handful of studies which have evaluated the performance of bond mutual funds appear to be largely confined to the U.S., where research concludes that active funds do not outperform passive benchmarks (Blake, Elton and Gruber 1993; Elton, Gruber and Blake 1995). Cornell and Green (1991) investigate the performance of high-yield U.S. bond funds and find no evidence of significant performance differences between high-grade and low-grade funds. However evidence presented by Blume and Keim (1987) and Blume, Keim and Patel (1991) indicates that a portfolio of lower grade bonds earn higher returns than for portfolios of higher investment grade, even after accounting for risk. Detzler (1999) evaluates the performance of active global bond mutual funds and finds no support of superior fund performance net of expenses against a wide range of benchmarks.

This paper evaluates the performance of active Australian bond funds using both unconditional and conditional approaches. Ferson and Schadt (1996) argue that the use of the traditional or unconditional performance evaluation techniques can lead to performance measurement biases which arise due to common time variation in managed fund risks and risk premia. With the exception of Sawicki and Ong (2000), all published

Australian studies have relied on the use of unconditional performance evaluation methods, while in the U.S. and other international markets the conditional performance approach has not been extended to bond funds. Accordingly, this study provides an indication of the level of potential bias existing between unconditional and conditional methods for active bond funds. The conditional methodology incorporates public information variables in addition to the naive benchmark (market) proxy to provide more accurate inferences concerning the magnitude of abnormal returns – that is returns earned beyond information that is widely available to the public. In the U.S., Fama and French (1992, 1993) found that two factors explained the variation in bond returns, namely default risk and maturity. Elton, Gruber and Blake (1995) evaluate the performance of relative asset pricing models for bond portfolios to help determine the factors exhibiting the greatest influence on returns. They find that bond fund returns are best explained by return indices and fundamental economic variables, namely inflation and economic growth. An innovation also used in the Elton, Gruber, and Blake (1995) paper is the employment of expectational data that captures unexpected changes in macroeconomic variables. However, Ferson and Harvey (1999) caution the use of the Fama and French (1993) and Elton, Gruber and Blake (1995) models where no attempt is made to control for systematic patterns in risk and expected return.

This paper also provides evidence concerning the influence of fund flow volumes on active portfolio performance for Australian retail funds. The literature concerning the impact of fund flow on performance is non-existent in the Australian literature and limited in the U.S.[2] Edelen (1999) argues that where an active manager, trading in a market in informational equilibrium, experiences an exogenous fund flow shock that is material, underperformance cannot be avoided. Indeed, Edelen (1999) documents that where performance measurement techniques are applied to open-ended funds that ignore the level of uninformed, liquidity-motivated trading activity, security selection and market timing estimates will be adversely affected. Edelen (1999) shows that funds' negative market timing estimates based on traditional performance measures are completely attributable to fund flow. However, where the relative magnitude of the liquidity shock each fund experiences is small, it may be argued that the negative impact on active returns could be negligible. From an empirical perspective, this paper considers the extent to which active bond fund performance, conditioned on publicly available information and fund flow, improves inferences in performance measurement.

The remainder of this paper is structured as follows. Section 2 outlines the methodology used in measuring investment performance for Australian bond funds. Section 3 provides institutional details and describes the data used in the analysis. Section 4 provides a discussion of the empirical results. The final section concludes the paper.

2. METHODOLOGY

2.1. Performance Measurement – Unconditional Measures

The CAPM-based approach, where risk-adjusted abnormal performance is measured following the seminal work of Jensen (1968), has been used extensively in the performance evaluation literature. Jensen's alpha, capturing the abnormal excess return of active funds, is estimated using ordinary least squares regression, where an active fund's return in excess of the risk-free rate is regressed on the excess return of the market proxy portfolio. The standard excess returns market model regression is therefore expressed as follows:

$$R_{pt} = \alpha_p + \beta_p R_{bt} + \varepsilon_{pt} \tag{1}$$

where:

R_{pt} = the return of fund p in period t in excess of the risk-free rate;

α_p = the unconditional risk-adjusted excess return of fund p in the period;

β_p = systematic risk of the fund, measuring the sensitivity of the excess return of fund p to the excess return on the Index;

R_{bt} = the return on the market portfolio in period t in excess of the risk-free rate; and

ε_{pt} = the residual return of fund p in period t not accounted for by the model.

The Jensen (1968) approach, however, does not consider an active investment manager's attempts to outperform the market portfolio through the use of 'timing' strategies. Treynor and Mazuy (1966) proposed the use of a quadratic term in addition to (1), arguing that funds with market timing ability will hold a greater (smaller) proportion of their portfolios in the market portfolio of risky assets when they expect the market to rise (fall). This attribution model decomposes active performance into either security selection or market timing ability. The intercept term in the Treynor-Mazuy model captures abnormal excess returns attributable to stock selection skill only and successful market timing exists where the coefficient γ is significantly positive:

$$R_{pt} = \alpha_p + \beta_p R_{bt} + \gamma_p R_{bt}^2 + \varepsilon_{pt} \qquad (2)$$

2.2 Performance Measurement – Conditional Measures

Ferson and Schadt (1996) propose the use of conditional performance evaluation methods given that the unconditional approach assumes that risks and risk premia remain constant over time. They argue the failure to account for the time variation in risks and returns may lead to biases in the evaluation of investment performance. Indeed, Ferson and Schadt (1996) and Becker et. al. (1999) find supporting evidence of negative Jensen alphas more often when an unconditional approach is adopted relative to a conditional methodology. In semi-strong form efficient capital markets, security prices fully reflect all publicly available price sensitive information, however, Ferson and Schadt (1996) argue that the traditional CAPM-based approach ignores the role of publicly available information used in the portfolio management process. Indeed, Becker et. al. (1999) argue that the role of conditional models is to account for the potential predictability in future market returns given the existence of publicly available information. In other words, active managers should not be attributed with excess returns (or superior ability) as a result of exploiting publicly known market anomalies. Where a portfolio manager incorporates public information within the investment strategy, unconditional models may indicate the fund exhibiting superior risk adjusted performance when in actual fact none exists. Therefore a potential bias may exists when traditional performance models are used.

The conditional approach involves an extension to the traditional Jensen (1968) model where a vector of lagged public information variables are incorporated to estimate alpha that is conditional on the public information they possess. In other words δ_p are the response coefficients of the conditional beta for all lagged public information variables (i.e. Z_{t-1}). In the measurement of conditional beta using the regression model (3), the excess market return must first be multiplied by each lagged public information variable.

$$R_{pt} = \alpha_p + \beta_p R_{bt} + \delta_p (R_{bt} x Z_{t-1}) + \varepsilon_{pt} \tag{3}$$

where:

α_p = the conditional estimate of risk-adjusted performance;

Z_{t-1} = the vector of public information variables lagged one period;

δ_p = measures the response coefficients of conditional beta with respect to lagged public information variables.

Ferson and Schadt (1996) measure conditional alpha for mutual funds (primarily funds invested in equity assets) using the following lagged public information variables - treasury note yield, dividend yield, term structure of interest rates, a corporate quality yield spread and a dummy variable for the month of January. Sawicki and Ong (2000) employ the Ferson and Schadt (1996) approach (excluding the corporate quality yield spread variable) to assess the conditional performance of active Australian equities and active balanced funds. There have been a number of empirical studies investigating factors that explain stock returns, for example, Chen, Roll and Ross (1986) and Fama and French (1993). Elton, Gruber and Blake (1995) argue that the same factors explaining equity returns should also be important factors driving bond returns. In separate regressions (not reported), we evaluated empirically the extent to which the returns derived in the Australian bond market (proxied by the Warburg Dillon Read Composite Bond Index) were explained by the factors documented by Sawicki and Ong (2000). The model also accounted for the Australian equity market (proxied by the ASX All Ordinaries Accumulation Index) as a broader measure of economic activity. The results indicated that the equity return was the most important and significant determinant of bond returns.

Accordingly, this study estimates conditional alpha for active Australian bond funds employing two conditional models. First, the conditional model in (3) incorporates all lagged public information variables used by Sawicki and Ong (2000), namely dividend yield, treasury note yield, term structure of interest rates and a January conditional variable. Second, the conditional model in (3) estimated conditional performance using all variables in Sawicki and Ong (2000), with the exception of dividend yield, which was replaced by another conditional variable, namely the returns on the All Ordinaries Index, as a broader proxy for industrial production and corporate profitability.[3] This equity return variable, measuring domestic economic conditions, was empirically found to have significant explanatory power for bond returns in Australia whereas dividend yield was not as strong as an explanatory variable. Therefore, the substitution of the economic conditions variable and the dividend yield variable was used to assess the variability in estimated conditional bond fund performance. While the January anomaly has been extensively documented in stock returns, a number of studies have found supporting evidence of a January seasonal in the corporate bond market (Chang and Pinegar (1986), Chang and Huang (1990), Fama and French (1993) and Maxwell (1998)). Accordingly, a dummy variable for January is included within the models as a public information variable.

Equation (3) may be considered as a unconditional multi-factor model, where the first factor is the market return in excess of the risk free rate and the additional factors represent the product of the lagged public information variables and the excess market return. Consistent with Ferson and Schadt (1996), heteroskedasticity-consistent *t*-statistics are calculated for analyses where market timing is considered. The conditional performance evaluation method incorporating market timing is an extension of (3) and is estimated as follows:

$$R_{pt} = \alpha_p + \beta_p R_{bt} + \delta_p (R_{bt} x Z_{t-1}) + \gamma_p R_{bt}^2 + \varepsilon_{pt} \qquad (4)$$

2.3 Fund Flows and Performance

Fund flows and their influence on managed fund performance is an emerging area in the literature. Two important reasons behind the increasing focus of fund flow activity includes (1) obtaining improved measures of active fund performance with respect to the liquidity service provided to clients of managed funds and (2) solving the puzzle of why a negative covariance exists between fund betas and market returns (see Ferson and Schadt (1996) and Sawicki and Ong (2000)). This negative covariance implies that investment managers reduce (increase) their market betas despite the available public information predicting high (low) expected returns.

In terms of the provision of client-driven liquidity, Edelen (1999) shows that active fund performance for open-end U.S. mutual funds is adversely affected due to investment managers engaging engage in uninformed, liquidity-motivated trading. Edelen (1999) further documents that perverse market timing ability derived from unconditional models can be attributed to the liquidity function these managers provide mutual fund investors. Edelen's (1999) argument follows from the analysis of Warther (1995), who demonstrates a strong positive correlation between monthly aggregate fund flow and market returns. Indeed, Edelen and Warner (2001) also document a strong positive relationship using daily data, providing further evidence of a negative market timing effect. Becker *et al.* (1999) also postulates that the exogenous liquidity shocks experienced by funds may lead to inaccurate conclusions being made concerning a mutual fund's true market timing ability when the liquidity effect is not accounted for in performance models.

Ferson and Schadt (1996) hypothesise that the negative covariance between fund betas and market returns may be driven by new money flows into mutual funds. The hypothesis here is that new money flows occurs when managed fund investors expect future market returns to be high, and where the manager subsequently experiences a delay in investing the new inflow, the higher cash level within the portfolio causes a reduction in the manager's beta. The extent to which new money flows reduce fund betas depends on the size of the inflow relative to the fund's total assets. An alternative explanation cited by Ferson and Schadt (1996) may be due to the variability in asset betas from the underlying securities comprising the fund manager's portfolio or changes in the weights of the securities in the fund. Sawicki and Ong (2000) also proposition both of these possibilities.

An examination of net fund flows of retail bond funds reveals that such funds experience a significant volume of flow, measured as the absolute value of monthly net flow scaled by the funds' asset size at the beginning of each period (or normalised flow). After controlling for extreme flows (for example, those flows that occur around the early stages of a funds life), on average retail funds exhibit net flow volume per month equivalent to 6.58 percent of total fund assets. Considering that a fund's gross flows exceed net flows, flow volume would therefore be even more significant. Overall, the average fund, in net terms at least, experiences a material volume of flow in managing their active bond portfolios, and the extent to which flow impacts on performance is an empirical issue.

This paper considers the extent to which the liquidity service provided to retail investors influences the performance estimates. Fund flow data for the institutional sample was not available. Flow-adjusted performance for the retail sample is evaluated using both unconditional and conditional performance evaluation techniques. Edelen's (1999) analysis incorporates gross fund flows, however this study employs net fund flows due to the unavailability of gross flow data. However, while gross flows capture the entirety of fund flow activity, the use of net flows may not be problematic, as inflows and outflows may be 'crossed' with unit holders either buying or redeeming their managed fund units, meaning that the manager is not required to engage in trading. Net flows will still provide important inferences in understanding how fund flow activity impacts on active bond fund managers, however the potential for bias in the use of net flows is dependent on the frequency and magnitude of the flow relative to the total size of the fund. Therefore, there is a possibility that this study will understate the effects of fund flow activity on investment performance. Net fund flows (NFF) are estimated from monthly bond fund asset values, where total fund assets (TFA) at period *t* minus total fund assets from the previous period *t-1* (after the adjustment for the appreciation/depreciation in period *t*-1 due to fund performance). Net fund flows (NFF) can be expressed as follows:

$$NFF_{pt} = TFA_{pt} - [TFA_{pt-1}(1+R_{pt})] \tag{5}$$

Extending the unconditional model in (3) with an additional variable accounting for the link between fund flows and market timing, Edelen (1999) advocates the use of an interactive regressor to control for the affect of the volume of fund flow on market timing. From (5), the volume of fund flows are scaled by the monthly fund size (SFF) and incorporated in unconditional and conditional models respectively:[4]

$$R_{pt} = \alpha_p + \beta_p R_{bt} + \gamma_p R_{bt}^2 + \lambda_p (SFF_{pt}) R_{bt}^2 + \varepsilon_{pt} \tag{6}$$

$$R_{pt} = \alpha_p + \beta_p R_{bt} + \delta_p (R_{bt} x Z_{t-1}) + \gamma_p R_{bt}^2 + \lambda_p (SFF_{pt}) R_{bt}^2 + \varepsilon_p \tag{7}$$

The additional flow variable assists in differentiating an active fund's true market timing ability from the uninformed, liquidity-motivated trading function that funds are required to perform. Hence, if fund flow is adversely captured in the timing coefficient of (3) and (4), the expectation is that (6) and (7) would document an improved timing coefficient coupled with a negative coefficient on the interactive flow term. If this is the case, then the interactive regressor accounts for the negative timing induced on funds arising from the flow they experience.[5]

3. INSTITUTIONAL DETAILS AND DATA

3.1 Institutional Details

Table 1 presents summary statistics relating to the size of the funds management market in Australia. The total asset size of investments controlled by investment managers was around $A589.7 billion as at 30 September 1999, of which the Australian fixed interest sector is valued at $A110.2 billion (or approximately one-fifth of the total market) and is the second largest asset class behind Australian equities. In other words, the Australian debt sector is a significant proportion of the total market and deserves attention as an investment sector in its own right.

Table 1

Funds Under Management of Professional Investment Managers in Australia

This table reveals the Australian-sourced funds under management from institutional and retail investors as at 30 September 1999. The Australian equities asset class is the largest sector managed by professional investors, with Australian fixed income assets representing the second largest sector. The asset class category 'other' represents funds invested in infrastructure, tactical asset allocation assets and miscellaneous investment classes otherwise outside of the asset category classifications.

Asset Class	$A Millions	Percentage (%)
Australian Equities	148,476	25.18
International Equities	96,704	16.40
Australian Fixed Interest	110,217	18.69
International Fixed Interest	18,220	3.09
Property	66,835	11.33
Cash	84,014	14.25
Other	65,196	11.06
TOTAL	589,662	100.00

Source: Rainmaker Information Services

The proxy used for the risk-free rate is the return derived in period *t* from a Reserve Bank of Australia 13-week Treasury note adjusted to a monthly rate. The most widely referenced market index by investment managers concerning the performance of the Australian debt market is the Warburg Dillon Read Composite Bond (All Maturities) Index (WDRCBI).[6] The paper uses this index as the proxy for the market return. The WDRCBI is a market capitalisation weighted benchmark that comprises Commonwealth Government bonds (CGB), Semi-Government bonds (SGB) and corporate issues, where the minimum credit rating issued by Standard and Poors' (S&P) is at the minimum A-. The minimum market-cap of bond securities included within the WDRCBI is $A100 million for all securities. The S&P ratings on the basis of credit quality are as follows (in descending order): AAA, AA+, AA, AA-, A+, A, A-. The highest S&P rating indicates an issuer exhibiting an extremely strong capacity to meet their financial obligations. An A rating represents an issuer holding a strong capacity to meet their financial commitments, however they may have a greater sensitivity to changing (adverse) economic conditions. BBB- is the lowest investment-grade rating, however these bonds are not included in the WDRCBI. The investment grade of fixed interest securities within the index is shown in Figure A1 in the Appendix. The market capitalisation of Australian debt securities comprising the WDRCBI as at 30 September 1989 was around $A61 billion, which had grown in size over the 10-year period by almost 150 percent to $A151 billion as at 30 September 1999. CGB, SGB and Corporate issues predominantly comprise fund manager Australian fixed interest portfolios, however investment managers may also invest a small proportion of fund assets in cash and other securities including convertible notes, preference shares and index-linked bonds.

3.2 Active Australian Bond Fund Data

This study incorporates monthly returns for 66 institutional and 77 retail Australian open-end active bond funds in existence within the 10-year period to 30 September 1999. The study does not evaluate the performance of passively managed bond index funds. While index funds should earn returns in line with the underlying index, the number of index-oriented bond funds available to Australian investors is small and these funds do not have long performance histories, therefore this paper focuses on active bond funds only. The average age of the active bond funds in the sample is 6.7 years (or 80 months), where the average institutional and retail fund's age is 7.5 years and 6.1 years respectively.

The combined market value of assets of the sample of actively managed institutional and retail bond funds at 30 September 1999 was in excess of $A20 billion and $A1.6 billion respectively. Australian bond funds invest in Australian fixed interest securities including CGB, SGB and corporate bonds. The investment managers indicated to us that the WDRCBI is the most widely cited index referenced by domestic fixed interest portfolio managers and that this index is considered to be the most appropriate market proxy with which to evaluate active bond fund performance. This is confirmed in the market model regressions (equation 1) showing high R^2 in Table 3a. Given this information, active bond managers would attempt to add value above the benchmark through active bets relative to the index, in terms of duration management and security selection (i.e. under or overweighting the component issues of the WDRCBI).

The institutional fund performance data was obtained from William M. Mercer Pty. Ltd. and Towers Perrin Australia. The retail fixed interest fund returns data was obtained from ASSIRT and includes domestic bond funds classified as retail trusts, retail superannuation and allocated pension funds. Net fund flow data for retail funds and was estimated using monthly data provided by ASSIRT. Fund flow data from Mercers and Towers Perrin was not available for the institutional bond fund sample, hence the fund flow analysis is limited to retail bond funds. Returns are calculated as the total return to investors arising from changes in capital value and income derived from portfolio assets. Performance is reported before investment management fees for the institutional sample and post fees for the retail sample.[7] The study evaluates performance for all funds in existence within the 10-year period to 30 September 1999, including an evaluation of non-surviving funds for the wholesale bond fund sample. Funds were required to have a minimum of two years of performance data to help ensure estimates of risk-adjusted performance were not significantly influenced with the start-up phase of the fund as well as providing enough observations to incorporate in the individual fund regressions. The advantage of not applying strict limits on the basis of a fixed, long-term evaluation horizon (e.g. all funds requiring 10 years of data to be included in the sample) helps to ensure a broader cross-section of funds being captured in the performance evaluation period. Constraining the fund sample to only funds with sufficient longevity, as is the case in most managed fund performance studies, leaves the study open to potential selection biases. While the institutional bond fund dataset contains performance of funds that have closed, merged into other funds or ceased to exist entirely, the sample may contain a small, but unknown degree of survivorship bias.[8] The retail bond fund sample does not contain non-surviving funds. Studies including Brown, Goetzmann, Ibbotson and Ross (1992), Elton, Gruber and Blake (1996) and Carpenter and Lynch (1999) highlight the problems performance evaluation studies face where survivorship bias exists.

3.3 Measurement of Public Information Variables

Ferson and Schadt (1996) and Becker et. al. (1999) advocate the use of conditional performance evaluation models to control for the level of public information available to active managers while also minimising the potential biases inherent in traditional methods. In this study, two conditional performance evaluation models incorporate three lagged (*t-1*) public information variables similar to those identified by Ferson and Schadt (1996) and consistent with Sawicki and Ong (2000). The first conditional model (A) employs a lagged 90-day Reserve Bank of Australia (RBA) Treasury note, adjusted to a monthly rate. Second, a lagged measure of the term structure of interest rates, expressed as the monthly difference in yield between the Commonwealth 10-year bond and 90-day RBA Treasury note. Third, the lagged monthly dividend yield of equity securities comprising the ASX All Ordinaries Index. Following Ferson and Schadt (1996) and Sawicki and Ong (2000), this study also incorporated a dummy variable for the month of January as a conditional variable. The second conditional model (B) evaluated in this study substituted an economic conditions variable - a proxy for industrial production, corporate profitability and general economic growth (measured as the lagged excess return on the ASX All Ordinaries Accumulation Index) as an alternative (and possibly broader) information variable to dividend yield. The remaining variables comprising conditional model A were also included in B. The study considered model B as an alternative model to A as a result of separate regressions (not reported) indicating the economic conditions variable to be a significant determinant of Australian bond returns, defined as the WDRCBI. Overall, both conditional models provided similar risk-adjusted excess returns and hence do not contradict the overall conclusion that active bond funds do not outperform passive indices.

4. EMPIRICAL RESULTS

4.1 Overall Active Bond Fund Performance

Table 2 presents the summary results for the individual, actively managed Australian bond funds included in the study over the 10-year period to 30 September 1999. The table shows the number of funds in both the institutional and retail samples exhibiting either significantly positive, significantly negative or statistically insignificant performance estimates at the 95 percent confidence interval. An important point to consider in the evaluation of performance of bond funds used in the sample is concerned investment management expenses. The retail sample of active bond fund returns provided by ASSIRT are reported net of expenses, however, the institutional database of William M. Mercer Pty. Ltd. reports returns before fees. In addition, given that investment managers levy higher fees for retail investors than is the case for institutional clients, *ceteris paribus*, actively managed retail funds will earn lower active returns after expenses. The main conclusion derived from the summary of individual fund performances at the total portfolio level from Table 2 is that the majority of funds do not exhibit superior risk-adjusted performance in the period. These conclusions are consistent with the use of either a conditional or unconditional methodology to adjust for fund returns for risk. There are a number of active strategies that domestic fixed income managers may use in their attempts to add value, such as duration management, yield curve analysis, re-weighting their portfolio from benchmark index weighting across CGS's, SGS's or corporates, and issue selection with respect to credit risk. However, Table 2 clearly indicates that the overall portfolio performance of the majority of active managers were unable to employ active investment strategies in such a manner that earned their clients superior returns to the market index. In particular, the results strongly indicate that retail fund managers significantly underperform as a result of security selection. While we do not have pre-expenses data with which to report gross performance for retail funds, we do know that the average management expense ratio of the sample at 30 September 1999 was 163 basis points per annum (or 13.6 basis points per month).[9] While these reported fees are static at a single point in time, on the basis of the results presented in Table 2 (Panel B), it would appear that fees only account for around half of the average retail bond fund underperformance. However quantification of the exact component of underperformance attributable to fees in this sample is not possible due to data constraints. In terms of the inherent survivor bias that exists in the retail sample, the results presented are also likely to be more favourable than would be the case if closed and terminated funds were included in the sample. Overall, the study confirms the inability of active Australian fixed income funds to outperform passive indices, and this finding is consistent with the empirical evidence of Blake, Elton and Gruber (1993) for active U.S. mutual bond funds.

In terms of the performance of retail funds when fund flow is considered using both the unconditional and conditional models, Table 2 shows that around half of all funds exhibit negative λ coefficients, indicating that fund flow is negatively related to performance. However, only a small percentage of the sample generate significantly negative λ estimates, which seems to indicate that fund flow activity does not significantly impact on active fund performance across the majority of the sample. There is only a small percentage increase in the number of funds whose performance estimates for market timing improve where flow is evaluated.

Table 2

Evaluation of Individual Active Australian Bond Funds in the 10-Year Period to September 1999

This table shows the number of individual active Australian bond funds in the 10-year period that exhibit performance estimates which are statistically significant at the 95 percent confidence interval. Panel A evaluates the performance of institutional funds on a before fees basis, whereas Panel B presents summary results for retail bond funds using fund returns data after expenses. Given that Panels A and B differ on the basis of gross and net of fees, respectively, direct comparisons between institutional and retail funds are not possible. Performance is evaluated using both unconditional (equations 1, 2 and 6) and conditional approaches (equations 3, 4 and 7). The conditional model (B) accounts for the variables economic conditions, term structure, treasury yield and January dummy. The results for conditional model (A) were similar and are not reported. Retail funds are also evaluated using fund flow data to assess the potential impact that flow causes on performance estimates. The columns labeled 'Total' refers to the portfolio's overall return which arises from an active manager's security selection and market timing strategies. Alpha (α) represents the active fund's stock selection skill; Gamma (γ) refers to the bond manager's market timing ability; Lamda (λ) denotes the fund flow variable's impact on performance for actively managed retail bond funds. Fund flow data for the institutional sample was not available. The *t*-statistics used to determine statistical significance are calculated using White (1980) heteroskedastic consistent standard errors for models (2), (4), (6), (7).

	Unconditional (ignoring flow)			Unconditional (including flow)			Conditional (ignoring flow)			Conditional (including flow)		
	Total (Eq. 1)	α (Eq. 2)	γ (Eq. 2)	α (Eq. 6)	γ (Eq. 6)	λ (Eq. 6)	Total (Eq. 3)	α (Eq. 4)	γ (Eq. 4)	α (Eq. 7)	γ (Eq. 7)	λ (Eq.7)
*Panel A: Institutional Bond Funds**												
Negative & Insignificant	22	18	41	-	-	-	25	21	39	-	-	-
Positive & Insignificant	35	35	19	-	-	-	30	31	21	-	-	-
Negative & Significant	2	2	6	-	-	-	2	2	5	-	-	-
Positive & Significant	7	11	0	-	-	-	9	12	1	-	-	-
Funds in Sample	66	66	66	-	-	-	66	66	66	-	-	-
*Panel B: Retail Bond Funds**												
Negative & Insignificant	19	21	39	25	28	21	27	35	42	35	38	34
Positive & Insignificant	1	4	32	1	35	35	3	4	30	2	36	23
Negative & Significant	57	52	1	51	4	16	47	38	3	40	2	10
Positive & Significant	0	0	5	0	10	5	0	0	2	0	1	10
Funds in Sample	77	77	77	77	77	77	77	77	77	77	77	77

* Significance level = 0.05

Table 3a indicates that institutional bond funds earn risk-adjusted excess returns comparable to an index fund before expenses, where the average alpha is insignificantly different from zero for both unconditional and conditional techniques. Retail funds on the other hand levy higher fees than institutional bond funds, and *ceteris paribus*, will underperform to a greater extent than institutional funds where management expenses are deducted. The overwhelming majority of retail bond funds have negative alphas and the average retail fund exhibits significantly negative risk-adjusted excess returns after expenses, irrespective of whether an unconditional or conditional performance model is considered. Analysis of bond funds using the unconditional Sharpe Ratio (not directly reported) also supports the evidence that active bond funds do not outperform the market benchmark.

The high R^2 reported for both the conditional and unconditional models indicate that active bond fund returns are explained well by the independent variable(s). While there is a difference in the coefficient of determination reported for institutional and retail funds of approximately 20 percent, the most likely explanation for this is due to the higher variability in performance for retail funds arising from returns being reported post-fees. In other words, due to retail funds being evaluated after expenses (whereas institutional funds are analysed before fees) the different expense ratios charged by retail funds ensures a lower R^2. In addition, retail funds may have different portfolio allocations to fixed income assets compared with institutional funds. For example, retail bond funds may hold higher cash levels, allocations to other debt securities including mortgage securities (which are not accounted for in the WDRCBI) or prefer exhibiting a shorter duration relative to the index.

Table 3a

Overall Risk Adjusted Performance of Active Australian Bond Funds

This table presents the cross-sectional descriptive statistics for 66 institutional and 77 retail actively managed Australian bond funds in the 10-Year Period to 30 September 1999. Alpha is expressed in percentage terms per month and represents the total active return (adjusted for risk) derived through the use of both security selection and market timing strategies. The table shows total portfolio risk-adjusted returns using both an unconditional (equation 1) and 2 conditional approaches (equation 3). The conditional model A incorporates the following public information variables – dividend yield, term structure, treasury note yield and a January conditional variable. The conditional model B uses the economic conditions variable in place of dividend yield, and all other remaining variables defined in conditional model A. The systematic risk of funds is measured as β. R^2 for the conditional model is reported as the adjusted R^2.

Model	Mean α	*t*-stat	SD α	Min α	Q1 α	Q2 α	Q3 α	Max α	Mean β	Mean R^2
Panel A: Institutional Bond Funds – Before Fees										
Unconditional	0.009	1.10	0.065	-0.365	-0.015	0.011	0.035	0.154	1.027	0.927
Conditional (A)	0.011	1.42	0.059	-0.238	-0.014	0.013	0.042	0.162	1.161	0.938
Conditional (B)	0.001	0.10	0.093	-0.567	-0.016	0.008	0.040	0.188	1.053	0.932
Panel A: Retail Bond Funds – After Fees										
Unconditional	-0.279	-11.46***	0.236	-0.926	-0.293	-0.179	-0.135	0.005	0.807	0.721
Conditional (A)	-0.307	-10.61***	0.253	-0.968	-0.578	-0.195	-0.130	0.026	0.954	0.705
Conditional (B)	-0.244	-10.50***	0.224	-0.971	-0.245	-0.168	-0.114	0.087	1.002	0.742

*** Significant at 0.01 level

An interesting point to note in Table 3a is the general improvement in the average alpha of funds when a conditional model is employed. With the exception of the conditional model A for retail funds, the conditional models shift the distribution of alphas to the right, however this shift is not large enough to change the general conclusion that active bond funds cannot significantly outperform the benchmark index. The shift in the distribution of fund alphas to the right is also supported in the literature, namely the empirical studies of Ferson and Schadt (1996), Becker et. al. (1999) and to some extent the results of Sawicki and Ong (2000).

Table 3b

Cross-Sectional Averages of the Conditional Variable Coefficients for Active Institutional and Retail Australian Bond Funds

This table presents the cross-sectional averages of the coefficients of the conditional public information variables for conditional models A and B. The sample comprises 66 institutional and 77 retail actively managed Australian bond funds in the 10-Year Period to 30 September 1999. The number of funds in the sample with statistically significant conditional variable coefficients (at 0.05 level) are also documented.

	Institutional Bond Funds			Retail Bond Funds		
Variable	Coefficient	*t*-stat	No. Funds Significant**	Coefficient	*t*-stat	No. Funds Significant**
Panel A: Conditional Model A						
Dividend Yield	-0.867	-3.45***	20	-0.799	-2.45**	8
Term Structure	0.210	1.68*	20	-0.067	-0.43	12
Treasury Note	0.246	2.88***	25	-0.098	-0.81	12
January Dummy	-0.012	-0.97	8	-0.053	-2.54**	3
Panel B: Conditional Model B						
Economic Conditions	-0.002	-1.90*	7	-0.002	-0.99	7
Term Structure	0.330	2.40**	25	0.194	1.35	12
Treasury Note	0.006	0.07	25	-0.020	-0.10	13
January Dummy	-0.019	-1.28	3	-0.152	-5.51***	13

* Significant at 0.10 level
** Significant at 0.05 level
*** Significant at 0.01 level

Table 3b presents the cross-sectional averages of the coefficients used as conditional variables for active institutional and retail bond funds. This study employs two conditional models applied specifically to active bond funds study. The difference between the models is that conditional model A (Panel A) evaluates performance conditioned on lagged public information variables consistent with Sawicki and Ong (2000) – dividend yield, term structure, treasury note yield and a January dummy. On the other hand, conditional model B (Panel B) substitutes an economic conditions variable for dividend yield. Sawicki and Ong (2000) report that the treasury note yield and term structure conditioning variables for tax-paying (PST) Australian share funds are statistically important in explaining equity fund returns. Sawicki and Ong (2000) also find dividend yield is an important determinant for their tax-paying (PST) balanced funds sample. The institutional bond fund results documented in Table 3b (Panel A) indicates that the coefficients on dividend yield, the term structure of interest rates and treasury note yield are statistically significant. Panel B indicates that the economic conditions variable and the term structure of interest rates are also significant explanatory variables for institutional Australian bond fund returns. While the results for retail bond funds are not as strong as for the institutional sample, the average retail fund exhibits a significant coefficient for dividend yield (which is consistent with institutional bond funds), however the remaining variables are not significant. An important difference between institutional and retail funds is the presence of a significantly negative January coefficient for both conditional models A and B.

Sawicki and Ong (2000) find 48 percent of individual balanced and equity-oriented funds exhibit a significant coefficient for the dividend yield conditional variable, however the other variables were not found to be important. The results presented in Table 3b for bond funds indicate that the dividend yield coefficient is significant 30 percent (institutional funds) and 10 percent (retail funds). The term structure of interest rates and treasury note yield also appears reasonably important for around one-third of institutional funds. The results are not as strong for the retail sample at the individual fund level.

In light of the empirical evidence presented in the literature (for example, Elton, Gruber and Blake 1996b), the inclusion of non-surviving funds in performance evaluation studies reduces the average alphas compared with survivorship-biased samples. In other words, survivor-biased samples will overstate the 'true' performance of managed funds. Elton, Gruber and Blake (1996b) argue that attrition rates for managed funds are high for those funds who perform poorly relative to their peers. In such cases, investment managers are likely to find the marketing of poor performing funds difficult, and as a result may choose to merge the underperforming fund into an another fund or terminate the fund altogether. The institutional sample used in this study includes both surviving and non-surviving active Australian bond funds. While poor performance may be the single most important factor behind the closure of a fund, managed funds may also cease to operate due to merger or takeover activity by another competitor. In addition, takeover or merger activity may also arise due to poor performance. The William M. Mercer institutional bond fund database does not include information explaining why funds cease, however subsequent analysis of performance prior to closure may assist in determining the proportion of funds which terminate. In terms of the institutional active bond fund sample employed in this study, 17 of the 66 bond funds (25.7 percent) do not have full performance histories to 30 September 1999. These 17 terminated funds are managed by 15 different managers, of which just under half the investment managers (7 managers, managing 7 defunct funds) remained as distinct and independent investment operations at the end of September 1999. On the basis of this information, analysis was performed using the unconditional and conditional models to evaluate the performance of the funds in the period of survival. The results are presented in Table 3c and show that non-surviving funds underperform on average where an unconditional approach is employed, however the statistical power of the test is likely to be affected due to the small sample size. Panel B, which evaluates surviving and non-surviving funds using the conditional measure, shows no significant difference in the average performance of surviving and non-surviving funds. While not reported directly, analysis was also performed by partitioning the sample of non-surviving funds on the basis of (a) whether the investment manager themselves ceased to exist after the fund was terminated and (b) whether the manager remained in existence until September 1999. While power of the statistical tests is weak, due to the small sample size, the results indicated that non-surviving managers, whose funds also ceased, underperformed the terminated funds offered by surviving managers.

Table 3c

Analysis of the Performance of Surviving and Non-Surviving Institutional Active Australian Bond Funds

This table presents the cross-sectional average returns for actively managed institutional bond funds that both survive and do not survive through until 30 September 1999. Alpha is expressed in percentage terms per month and represents the total active return (adjusted for risk) derived through the use of both security selection and market timing strategies. Panel A shows cross-sectional average risk-adjusted returns using the unconditional model (equation 1) and Panel B employs a conditional approach (B) employing conditional variables economic conditions, term structure, treasury yield and January dummy (equation 3). The results for conditional model (A) were largely consistent and are not reported.

Category	No. Funds	Mean α	*t*-stat	SD α
Panel A: Unconditional Model				
Non-Surviving	17	-0.016	-0.66	0.103
Surviving	49	0.018	2.90***	0.042
Difference	-	0.034	1.32	-
Panel B: Conditional Model				
Non-Surviving	17	0.011	0.52	0.090
Surviving	49	-0.002	-0.18	0.095
Difference	-	0.013	0.54	-

*** Significant at 0.01 level

4.2 Market Timing and Selectivity for Active Bond Funds

Table 4 present the performance attribution results for security selection and market timing for the institutional and retail bond fund samples. Panel A summarises the results for the institutional bond fund sample and shows the average active manager earned significantly positive returns attributable to the selection of bond securities before management fees. However, institutional funds exhibit significantly negative market timing ability, which indicates that macroeconomic forecasting on the part of active bond managers detracts from their ability to earn significantly positive risk-adjusted excess returns (see Table 3a, Panel A). Panel B of Table 4, which controls for public information, indicates active returns attributable from security selection and market timing for institutional funds are consistent with an efficient capital market. In terms of the both performance estimates, the average institutional fund exhibits improved selectivity and market timing estimates compared with the unconditional model. This is consistent with Ferson and Schadt (1996), who also document improved performance when conditional models are employed. However Ferson and Schadt (1996) indicate that this phenomenon is attributed to the negative covariance between fund betas and market returns, where information conditioning controls for this effect. Sawicki and Ong (2000) also highlight the perplexing nature of this result, because a negative covariance suggests irrationality on the part of active investment managers who increase (reduce) their exposure to the market when returns are low (high).

In terms of active retail bond funds, both the conditional and unconditional models show significantly negative risk-adjusted excess returns arising from bond selection. While retail funds on average exhibit negative market coefficients, both models evaluated are statistically insignificant at conventional levels, although the *p*-value derived using the conditional model is close to being statistically significant. Overall, the general findings that active bond funds are unable to earn significantly positive risk-adjusted excess returns confirm the U.S. evidence documented by Elton, Gruber and Blake (1993) using unconditional models.

Table 4

Security Selection and Market Timing Performance of Active Institutional and Retail Australian Bond Funds

This table presents the cross-sectional descriptive statistics for 66 institutional and 77 retail actively managed Australian bond funds existing in the 10-Year Period to September 1999. Panels A and C employ the unconditional approach (equation 2) whereas Panels B and D evaluate active bond funds using the conditional model (B) (equation 4) incorporating conditional variables: economic conditions, term structure, treasury yield and January dummy (model B). The results for conditional model (A) were consistent and are not reported. Alpha is expressed in percentage terms per month (before fees) and represents the active return (adjusted for risk) derived through the use of security selection only. Market timing is denoted by γ, and superior ability is present when γ is significantly positive. The Pearson's correlation coefficient between selectivity and timing estimates is denoted ρ.

	Mean	*t*-stat	SD	Min	Q1	Q2	Q3	Max
Panel A: Institutional Funds - Unconditional Model (ignoring fund flow)								
α	0.020*	1.83	0.089	-0.500	-0.008	0.024	0.054	0.265
γ	-0.006*	-1.92	0.027	-0.057	-0.015	-0.007	0.002	0.152
$\rho(\alpha,\gamma)$	-0.588***	-	-	-	-	-	-	-
Panel B: Institutional Funds - Conditional Model (B) (ignoring fund flow)								
α	0.011	0.76	0.114	-0.566	-0.017	0.019	0.051	0.320
γ	-0.004	-1.36	0.025	-0.082	-0.014	-0.006	0.006	0.071
$\rho(\alpha,\gamma)$	-0.540***	-	-	-	-	-	-	-
Panel C: Retail Funds - Unconditional Model (ignoring fund flow)								
α	-0.316***	-10.08	0.276	-0.907	-0.624	-0.196	-0.138	0.091
γ	0.006	0.98	0.051	-0.105	-0.019	-0.001	0.029	0.256
$\rho(\alpha,\gamma)$	-0.480***	-	-	-	-	-	-	-
Panel D: Retail Funds - Conditional Model (B) (ignoring fund flow)								
α	-0.254***	-8.48	0.261	-0.914	-0.424	-0.156	-0.096	0.210
γ	-0.010^	-1.66	0.051	0.223	-0.028	-0.009	0.016	0.141
$\rho(\alpha,\gamma)$	-0.379***	-	-	-	-	-	-	-

* Significant at 0.10 level
** Significant at 0.05 level
*** Significant at 0.01 level
^ p-value = 0.11

An interesting finding reported in Table 4 is the existence of strong negative correlation (cross-sectional) between selectivity and timing estimates where flow is not accounted for. Both the unconditional and conditional models derive significantly negative Pearson correlation coefficients. Other studies, including Henriksson (1984) and Coggin, Fabozzi and Rahman (1993) also find evidence of a strong negative relationship between timing and selectivity, indicating that perceived skill in one component of portfolio management activity does not necessarily imply skill in the other. There have been a number of hypotheses concerning why this negative correlation phenomenon exists. Henriksson (1984) postulates that the existence of a negative relationship is due to the market proxy being misspecified or the model omitting relevant factors explaining the derivation of fund returns. Jagannathan and Korajczyk (1986) suggest the negative correlation between timing and selectivity may occur as a result of portfolio managers holding options or option-like securities such as listed securities with high leverage. Alternatively, Coggin, Fabozzi and Rahman (1993) argue the negative relationship between timing and security selection is derived due to sampling errors of the two estimates being negatively correlated.

4.3 Fund Flow Effects on Active Bond Fund Performance

Ferson and Schadt (1996) and Sawicki and Ong (2000) speculate that new money flows into mutual funds may explain the existence of the negative covariance between fund betas and the market returns. Analysis by Warther (1995) indeed confirms the existence of a negative relationship between fund betas and new money flows for Ferson and Schadt's (1996) sample. Ferson and Warther (1996) document that money flows into mutual funds partly explain the changes in betas over time, and represents a plausible interpretation highlighting the negative impact on market timing that is attributable to fund flow. The results of Ferson and Schadt (1996), Warther (1995) and Ferson and Warther (1996) all contribute to Edelen's (1999) examination of the relationship between fund flow activity and a fund's market timing performance. Indeed, Edelen (1999) finds the source of negative market timing is attributable to the flow experienced by active mutual funds. Given the empirical evidence in the U.S., this study therefore attempts to explain the impact of fund flow activity on active bond fund performance with respect to market timing.

Table 5 presents the results for the retail bond fund sample using a similar approach to Edelen (1999) that accounts for the effect that fund flow exhibits on market timing through the use of an interactive regressor term (see equations 6 and 7). If the liquidity effect is detrimental to an active manager attempting to successfully time the market, then the coefficient on the interactive term (λ) should be negative and a corresponding improvement of the market timing coefficient should subsequently be reported. Panel A of Table 5 presents the cross-sectional performance results of active retail fixed interest funds that accounts for flows according to the unconditional model. Consistent with Edelen's (1999) results for U.S. mutual funds, the interactive term (accounting for both market timing and fund flow) is significantly negative, and the coefficient determining market timing ability is correspondingly significantly positive. At the individual fund level, the unconditional model indicates that 21 percent of retail funds have significantly negative interactive flow coefficients. When the cross-sectional results in Panel A of

Table 5 are compared with the unconditional model that excludes flow for retail funds (Table 4, Panel C), market timing ability appears to be understated when flow is not considered. However, the conditional flow-control model (Panel B) does not (statistically) support the findings presented in Panel A. While the results indicate that flow for the sample is on average negative, the coefficient is not significant. While the market timing estimate has improved (marginally) compared with Table 4 (Panel C), the conditional model does not suggest retail bond fund managers are successful market timers.

Table 5

Security Selection, Market Timing and Fund Flow for Active Retail Australian Bond Funds

This table presents the cross-sectional averages for 77 retail actively managed Australian bond funds in the 10-Year Period to September 1999. Panel A evaluates active bond funds employing the unconditional model that accounts for fund flows (equation 6). Panel B accounts for fund flows within the conditional model (B) (equation 7). Flows are incorporated into the models in concurrent terms with returns. The results are similar (but not directly reported) when flows are lagged one period. The conditional model (B) accounts for economic conditions, term structure, treasury yield and a conditional January dummy. The results for conditional model (A) were largely consistent and are not reported. Alpha is expressed in percentage terms per month (after fees) and represents the active return (adjusted for risk) derived through the use of security selection only. Market timing is denoted by γ, and superior ability is present when γ is significantly positive. The influence of fund flow on performance is represented by lambda (λ).

Coefficient	Mean	*t*-stat
Panel A: Retail Funds - Unconditional Model		
α	-0.296***	-9.96
γ	0.011*	1.70
λ	-0.008***	-4.19
Panel B: Retail Funds - Conditional Model(B)		
α	-0.266***	-8.77
γ	-0.008	-1.05
λ	-0.030	-0.99

* Significant at 0.10 level
** Significant at 0.05 level
*** Significant at 0.01 level

5. CONCLUSION AND SUGGESTIONS FOR FUTURE RESEARCH

This is the first study that evaluates the performance of actively managed Australian bond funds, using both unconditional and conditional performance evaluation techniques as well as assessing the impact of flow on retail bond fund performance. The evidence presented in this study overwhelmingly indicates that the average active bond fund does not outperform the market index. These conclusions are independent of whether performance is (a) considered pre or post expenses and (b) whether an unconditional or conditional performance model is employed. In other words, active fixed income funds would appear comparable to an index fund before costs. Furthermore, conditional models that account for time variation in fund betas improve the performance of active bond fund managers relative to the traditional evaluation techniques, however performance remains consistent with an efficient market. The study also documents that retail fund flows negatively impact on market timing coefficients when flow is not accounted for in unconditional models. In other words, unconditional models ignoring flow activity may bias performance inferences – specifically, an active manager's market timing ability. In terms of the conditional model, while market timing estimates are improved with the flow variable, statistical significance is absent.

There are a number of avenues that future research in this area may follow. First, additional research is warranted concerning the effects of fund flow on performance. Second, further research should also consider whether other factors have explanatory power in understanding bond fund returns. In particular, attention should be given to the apparent differences in performance between retail and institutionally managed bond funds and the preferences these two market segments exhibit for different types of fixed income securities. Third, an evaluation of active bond funds should also be considered in light of the specific investment strategies adopted by investment managers to determine whether particular groups of managers who emphasise specific strategies delivers a performance advantage to their competitors. An interesting consideration may include an analysis of bond fund strategy across different months of the year. Fourth, a decomposition of the sources of value added or lost from portfolio strategies adopted by fixed interest managers could also provide interesting findings of how these portfolios are managed. Fifth, the extent to which fund managers adjust their fixed income portfolios in anticipation of announcements concerning macroeconomic variables such as inflation and interest rates would also be an interesting area for research. And lastly, future research should consider why active bond funds have been unable to beat passive benchmark indices. Potential explanations may be due to the structure of both the market and the underlying benchmark indices, the degree of market efficiency which exists in the domestic bond market, the transaction costs incurred or size-related issues that may place constraints on active bond fund managers.

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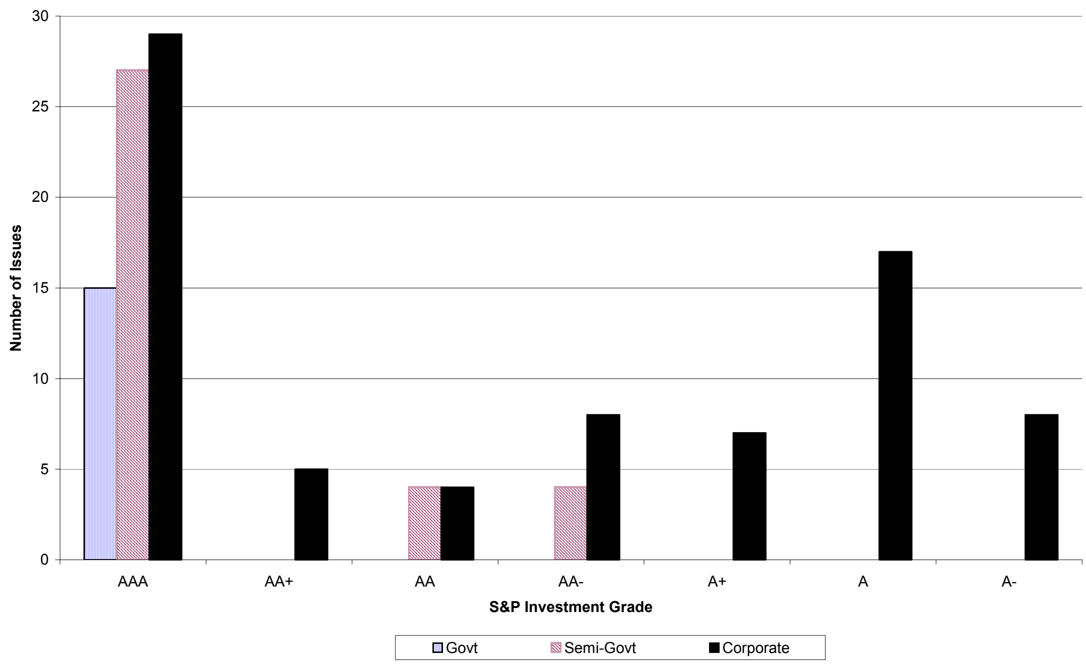
Appendix

Figure A1 - Investment Grade of WDR Composite Bond Index Securities by Issuer

The figure below shows the investment grade of fixed income securities represented by the Warburg Dillon Read Composite Bond Index (WDRCBI). The WDRCBI comprised 128 issues at 30 September 1999, of which 15 securities were CGB, 35 SGB and 78 were corporate issues. All CGB and the majority of SGB had credit ratings of AAA. Only 37 percent of corporate issues had an investment grade of AAA. The second most common S&P rating (A) for corporate bonds accounted for 22 percent of the total corporate fixed income stocks within the WDRCBI.



Source: Warburg Dillon Read

Table A1 – Market Capitalisation of Warburg Dillon Read Australian Bond Indices (Market Value in $A millions)

	Warburg Dillon Read Bond Indices			
Maturity	Composite ($M)	Commonwealth Government ($M)	Semi-Government ($M)	Corporate ($M)
0+YR	151,134	72,901	52,463	25,770
1+YR	138,336	63,499	50,958	23,879
0-3YR	43,657	22,328	13,012	8,317
0-5YR	85,561	38,209	28,521	18,831
3-5YR	41,904	15,881	15,509	10,514
5-7YR	22,261	8,474	9,623	4,163
7-10YR	38,684	22,939	12,969	2,776
5-10YR	60,944	31,413	22,591	6,939
10+YR	4,629	3,279	1,350	0

Source: Warburg Dillon Read

ENDNOTES

[1] Rainmaker Information Services. In correspondence with a number of the managers and William M. Mercer Pty. Ltd., these sources indicated that active bond fund management was the predominant strategy adopted by domestic fixed interest managers.

[2] Sawicki (2000) evaluates the relation between fund flow and past performance, however the focus of the study does not assess the impact of flow on performance. Other international studies evaluating fund flows and performance include Warther (1995), Ferson and Scahdt (1996), Edelen and Warner (1998).

[3] Ferson and Schadt (1996) measure corporate quality variable as the difference between high-yield or low-grade corporate bonds (BAA-rated by Moody's) and AAA rated bonds. Australia does not have an established high-yield market in corporate bonds, therefore the variable is excluded from the analysis. This is also consistent with Sawicki and Ong (2000).

[4] At the beginning of a fund's life, usually within the period of the first six-months, extreme or abnormal fund flows (as a proportion of the fund's total assets) may arise due to significantly rapid asset growth. We omitted fund flows that exceeded 75 percent of a bond fund's asset size to avoid potential bias in the analysis. In all, extreme values only affected 15 funds in the sample group and of these, only around 3% of fund observations required omission.

[5] In addition, this paper also accounts for the potential problem of reverse-causality bias by lagging flow one period. This adjustment accounts for the possibility that fund returns are correlated with flow. The

results were consistent with those presented in Section 4. For further information, see Warther (1995) and Edelen (1999).

[6] Warburg Dillon Read Australia was re-named UBS Warburg Australia in early 2000.

[7] The ASSIRT database reports performance data after investment management expenses but does not account for entry or exit charges in the net return reported.

[8] While William M. Mercer has an outstanding institutional database, there may exist slight possibility that one or more closed/terminated funds have been omitted from the database. While this is extremely unlikely, we cannot say with complete certainty that all non-surviving funds have been accounted for.

[9] The standard deviation of annual expenses at 30 September 1999 was 35 basis points per annum, and the maximum and minimum fees in the sample were 227 and 71 basis points per annum.