The Performances of MBS Mutual Funds and Hedge Funds: Another Puzzle

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Abstract

Mutual funds that target mortgage-backed securities (MBS) as an investment objective have underperformed the Lehman MBS Index by an average of 141 basis points annually from 1992 through 2003. In contrast, MBS hedge funds have outperformed the Lehman MBS Index by an average of 210 basis points per year. This contrast in performance persists even after adjusting for total risk, as measured by Sharpe ratios. It also persists on a market risk-adjusted basis. Using CAPM single-index, market-timing, and various multi-index and multi-factor models, we consistently find that Jensen's alpha is negative and significant for MBS mutual funds, but positive and significant for MBS hedge funds. Extending the study to examine the cross-sectional variation in MBS mutual fund performance, we find that performance is negatively related to the expense ratio and load, but positively related to the turnover ratio.

Keywords: mortgage-backed securities (MBS), mutual funds, hedge funds, and performance

JEL Classifications: G11, G21

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I. Introduction

During the past twenty years, the securitization of residential mortgages has come to dominate the U.S. mortgage market. From 1985 to 2004, the size of all outstanding mortgage-backed securities (MBS) climbed from $370 billion to $5.5 trillion, nearly 15-fold. Currently, at more than 45% of U.S. GDP, the MBS market has become the largest bond sector, surpassing the Treasury and corporate bond markets.

From a borrower's perspective, this mortgage-based, financial innovation has led to a more efficient residential housing market, one marked by lower mortgage rates and greater access to domestic and international capital. From a financial institution's perspective, the securitization of mortgages has allowed for a greater diversification of its assets and has reduced its exposure to interest rate risk. From an investor's viewpoint, MBS has infused liquidity into a fundamentally illiquid mortgage market, leading to lower-risk investment alternatives – mostly guaranteed by federal agencies, such as Ginnie Mae, Fannie Mae, and Freddie Mac – on what would otherwise be non-rated debt.

However, with its ever-evolving, technical securitization features, the MBS market is complex for investors, arguably the most complex of any fixed-income market. As a result, many MBS investors have turned to professionally managed mutual funds and hedge funds. MBS mutual funds typically adopt the long-only investment approach because regulations prohibit their using derivatives or taking short positions. Alternatively, MBS hedge funds commonly use a long-short investment strategy not only to capture the positive spread between MBS and other sectors, but also to hedge exposure to various risks, such as interest rate risk and prepayment risk.

Investor interest in both kinds of funds has been rising. As evidence, the number of MBS mutual funds has increased from 138 in 1992 to 247 in 1995, before settling to 192 by the end of 2003. In contrast, although the minimum investment in MBS hedge funds is about $1.3 million, effectively limiting this group to wealthy individual investors and institutional investors, the number of funds, as reported by the Center for International Securities and Derivatives Markets (CISDM), has risen from 3 in 1992 to 31 by the end of 2003.

Despite rising investor interest and the increasing size of the MBS market, the literature on MBS fund performance contains to date only one direct and insightful study. Gallo, Buttimer, Lockwood, and Rutherford (1997) examine the performance of MBS mutual funds and find that the funds underperform the MBS market index. They attribute the underperformance to incorrect security selection, bad timing, and high fund expenses. However, they had to confine their sample to 31 MBS mutual funds covering January of 1987 through June of 1995, a period that largely predates hedge funds. No one has yet tested if their results hold for a larger set of mutual funds covering a different and more recent period, and no one has extended their study to MBS hedge funds. A related study is by Lin and Yung (2004), who analyze the performance of real estate mutual funds, an area broadly related to MBS funds. Using various CAPM and multi-factor specifications, they do not find evidence of positive abnormal performance.

A number of researchers examine hedge fund performance, but confine their analysis to equities. Some, such as Liang (1999) and Edwards and Caglayan (2001), find excess returns. Others, such as Ackermann, McEnally, and Ravenscraft (1999), Asness, Krail, and Liew (2001), and Fung, Xu, and Yau (2004) do not. However, these hedge fund studies use an equity market benchmark in performance evaluations, offering no direct evidence on the performance of MBS hedge funds. Fung and Hsieh (2002) study the risks in fixed-income hedge fund styles, but they

do not examine the performance of MBS hedge funds. Hellerman (2004) studies the problems that hedge fund managers face when valuing MBS securities, but he does not examine the performance of MBS hedge funds.

As an additional motivation for this study, we find the interesting observation that MBS mutual funds, which include all live and dead funds, have underperformed the Lehman MBS Index by an annual average of 141 basis points from 1992 through 2003. A similar finding holds if we change the benchmark to the Lehman U.S. Aggregate Bond Index, producing a difference of 173 basis points per year. The underperformance, though, is particularly striking when compared to MBS hedge funds: 377 basis points. At the same time, MBS hedge funds have outperformed the Lehman MBS Index annually by an average of 210 basis points.

Because the literature does not recently address the systematic difference in performance between the MBS mutual funds and the MBS market benchmark, and does not address the striking difference in performance between MBS mutual funds and hedge funds, the aim of this study is to fill this void. To do so, we examine the total returns, total risk-adjusted returns, and market risk-adjusted returns of MBS mutual funds and hedge funds. For the total risk-adjusted returns, we use the Sharpe (1966) ratio. For the market risk-adjusted returns, we use CAPM single-index and market-timing models, as found in various studies of mutual funds and hedge funds [e.g., Jensen (1968), Merton (1981), Hendriksson (1984), Lee and Rhaman (1990), Gallo et al. (1997), Fung, Xu, and Yau (2002), and Lin and Yung (2004)], and various multi-index and multi-factor extensions.

The results strongly support our initial observation that MBS hedge funds significantly outperform MBS mutual funds. We extend the analysis to cross-sectional models of mutual fund performance to aid MBS investors who cannot afford the high minimum investment of hedge

funds or do not like the unregulated nature of them. We find that MBS mutual fund performance is negatively related to the expense ratio and load, but positively related to the turnover ratio.

The rest of the paper is organized as follows. Section II presents the models and empirical methodology. Section III discusses the empirical results. Section IV provides the cross-sectional results of MBS mutual fund performance. Section V concludes the paper and discusses the implications of our results for investors.

II. Models

We use six models to examine the market-risk adjusted performance of MBS funds, beginning with the CAPM single-index model. Following Merton (1981), we extend this specification to a market-timing model to separate fund managers' market-timing ability from their security selection skill. A number of researchers have used both specifications in assessing fund performance, including Lee and Rahman (1990), Bollen and Busse (2001), and Fung, Xu, and Yau (2002). These two basic models are as follows:

$$R_{jt} = \alpha_{1j} + \beta_{1j} R_{mt} + \varepsilon_{1jt} \quad (1)$$

$$R_{jt} = \alpha_{2j} + \beta_{21j} R_{mt} + \beta_{22j} (R_{mt} D_t) + \varepsilon_{2jt}, \quad (2)$$

where R_j and R_m, respectively, are excess returns[1] on MBS fund j and the MBS market benchmark. Following Gallo et al. (1997), we measure MBS market benchmark performance using the Lehman MBS Index, the total returns of which we obtain directly from Lehman Brothers.[2] The dummy variable, D, equals -1 during down-market periods (i.e., when $R_m<0$) and

[1] Excess return measures the total return minus the risk free return (the three-month U.S. Treasury bill return).
[2] Their empirical study concludes that the Lehman MBS Index is the most appropriate benchmark for the MBS market. The Lehman MBS Index covers the mortgage pass-throughs of Ginnie Mae, Freddie Mac and Fannie Mae

0 if otherwise. In equation (1), α_1 is the alpha of Jensen (1968) and β_1 is the market beta. In equation (2), α_2 measures a fund manager's security selection skill; β_{21} is the up-market beta; and β_{22} accounts for the fund manager's market timing ability.

We extend the traditional model in two ways. First, we construct two multi-index models to test the sensitivity of MBS funds to long-term and intermediate-term Treasury bonds and to stocks. Gallo et al. (1997) observe that MBS mutual fund holdings often include a small allocation to Treasury bonds. Thus, they suggest the inclusion of long-term and intermediate-term Treasury bond returns as additional variables to explain MBS fund performance. In addition, we observe that some MBS funds invest a small percentage of total assets in stocks, so we include the returns from the S&P 500 as an additional index. The two multi-index models are as follows:

$$R_{jt} = \alpha_{3j} + \beta_{31j} R_{mt} + \beta_{32j} R_{lt} + \beta_{32j} R_{it} + \varepsilon_{3jt} \quad (3)$$

$$R_{jt} = \alpha_{4j} + \beta_{41j} R_{mt} + \beta_{42j} R_{lt} + \beta_{43j} R_{it} + \beta_{44j} R_{st} + \varepsilon_{4jt}. \quad (4)$$

The additional independent variables, R_l, R_i and R_s, represent, respectively, excess returns on the long-term government bond, intermediate-term government bond, and S&P stock index. In each case, we expect the respective coefficients to be positive because the addition of these securities to MBS funds increases their exposure to these asset classes.

Second, we construct two multi-factor models to account for variables reflecting MBS investment risks, such as those that deal with default, liquidity, term structure, interest rate, and prepayment. We include the change in the bond quality premium (BQPD) and the change in the

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fixed-rate mortgage loans. The index excludes buydowns, graduated-payment mortgages (GPMs), project loans, nonagency loans, jumbos, adjustable-rate mortgages (ARMs), Collateralized Mortgage Obligations (CMOs), and commercial mortgage-backed securities (CMBS). The Lehman MBS Index is the most frequently followed and tracked MBS market benchmark in the industry.

bond horizon premium (BHPD), each of which may be an important determinant of MBS returns. The bond quality premium represents the aggregation of credit, liquidity, and call risk premiums, while the bond horizon premium approximates the risk premium of the interest rate term structure. The bond quality premium is computed as the difference between total returns on long-term AAA corporate bonds and long-term Treasury bonds, while the bond term structure premium is computed as the difference between the total returns on long-term Treasury bonds and 30-day Treasury bills. These two premium variables are taken from SBBI of Ibbotson Associates (2004). The extent of the significance of these premium effects depends on the degree to which, if any, the MBS market benchmark index accounts for them. If it does not, then we expect positive coefficients each on BQPD and BHPD.

We also add the change in the thirty-year mortgage rate to reflect the discount rate effect, which accounts for the fact that the current mortgage rate and the present value of the mortgage cash flows are inversely related. Accordingly, we expect a negative coefficient because a lower interest rate implies a higher present value of the cash flows and a higher return on the MBS funds. Associated with the change in the mortgage rate is a dummy variable interaction effect, which is designed to pick up the impact of prepayments. It equals 1 if the weighted average coupon rate of the MBS index mortgage pool is higher than the prevailing 30-year mortgage rate and zero if otherwise (with additional discussion below). The two models are as follows:

$$R_{jt} = \alpha_{5j} + \beta_{51j} R_{mt} + \beta_{52j} BQPD_t + \beta_{53j} BHPD_t + \varepsilon_{5jt} \quad (5)$$

$$R_{jt} = \alpha_{6j} + \beta_{61j} R_{mt} + \beta_{62j} BQPD_t + \beta_{63j} BHPD_t + \beta_{64j} MRD_t + \beta_{65j} PR_t + \varepsilon_{6jt}, \quad (6)$$

where MRD is the change in the 30-year mortgage rate and PR is the dummy variable interaction effect (PR=MRD x C, where C=0,1). If the thirty-year mortgage rate is below the weighted

average coupon rate of the mortgage index pool, then C=1 and PR=MRD. A decrease in prevailing mortgage rates will not only lead to more prepayments but also to a lower return on MBS funds because the prepaid cash flows will have to be reinvested at lower yields. Thus, as long as the prepayment risk premium has not been fully reflected in the MBS market benchmark index, we expect the coefficient of PR to be positive.

III. Empirical Results

Our sample period is from January of 1992 to December of 2003, covering 12 years of monthly data. The Lehman MBS Index and Lehman Aggregate Bond Index are provided directly by Lehman Brothers. The survivorship-free data on mutual funds and hedge funds are obtained, respectively, from CRSP and CISDM databases.[3] Data on the bond quality premium, the bond horizon premium, and the S&P 500 returns are taken from SBBI of Ibbotson Associates (2004). Mortgage rates are obtained from the Federal Reserve Board.

To identify the MBS mutual funds, we first select all mutual funds that target MBS as an investment objective, whether rates are adjustable or fixed. Adjustable-rate MBS mutual funds (GMA) invest primarily in MBS created from pools of adjustable-rate mortgages, while fixed-rate MBS funds (GMB) invest principally in MBS created from pools of fixed-rate mortgages.[4]

To identify the MBS hedge funds, we select the funds that have the strategy of "Fixed Income: Mortgage-backed." They may invest in mortgage-backed securities, including government agency, government-sponsored enterprise, private-label fixed-rate or adjustable-rate

[3] While mutual funds are subject to the SEC reporting and disclosure requirements, hedge funds are not required to report their returns and characteristics. Hence, there is a potential reporting bias associated with the CISDM hedge fund database.

[4] Since most MBS are the securitized products on fixed-rate mortgage pools, the GMB funds are the most typical type of MBS mutual funds. For the empirical results in this paper, we present separate results for GMA, GMB, and the two combined. However, the attention should be focused on the GMB funds.

mortgage pass-through securities, fixed-rate or adjustable-rate collateralized mortgage obligations, real estate mortgage investment conduits, and stripped mortgage-backed securities.

Initially, we identify 404 MBS mutual funds and 46 hedge funds. Table 1 provides a detailed statistical summary of their characteristics, providing a major motivation for this study, as seen in Panel A. For the MBS mutual funds, we find that the average monthly excess return, or the return minus the risk-free return, as shown in the third column, averaged 0.104%. By comparison, the MBS hedge fund excess returns averaged 0.413%. As shown in the last column, this translates to a difference of -0.309%, or -3.77% per year, between the returns on MBS mutual funds and hedge funds. Compared to the Lehman MBS Index and Aggregate Bond Index, the MBS hedge funds fared much better than the mutual funds, beating each index, respectively, by 0.173% and 0.134%, or annually by 210 and 162 basis points. As shown in the fourth and fifth columns, the mutual funds significantly underperformed the Lehman indices, respectively, by an average of -0.118% and -0.145%.

As displayed in Panel B, which contains the results for the live MBS funds as of December of 2003, the same conclusions hold, and even more strongly in the case of the MBS hedge funds. We see that they significantly outperformed the Lehman MBS Index, beating it on a monthly basis by 0.396%. By contrast, even all live mutual funds were unable to beat either Lehman index, underperforming the Lehman MBS Index by -0.089%.

To further examine the performance of MBS funds, following Elton, Gruber, and Blake (1996), we narrow the sample to funds with at least 36 months of data. This leads to a final sample of 274 MBS mutual funds and 34 MBS hedge funds. Among the 274 MBS mutual funds included in the sample, 68 are with adjustable rates (GMA funds) and 206 are with fixed rates

(GMB funds). Table 2 provides a cross-sectional distribution of descriptive statistics of these MBS funds.

The 274 MBS mutual funds are in Panel A and the 34 MBS hedge funds are in Panel B. For both MBS mutual funds and hedge funds, we compute the mean fund return ("Mean Fund Return"), the standard deviation ("Standard Deviation of Fund Return"), the mean fund excess return ("Mean Fund Excess Return over Risk-Free Return"), the mean fund excess return over the Lehman MBS Index ("Mean Fund Excess Return over LB MBS Index Return"), the mean fund excess return over the Lehman Aggregate Bond Index ("Mean Fund Excess Return over LB Aggregate Bond Index Return"), and the Sharpe Ratio ("Sharpe Ratio of Fund Return").

As illustrated in Table 2, the distribution supports the observations from Table 1, showing, for example, that the mutual fund excess returns trail those of the Lehman indices. The distribution also shows that the monthly MBS hedge fund average excess return significantly exceeds that of the mutual fund excess return, 0.460% versus 0.095%. It also shows that the hedge fund excess return exceeds those of the Lehman indices.

Although the hedge fund total return has a higher mean, it has also has a higher standard deviation, or total risk. At 0.425 and 0.256, however, the respective hedge fund mean and median Sharpe (1966) ratios significantly exceed 0.125 and 0.141, the respective mean and median mutual fund Sharpe ratios. Thus, the gain in hedge fund return more than offsets the increase in risk. This supports the observation that hedge fund performance is superior to mutual fund performance even on a total risk-adjusted basis.

A. Performance Estimates from Two Basic CAPM Models

Table 3 provides the cross-sectional distribution of the regression results for equations (1) and (2), the CAPM single-index and market-timing models, for the MBS funds with at least 36 months of data. Panel A includes all live and dead funds, while Panel B includes live funds only. In addition to the mean and median of the coefficient estimates, we provide the first and third quartiles (i.e., "Q1" and "Q3"), the standard errors, and the respective *t* ratios of the coefficients. The last four columns indicate the number of funds that have positive and negative coefficient estimates (N+ and N-), including the numbers that have significant estimates at the 5% level ($N+^{*}$ and $N-^{*}$). The results are divided into four categories: MBS hedge funds, MBS mutual funds, MBS mutual funds specializing in adjustable-rate mortgages (GMA), and MBS mutual funds based on fixed-rate mortgages (GMB).

In Panel A, for both models, a noticeable difference exists in the average adjusted R^2. In equation (1), it is 3.9% for the hedge funds and 74.1% for all mutual funds. In particular, the GMB, or fixed-rate MBS mutual funds, register an adjusted R^2 of 86.2%, suggesting that fund managers of GMBs closely track the Lehman MBS Index, similar to what would be expected from a passively managed fund. The Jensen's alphas are even more interesting. They range from a positive and significant 0.370% for the hedge funds to a negative and significant -0.144% for the GMA funds, suggesting that MBS hedge fund managers display superior security selection skill. As additional support, as shown in the "$N+^{*}$" column, 17 of the hedge funds, exactly half, display positive and significant Jensen's alphas at the 5% level. However, 238 of the 274 mutual funds have negative alphas, and 175 are negative and statistically significant at the 5% level, suggesting that only a small percentage of MBS mutual fund managers have security selection skill. The same conclusions, with alphas of similar size, hold in the case of equation (2), although

the lower *t* values and the smaller number of statistically significant results suggest somewhat less confidence in them.

For equation (1), the estimated beta, at 1.035, and the associated large *t* value, of 29.92, indicate that fluctuations in the GMB, or fixed-rate, MBS funds move in tandem with the Lehman MBS Index. For the GMA, or adjustable-rate, MBS funds, the significant beta is much lower, reflecting the fact that the Lehman MBS Index excludes adjustable-rate mortgages. In the case of the MBS hedge funds, the beta is insignificant, suggesting a dynamic, market-neutral strategy on the part of hedge fund managers.[5]

The market timing indicator, formulated in equation (2) to account for the difference in the up-market and down-market beta, is shown at the bottom of Panel A. Not only are the estimated coefficients small, but very few are significant, showing that MBS fund managers are neither good nor bad market-timers. This suggests that MBS mutual fund and hedge fund managers either do not try systematically to time the MBS market or are unsuccessful in doing so. These results are different from those obtained in studies of equity-based mutual funds and hedge funds, which typically display significantly negative market-timing performance [e.g., Lee and Rahman (1990), Bollen and Busse (2001), and Fung, Xu, and Yau (2002)].

We find the same observations to hold in the case of Panel B, which contains only the live funds. The adjusted R^2 in equation (1) varies from 5.5% to 87.4% and Jensen's alphas range from -0.080 to 0.416, with 13 of the 25 hedge funds having positive and statistically significant

[5] Following Fung, Xu and Leung (2004), we also use the higher-moment-adjusted CAPM of Rubinstein (1976) and Leland (1999), which relaxes the normality (and thus symmetric) assumption in fund returns, to test the robustness of the results from equation (1). The non-normality of the hedge fund returns does not appear to materially change the size or the significance of the Jensen's alpha and beta estimates, and our conclusion remains robust regardless of the assumption on fund return distributions. These results are available upon request.

alphas. In both equations, the betas are of similar size and significance as in Panel A, and in equation (2), the coefficients on the market timing variable are insignificant.

B. Performance Estimates from the Two Multi-index Models

Table 4 illustrates the cross-sectional distribution of results from equation (3), the multi-index model, which includes returns on long-term government bonds (maturity of twenty years) and intermediate-term government bonds (maturity of five years), as taken from SBBI of Ibbotson and Associates (2004). They incorporate the observation that some MBS mutual funds and hedge funds have a small percentage allocated to government bonds. Overall, the results are somewhat stronger than those from the single-index model. For example, in Panel A, the adjusted R^2 ranges from 11.4% to 90.1%, higher than those in Table 3. We also find a relatively large, positive, and significant alpha, at 0.354%, for the hedge funds, with 19 of the 34 funds having positive and statistically significant alphas at the 5% level, as compared to 17 in Table 1. In addition, the alphas are negative and significant for the mutual funds, with 163 of the 274 funds registering negative and significant alphas.

Several additional results are noteworthy. First, the MBS market beta is significant for each category of funds, suggesting that even hedge funds have significant co-movement with the MBS market index after adjusting for government bond returns. Second, returns on the GMB, or fixed-rate, MBS mutual funds display a positive and significant relationship with the long-term government bond return, and a positive and marginally significant relationship with the intermediate-term government bond return. This result is consistent with that of Gallo et al. (1997). Third, MBS hedge funds display a weak negative relationship with the intermediate bond return. Although the mean coefficient is insignificant at the 5% level, 15 of the 34 funds register

negative and statistically significant coefficients at this level, suggesting that some hedge fund managers may have successfully employed a short position in Treasury futures to neutralize the interest rate risk.

Panel B contains the results from equation (4), which extends equation (3) by testing for a stock market effect, since some funds are known to hold a small percentage of total assets in stocks. The results are similar to those in Table 3. The stock market effect is insignificant, though, with only a relatively small number of funds registering significant results. The return on the stock market appears to have no significant impact on MBS fund performance.

Panel C displays the estimates from equations (3) and (4) for live funds only. They resemble the results in Panels A and B. Once again, we find positive and significant alphas for the hedge funds and negative and significant alphas for the mutual funds. The MBS market betas are statistically significant and the long-term government bond beta, although small at 0.054 for the GMB funds and 0.044 for all mutual funds, is significant at the 5% level. As before, the intermediate bond beta is insignificant in all cases, as is the stock market beta.

C. Performance Estimates from Two Multi-factor Models

We now turn to the multi-factor model results, equations (5) and (6). Table 5, Panel A, illustrates the results for equation (5). In addition to the estimates for the market index, it contains the results for the changes in bond quality (BQPD) and bond horizon premiums (BHPD). As in the previous results, the alpha value of 0.394% for the hedge funds is sizable and significant, with 18 of the 34 MBS hedge funds having significant and positive alphas at the 5% level. The alpha values are negative and significant for the mutual funds. The MBS market betas resemble those from the single-index model in size and significance. The beta is insignificant for

the hedge funds but significant for the mutual funds, indicating the long-short nature of hedge funds and the long-only nature of mutual funds. We also find that most of the coefficients are not significant for the bond quality and bond horizon premium variables. Thus, the effects of these variables appear to have been fully incorporated into the Lehman MBS Index, as suggested by Xu and Fung (2005).[6]

Panel B contains the results from equation (6), which includes the change in the thirty-year mortgage rate (MRD) and the prepayment effect (PR). The results on the change in the thirty-year mortgage rate are negative and significant for the GMB mutual funds. Lower mortgage rates act as a discount factor that improves the returns on fixed-rate MBS securities, and hence the GMB mutual funds. The long-short nature of MBS hedge funds and the adjustable-rate focus of the GMA mutual funds account for the insignificant MRD coefficients for the other two groups. In addition, most of the coefficients are insignificant with respect to the prepayment effect, suggesting that this factor is adequately captured by the Lehman MBS index.

Panel C presents the results for the live funds only, which are largely consistent with those of Panels A and B. For example, with respect to equation (5), we find a large and significant alpha for the hedge funds, a significant beta for all but the hedge funds, and insignificant results for the bond quality and bond horizon premiums. For equation (6), we find, once again, a negative discount rate effect for the GMB mutual funds.

IV. Cross-Sectional Analysis of MBS Mutual Fund Performance

To identify the drivers of performance in the cross-sectional analysis of MBS fund performance, we initially deal with both MBS mutual funds and hedge funds at an aggregate

[6] Although not reported in the results, we included an additional credit risk spread factor, as measured by the change in *BAA to AAA credit spread*, in the multi-factor model of equation (5), but did not find that it added significant explanatory power. These results are available upon request.

level and at a disaggregated one. Using the aggregate approach, in which we combine the MBS hedge funds and mutual funds into one cross-sectional analysis, we encounter two nearly insurmountable problems at this time: the large difference in the number of MBS mutual funds (273) relative to MBS hedge funds (23) with complete fund characteristic data, and the different structure and strategies of hedge funds relative to mutual funds (e.g., the higher leverage and smaller size of hedge funds). Using the disaggregated approach, we perform a cross-sectional analysis on each set of funds (i.e., one set for MBS mutual funds and another set for MBS hedge funds). However, we find that the small sample size and the lack of variation in fund characteristics across the MBS hedge funds significantly limit the explanatory power of the model, and to the extent that we cannot be confident that the hedge fund cross-sectional analysis can offer any insights into identifying the performance drivers. Alternatively, we are much more confident that our MBS mutual fund cross-sectional analysis provides some insight into the identification of the performance drivers and gives some needed direction to investors and researchers.

In addition, although the evidence demonstrates that MBS hedge funds substantially outperform MBS mutual funds, whether in terms of total returns, total risk-adjusted returns, or market risk-adjusted returns, many investors do not consider hedge funds to be an alternative investment for three reasons. First, hedge funds generally require a minimum investment of at least $1 million, well beyond the net worth of many investors. Second, hedge funds are unregulated private limited partnerships that have poor transparency and weak disclosures even for investors who can afford them. Third, the far fewer number of MBS hedge funds compared to MBS mutual funds limits the choice for investors. Thus, many investors end up having to select from among the many MBS mutual funds available. However, it is unclear which

selection criteria they should use, which is an additional motivation for the cross-sectional analysis.

The cross-sectional analysis uses performance measures that are adjusted for total risk, as measured by the Sharpe ratio, and those that are adjusted for market risk, as measured by the Jensen's alphas from the six regression models. The MBS mutual fund characteristic variables that are used to explain fund performance are asset size, expense, age, load, and turnover. Table 6 contains the cross-sectional descriptive statistics of these variables. The average asset size is $365 million. The average expense ratio, which is the mean percentage of the total investment paid for operating expenses, is 1.111%. The average load, or the average of all maximum front, back, deferred, and redemption fees, is 2.323%. The average age of the funds since their inception is three years. The average turnover ratio, which represents the minimum of total purchases and total sales of securities divided by the total net assets, is 1.633%.

Table 7 illustrates the cross-sectional variation in performance for MBS mutual funds based on asset size, expense ratio, load, age, and turnover. At this level, the results suggest that larger size, lower expense ratio, lower load, older age, and higher turnover are associated with better performance, as measured by Jensen's alpha.

Table 8, Panel A, displays the cross-sectional regression results for all MBS mutual funds on fund characteristics. We compute the *t* ratios using the heteroskedasticity-consistent variance-covariance estimator of White (1980). Overall, the results suggest that MBS mutual fund performance is negatively related to the expense ratio and load, but positively related to the turnover ratio. As expected, the expense ratio and load effects each are consistently negative for all measures of MBS mutual fund performance. For example, our results indicate that a 1% reduction in the expense ratio would increase Jensen's alpha from 0.078% to 0.089% on a

monthly basis (i.e., from 0.936% to 1.068% on an annual basis). These results are consistent with those of Gallo et al. (1997), who conclude that the expense ratio is an important determinant of MBS mutual fund performance.

In contrast to the expense ratio and load coefficients, we find that the turnover ratio has a positive impact on all MBS mutual performance indicators. This result is consistent with that of Wermers (2000), who finds that high-turnover equity mutual funds outperformed the Vanguard 500 Index Fund and concludes that active management adds value.

Panel B provides the results for the GMA funds, or those that invest in adjustable-rate mortgage pools. Interestingly, with respect to the Jensen's alphas, the adjusted R^2 for each of the six cross-sectional regressions is higher than for all the MBS mutual funds taken together, but load is the only variable with a consistently significant coefficient. As expected, it has a negative impact on fund performance. The Sharpe ratio is negatively influenced by both the expense ratio and load.

Panel C contains the results for the GMB funds, or those that invest in fixed-rate mortgage pools. Several results are noteworthy. Across the regressions, the adjusted R^2 is consistently higher than those in Panels A and B. The expense ratio has the most coefficients with significant results, followed by turnover. In all cases, the signs are as expected. The Sharpe ratio is influenced by more variables than the case of the Jensen's alphas. The expense ratio, load, and age each have negative and significant coefficients.

Panel D illustrates the results for live mutual funds only. The results resemble those in Panel C, the GMB results. The adjusted R^2 for three of the regressions exceeds 40%, the highest among all results. The expense ratio has the most coefficients with significant results, followed

by turnover and asset size. The Sharpe ratio is influenced by the most variables; in this case, the expense ratio, age, and turnover.

V. Conclusions

During the past twenty years, the securitization of residential mortgages has come to dominate the U.S. mortgage market. From 1985 to 2004, the size of all outstanding mortgage-backed securities (MBS) climbed from $370 billion to $5.5 trillion, nearly 15-fold. A sharp increase in the number of mutual funds and hedge funds that specialize in MBS has accompanied this growth. However, the literature does not address the relative performances of these funds. To fill this void, we examine the total returns, total risk-adjusted returns, and market risk-adjusted returns of MBS mutual funds and hedge funds.

Using survivorship-free data on both groups of MBS funds, we find that MBS mutual funds consistently underperform the Lehman MBS Index. From 1992 through 2003, the gap is 141 basis points per year and 377 basis points with respect to MBS hedge funds. Moreover, MBS hedge funds have outperformed the Lehman's MBS index annually by an average of 210 basis points. This contrast in performance persists even after adjusting for total risk, as measured by Sharpe ratios. It also persists on a market risk-adjusted basis. Using CAPM single-index, market-timing, and various multi-index and multi-factor models, we consistently find that Jensen's alpha is negative and significant for MBS mutual funds. However, we find it to be positive and significant for MBS hedge funds, which is evidence of managerial skill, Our results also indicate that MBS mutual fund returns closely track the Lehman MBS Index but hedge fund returns do not, consistent with the long-only nature of mutual fund investing and the long-short nature of hedge fund investing. Extending the analysis to explain the cross-sectional variation in MBS

mutual fund performance, we find that performance is negatively related to the expense ratio and load, but positively related to the turnover ratio.

These findings have several implications. First, the difference in performance between MBS mutual funds and hedge funds is striking. MBS hedge funds substantially outperform MBS mutual funds, whether in terms of total returns, total risk-adjusted returns, or market risk-adjusted returns. Thus, MBS investors are more likely to beat standard MBS benchmarks with MBS hedge funds than mutual funds.

Second, on the basis of the market betas and negative Jensen's alphas, it appears that active MBS mutual fund managers closely track the Lehman MBS Index, not unlike that found in passive management. As a result, and because of the fee structure inherent in mutual funds, investors should not expect to outperform the Lehman MBS Index, a finding the supports the work of Gallo et al. (1997). By contrast, hedge fund performance appears to be only weakly related to MBS market movements, suggesting a dynamic, market-neutralizing strategy on the part of hedge fund managers, which is additional evidence of managerial skill.

Third, the persistent outperformance of MBS hedge funds relative to MBS mutual funds and the MBS market benchmark documented by this study points to an important direction for future research. To effectively address the reasons behind this puzzle, details are needed on the asset allocation (among, for example, MBS pass-throughs, different types of CMOs, and different ratings of commercial MBS) and dynamic investment/trading strategies employed by the MBS hedge funds. This remains a challenge given the nontransparent and private nature of the hedge fund industry.

Finally, although the evidence on MBS fund performance implies that the first choice of MBS investors should be MBS hedge funds, many investors may still prefer MBS mutual funds.

This is because MBS hedge funds lack transparency, are unregulated, are fewer in number, and have high minimum investment requirements. The results from our cross-sectional analysis suggest that MBS mutual fund investors should choose funds with lower expense ratios, lower loads, and greater active management.

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Table 1. Comparison of MBS Mutual Funds and Hedge Funds: Monthly Returns for All Live and Dead Funds, 1992-2003

Results for 46 MBS hedge funds and 404 MBS mutual funds, with excess return over the risk-free return, the Lehman MBS index return, and the Lehman Aggregate Bond index return.

Panel A: All MBS Funds

Year	# of Mutual Funds	Mutual Fund Return – Risk Free Return (%)	Mutual Fund Return - Lehman MBS Index Return (%)	Mutual Fund Return - Lehman Aggregate Bond Index Return (%)	# of Hedge Funds	Hedge Fund Return – Risk Free Return (%)	Hedge Fund Return - Lehman MBS Index Return (%)	Hedge Fund Return - Lehman Aggregate Bond Index Return (%)	Mutual Fund Return - Hedge Fund Return (%)
1992	138	0.181	-0.109	-0.154	3	-0.200	-0.580	-0.654	0.381
1993	190	0.196	-0.084	-0.298	3	0.463	0.164	-0.063	-0.266
1994	216	-0.607	-0.126	-0.019	5	0.375	0.794	0.890	-0.983
1995	247	0.470	-0.364	-0.482	9	0.691	-0.106	-0.246	-0.220
1996	227	-0.087	-0.089	0.049	16	1.542	1.471	1.579	-1.629
1997	212	0.214	-0.112	-0.125	24	0.553	0.205	0.175	-0.340
1998	206	0.070	-0.084	-0.220	32	-0.961	-1.116	-1.264	1.031
1999	198	-0.340	-0.098	0.126	34	0.666	0.908	1.126	-1.006
2000	191	0.275	-0.106	-0.141	31	-0.185	-0.564	-0.602	0.460
2001	191	0.310	-0.071	-0.091	32	1.091	0.709	0.687	-0.781
2002	172	0.492	-0.077	-0.197	32	0.713	0.141	0.019	-0.220
2003	192	0.077	-0.092	-0.184	31	0.211	0.045	-0.040	-0.134
Mean		0.104	-0.118	-0.145		0.413	0.173	0.134	-0.309
Median		0.189	-0.095	-0.147		0.508	0.153	-0.011	-0.243

Panel B: Live MBS Funds (as of December of 2003)

Year	# of Mutual Funds	Mutual Fund Return – Risk Free Return (%)	Mutual Fund Return - Lehman MBS Index Return (%)	Mutual Fund Return - Lehman Aggregate Bond Index Return (%)	# of Hedge Funds	Hedge Fund Return – Risk Free Return (%)	Hedge Fund Return - Lehman MBS Index Return (%)	Hedge Fund Return - Lehman Aggregate Bond Index Return (%)	Mutual Fund Return- Hedge Fund Return (%)
1992	60	0.198	-0.092	-0.137					
1993	80	0.238	-0.046	-0.261					
1994	91	-0.555	-0.075	0.033					
1995	104	0.661	-0.163	-0.286	4	1.303	0.597	0.410	-0.641
1996	116	-0.074	-0.089	0.045	10	1.998	1.902	2.000	-2.073
1997	118	0.241	-0.086	-0.101	10	0.863	0.535	0.520	-0.622
1998	130	0.087	-0.066	-0.205	17	-0.944	-1.098	-1.251	1.031
1999	136	-0.342	-0.098	0.123	22	0.679	0.927	1.137	-1.021
2000	144	0.285	-0.105	-0.139	23	-0.082	-0.477	-0.512	0.367
2001	160	0.306	-0.067	-0.086	27	1.206	0.830	0.808	-0.899
2002	159	0.486	-0.082	-0.202	29	0.865	0.298	0.176	-0.380
2003	183	0.078	-0.093	-0.183	30	0.213	0.048	-0.037	-0.135
Mean		0.134	-0.089	-0.117		0.678	0.396	0.361	-0.486
Median		0.218	-0.087	-0.138		0.863	0.535	0.410	-0.622

Table 2. Cross-sectional Distribution of Descriptive Statistics of MBS Funds with at Least 36 Months of Data

For each MBS fund, we compute the Mean Fund Return, Standard Deviation of Fund Return, Mean Fund Excess Return over Risk Free Return, Standard Deviation of Fund Excess Return over Risk Free Return, Mean Fund Excess Return over Lehman MBS Index Return, and Mean Fund Excess Return over Lehman Aggregate Bond Index Return, and Sharpe Ratio of Fund Return (calculated as the mean fund excess return divided by the standard deviation of fund return). Table 2 reports the cross-sectional distributions of these performance statistics for the 274 MBS mutual funds and 34 MBS hedge funds that have at least 36 months of data.

	Mean Fund Return (%)	Standard Deviation of Fund Return (%)	Excess Return: Mean Fund Return over Risk Free Return (%)	Mean Fund Excess Return over LB MBS Index Return (%)	Mean Fund Excess Return over LB Aggregate Bond Index Return (%)	Sharpe Ratio of Fund Return
Panel A. MBS mutual funds with at least of 36 months of data (274 funds)						
Mean	0.443	0.862	0.095	-0.133	-0.159	0.125
Median	0.473	0.870	0.117	-0.102	-0.127	0.141
Maximum	1.085	3.352	0.722	0.450	0.431	0.846
Minimum	-1.216	0.187	-1.557	-1.763	-1.824	-0.480
Std Dev	0.206	0.421	0.216	0.195	0.198	0.195
Std Error	0.012	0.025	0.013	0.012	0.012	0.012
Panel B. MBS hedge funds with at least of 36 months of data (34 funds)						
Mean	0.788	2.146	0.460	0.211	0.187	0.425
Median	0.741	1.484	0.427	0.183	0.170	0.256
Maximum	2.093	7.486	1.792	1.561	1.535	1.535
Minimum	-0.023	0.441	-0.445	-0.532	-0.518	-0.065
Std Dev	0.398	1.797	0.405	0.397	0.398	0.420
Std Error	0.068	0.308	0.069	0.068	0.068	0.072

Table 3. Cross-sectional Distribution of Risk-adjusted Performance Estimates: CAPM Single-index and Market Timing Models

$$R_{jt} = \alpha_{1j} + \beta_{1j} R_{mt} + \varepsilon_{1jt} \quad (1)$$

$$R_{jt} = \alpha_{2j} + \beta_{21j} R_{mt} + \beta_{22j} (R_{mt} D_t) + \varepsilon_{2jt}, \quad (2)$$

where R_j and R_m respectively are excess returns on MBS fund j and the Lehman MBS Index. D=-1 when $R_m<0$ and 0 if otherwise. Excess return measures the total return minus the risk free return. In equation (1), α_1 is the alpha of Jensen (1968) and β_1 is the market beta. In equation (2), α_2 measures security selection skills; β_{21} measures the up-market beta; and β_{22} accounts for market-timing ability.

Presented in the table below is the cross-sectional distribution for the parameter estimates for models (1) and (2). N+ (N+*) reports the number of funds with positive (positive and significant at the 5% level) parameter estimates, while N- (N-*) reports the number of funds with negative (negative and significant at the 5% level) parameter estimates.

Panel A. All MBS funds with at least 36 months of data, equations (1) and (2)

			Coefficient					*t* Ratio					
Para-meter	Group (# of Funds)	Adj. R^2 (%)	Mean	Std Error	Q1	Median	Q3	Mean	Median	N+	N+*	N-	N-*
Alpha (α_1)	Hedge Funds (34)	3.9	0.370	0.070	0.070	0.343	0.583	2.88	2.03	30	(17)	4	(0)
	GMA Mutual Funds (68)	37.4	-0.144	0.051	-0.148	-0.062	-0.007	-1.68	-2.01	16	(6)	52	(35)
	GMB Mutual Funds (206)	86.2	-0.089	0.014	-0.142	-0.085	-0.048	-2.81	-2.76	20	(5)	186	(140)
	All Mutual Funds (274)	74.1	-0.103	0.028	-0.144	-0.079	-0.039	-2.53	-2.53	36	(11)	238	(175)
MBS Market Beta (β)	Hedge Funds (34)		0.402	0.115	0.052	0.216	0.512	1.40	1.02	27	(7)	7	(0)
	GMA Mutual Funds (68)		0.228	0.018	0.175	0.242	0.301	7.03	6.89	64	(63)	4	(0)
	GMB Mutual Funds (206)		1.035	0.014	0.954	1.025	1.109	29.92	29.08	206	(205)	0	(0)
	All Mutual Funds (274)		0.835	0.024	0.452	0.972	1.085	24.24	24.06	270	(268)	4	(0)
Select-ivity Index (α_2)	Hedge Funds (34)	2.9	0.342	0.061	0.088	0.266	0.483	1.65	1.49	33	(8)	1	(0)
	GMA Mutual Funds (68)	37.5	-0.172	0.037	-0.206	-0.098	-0.016	-1.59	-1.78	14	(2)	54	(31)
	GMB Mutual Funds (206)	86.3	-0.082	0.006	-0.132	-0.076	-0.029	-1.61	-1.50	27	(2)	179	(76)
	All Mutual Funds (274)	74.2	-0.104	0.011	-0.147	-0.082	-0.029	-1.60	-1.52	41	(4)	233	(107)
Up-market Beta (β_{21})	Hedge Funds (34)		0.439	0.113	0.080	0.316	0.489	0.94	0.59	29	(5)	5	(0)
	GMA Mutual Funds (68)		0.266	0.020	0.214	0.251	0.320	4.58	4.51	65	(56)	3	(0)
	GMB Mutual Funds (206)		1.026	0.013	0.942	1.009	1.114	17.18	16.44	206	(205)	0	(0)
	All Mutual Funds (274)		0.837	0.023	0.505	0.966	1.086	14.05	13.41	271	(261)	3	(0)
Market Timing Indica-tor (β_{22})	Hedge Funds (34)		0.099	0.087	-0.111	0.058	0.437	0.18	0.05	19	(0)	15	(0)
	GMA Mutual Funds (68)		0.081	0.021	0.015	0.077	0.139	0.65	0.56	55	(5)	13	(0)
	GMB Mutual Funds (206)		-0.021	0.019	-0.127	-0.013	0.088	-0.22	-0.13	94	(9)	112	(25)
	All Mutual Funds (274)		0.004	0.015	-0.103	0.016	0.106	0.00	0.12	149	(14)	125	(25)

Panel B. Live MBS funds with at least 36 months of data, equations (1) and (2)

Parameter	Group (# of Funds)	Adj. R^2 (%)	Coefficient					*t* Ratio					
			Mean	Std Error	Q1	Median	Q3	Mean	Median	N+	N+*	N-	N-*
Alpha (α_1)	Hedge Funds (24)	5.5	0.416	0.071	0.070	0.371	0.586	2.60	2.18	22	(13)	2	(0)
	GMA Mutual Funds (28)	45.0	-0.018	0.011	-0.050	-0.023	0.028	-0.76	-0.99	10	(6)	15	(9)
	GMB Mutual Funds (135)	87.4	-0.080	0.014	-0.134	-0.078	-0.033	-2.76	-2.94	16	(5)	119	(91)
	All Mutual Funds (160)	80.8	-0.070	0.015	-0.123	-0.065	-0.024	-2.45	-2.52	26	(11)	134	(100)
MBS Market Beta (β_1)	Hedge Funds (24)		0.470	0.145	0.129	0.311	0.526	1.83	1.05	21	(7)	3	(0)
	GMA Mutual Funds (28)		0.242	0.018	0.184	0.233	0.275	9.66	9.57	25	(25)	0	(0)
	GMB Mutual Funds (135)		1.042	0.015	0.957	1.026	1.109	32.24	31.08	135	(135)	0	(0)
	All Mutual Funds (160)		0.917	0.026	0.878	0.996	1.101	28.71	27.65	160	(160)	0	(0)
Select-ivity Index (α_2)	Hedge Funds (24)	4.7	0.379	0.075	0.097	0.299	0.488	1.42	1.49	24	(5)	0	(0)
	GMA Mutual Funds (28)	45.1	-0.040	0.016	-0.088	-0.040	0.024	-1.18	-1.35	9	(1)	16	(9)
	GMB Mutual Funds (135)	87.5	-0.065	0.007	-0.112	-0.063	-0.024	-1.48	-1.35	21	(2)	114	(45)
	All Mutual Funds (160)	80.9	-0.061	0.006	-0.110	-0.059	-0.019	-1.44	-1.35	30	(3)	130	(54)
Up-market Beta (β_{21})	Hedge Funds (24)		0.522	0.143	0.125	0.347	0.498	1.24	0.71	23	(5)	1	(0)
	GMA Mutual Funds (28)		0.272	0.021	0.215	0.249	0.310	6.29	6.45	25	(24)	0	(0)
	GMB Mutual Funds (135)		1.022	0.013	0.951	1.008	1.097	18.41	17.69	135	(135)	0	(0)
	All Mutual Funds (160)		0.905	0.025	0.897	0.987	1.085	16.52	16.03	160	(159)	0	(0)
Market Timing Indica-tor (β_{22})	Hedge Funds (24)		0.124	0.071	-0.141	0.086	0.411	0.24	0.05	14	(0)	10	(0)
	GMA Mutual Funds (28)		0.065	0.015	0.028	0.084	0.124	0.87	0.87	22	(1)	3	(0)
	GMB Mutual Funds (135)		-0.046	0.018	-0.152	-0.026	0.070	-0.34	-0.28	59	(4)	76	(20)
	All Mutual Funds (160)		-0.029	0.015	-0.115	0.005	0.088	-0.15	0.06	81	(5)	79	(20)

Table 4. Cross-sectional Distribution of Risk-adjusted Performance Estimates: Two Multi-index Models

$$R_{jt} = \alpha_{3j} + \beta_{31j} R_{mt} + \beta_{32j} R_{lt} + \beta_{32j} R_{it} + \varepsilon_{3jt} \quad (3)$$

$$R_{jt} = \alpha_{4j} + \beta_{41j} R_{mt} + \beta_{42j} R_{lt} + \beta_{43j} R_{it} + \beta_{44j} R_{st} + \varepsilon_{4jt}. \quad (4)$$

R_j, R_m, R_l, R_i, and R_s, respectively, are excess returns on the MBS fund j, the Lehman MBS bond index, the long-term government bond, intermediate-term government bond, and S&P stock index.

Presented in the table below is the cross-sectional distribution for the parameter estimates for models (3) and (4). N+ (N+*) reports the number of funds with positive (positive and significant at the 5% level) parameter estimates, while N- (N-*) reports the number of funds with negative (negative and significant at the 5% level) parameter estimates.

Panel A. All funds with at least 36 months of data, equation (3)

Para-meter	Group (# of Funds)	Adj. R^2 (%)	Coefficient					*t* Ratio					
			Mean	Std Error	Q1	Median	Q3	Mean	Median	N+	N+*	N-	N-*
Alpha (α_3)	Hedge Funds (34)	11.4	0.354	0.067	0.074	0.332	0.580	2.76	2.10	30	(19)	4	(0)
	GMA MFs (68)	39.2	-0.127	0.032	-0.139	-0.055	-0.010	-1.51	-1.80	16	(6)	52	(33)
	GMB MFs (206)	90.1	-0.074	0.005	-0.129	-0.072	-0.036	-2.87	-2.87	25	(5)	181	(130)
	All MFs (274)	77.4	-0.087	0.009	-0.129	-0.067	-0.031	-2.53	-2.51	41	(11)	233	(163)
MBS Market Beta (β_{31})	Hedge Funds (34)		1.283	0.357	0.144	0.577	1.478	2.03	1.58	29	(12)	5	(1)
	GMA MFs (68)		0.139	0.034	0.129	0.181	0.252	2.83	2.76	60	(46)	8	(0)
	GMB MFs (206)		0.779	0.019	0.602	0.850	0.935	14.66	13.56	205	(201)	1	(0)
	All MFs (274)		0.620	0.023	0.294	0.738	0.909	11.73	10.75	265	(247)	9	(0)
LT Gov Bond Beta (β_{32})	Hedge Funds (34)		0.009	0.112	-0.026	0.039	0.181	0.44	0.42	22	(6)	12	(1)
	GMA MFs (68)		-0.071	0.020	-0.044	-0.020	-0.004	-0.81	-0.81	13	(0)	55	(8)
	GMB MFs (206)		0.062	0.006	0.016	0.042	0.085	2.55	2.10	178	(108)	28	(1)
	All MFs (274)		0.029	0.008	-0.009	0.024	0.067	1.71	1.23	191	(108)	83	(9)
IT Gov Bond Beta (β_{33})	Hedge Funds (34)		-0.661	0.145	-1.551	-0.420	0.070	-1.46	-1.30	10	(3)	24	(15)
	GMA MFs (68)		0.199	0.050	0.025	0.079	0.180	1.30	1.39	58	(25)	10	(1)
	GMB MFs (206)		0.082	0.013	-0.006	0.063	0.179	1.63	1.23	147	(83)	59	(14)
	All MFs (274)		0.111	0.016	-0.001	0.068	0.179	1.55	1.28	205	(108)	69	(15)

Panel B. All funds with at least 36 months of data, equation (4)

Para-meter	Group (# of Funds)	Adj. R^2 (%)	Coefficient					*t* Ratio					
			Mean	Std Error	Q1	Median	Q3	Mean	Median	N+	N+*	N-	N-*
Alpha (α_4)	Hedge Funds (34)	11.8	0.366	0.068	0.094	0.343	0.579	2.78	2.34	32	(19)	2	(0)
	GMA MFs (68)	39.3	-0.134	0.034	-0.130	-0.051	-0.011	-1.38	-1.74	14	(6)	54	(28)
	GMB MFs (206)	90.2	-0.075	0.006	-0.129	-0.073	-0.036	-2.84	-2.82	24	(6)	182	(128)
	All MFs (274)	77.6	-0.090	0.010	-0.129	-0.068	-0.029	-2.48	-2.42	38	(12)	236	(156)
MBS Market Beta (β_{41})	Hedge Funds (34)		1.336	0.352	0.132	0.594	1.915	2.08	1.72	29	(15)	5	(1)
	GMA MFs (68)		0.128	0.040	0.112	0.200	0.252	2.81	2.79	60	(47)	8	(0)
	GMB MFs (206)		0.774	0.018	0.601	0.841	0.928	14.33	13.52	204	(200)	2	(0)
	All MFs (274)		0.614	0.024	0.290	0.742	0.906	11.47	10.51	264	(247)	10	(0)
LT Gov Bond Beta (β_{42})	Hedge Funds (34)		0.017	0.112	-0.024	0.035	0.174	0.48	0.42	24	(6)	10	(1)
	GMA MFs (68)		-0.072	0.022	-0.046	-0.019	-0.007	-0.81	-0.79	12	(0)	56	(7)
	GMB MFs (206)		0.063	0.006	0.017	0.043	0.085	2.57	2.11	179	(107)	27	(2)
	All MFs (274)		0.030	0.008	-0.009	0.024	0.067	1.73	1.30	191	(107)	83	(9)
IT Gov Bond Beta (β_{43})	Hedge Funds (34)		-0.729	0.153	-1.570	-0.438	0.065	-1.58	-1.20	9	(3)	25	(15)
	GMA MFs (68)		0.195	0.053	0.024	0.060	0.180	1.22	1.19	56	(23)	12	(1)
	GMB MFs (206)		0.083	0.012	-0.002	0.058	0.169	1.57	1.22	153	(76)	53	(12)
	All MFs (274)		0.111	0.016	0.006	0.059	0.173	1.49	1.22	209	(99)	65	(13)
Stock Market Beta (β_{44})	Hedge Funds (34)		-0.027	0.013	-0.033	-0.014	0.008	-0.52	-0.54	11	(0)	23	(5)
	GMA MFs (68)		0.009	0.005	-0.010	-0.004	0.005	-0.42	-0.44	25	(0)	43	(5)
	GMB MFs (206)		0.000	0.002	-0.008	-0.002	0.004	-0.21	-0.20	85	(11)	121	(24)
	All MFs (274)		0.002	0.002	-0.009	-0.002	0.004	-0.26	-0.26	110	(11)	164	(29)

Panel C. Live funds with at least 36 months of data, equations (3) and (4)

Para-meter	Group (# of Funds)	Adj. R^2 (%)	Coefficient					*t* Ratio					
			Mean	Std Error	Q1	Median	Q3	Mean	Median	N+	N+*	N-	N-*
Alpha (α_3)	Hedge Funds (24)	10.8	0.397	0.082	0.095	0.354	0.581	2.54	2.23	22	(15)	2	(0)
	GMA MFs (28)	46.7	-0.014	0.013	-0.049	-0.019	0.031	-0.72	-0.84	10	(6)	15	(8)
	GMB MFs (135)	90.8	-0.062	0.007	-0.113	-0.062	-0.026	-2.78	-2.87	20	(5)	115	(81)
	All MFs (160)	83.9	-0.055	0.006	-0.106	-0.055	-0.017	-2.46	-2.46	30	(11)	130	(89)
MBS Market Beta (β_{31})	Hedge Funds (24)		1.072	0.364	0.179	0.519	1.158	2.01	1.45	21	(6)	3	(1)
	GMA MFs (28)		0.196	0.016	0.154	0.189	0.234	4.21	3.93	25	(22)	0	(0)
	GMB MFs (135)		0.819	0.019	0.672	0.874	0.954	16.71	18.00	135	(135)	0	(0)
	All MFs (160)		0.722	0.024	0.490	0.833	0.939	14.76	13.76	160	(157)	0	(0)
LT Gov Bond Beta (β_{32})	Hedge Funds (24)		0.118	0.071	-0.046	0.021	0.468	0.51	0.31	15	(5)	9	(0)
	GMA MFs (28)		-0.013	0.003	-0.022	-0.014	-0.005	-0.63	-0.61	3	(0)	22	(1)
	GMB MFs (135)		0.054	0.006	0.015	0.040	0.081	2.74	2.16	116	(71)	19	(1)
	All MFs (160)		0.043	0.005	-0.001	0.025	0.068	2.21	1.50	119	(71)	41	(2)
IT Gov Bond Beta (β_{33})	Hedge Funds (24)		-0.646	0.169	-1.565	-0.230	0.061	-1.24	-1.18	7	(3)	17	(10)
	GMA MFs (28)		0.058	0.015	0.013	0.053	0.092	1.45	1.52	22	(9)	3	(1)
	GMB MFs (135)		0.065	0.012	-0.009	0.043	0.159	1.51	0.92	93	(55)	42	(10)
	All MFs (160)		0.063	0.010	-0.003	0.044	0.150	1.50	1.01	115	(64)	45	(11)
Alpha (α_4)	Hedge Funds (24)	11.2	0.418	0.082	0.111	0.366	0.580	2.59	2.41	24	(15)	0	(0)
	GMA MFs (28)	47.3	-0.010	0.012	-0.047	-0.017	0.032	-0.51	-0.72	10	(6)	15	(7)
	GMB MFs (135)	91.0	-0.062	0.007	-0.112	-0.063	-0.026	-2.78	-3.00	20	(6)	115	(83)
	All MFs (160)	84.1	-0.053	0.006	-0.103	-0.055	-0.016	-2.42	-2.39	30	(12)	130	(90)
MBS Market Beta (β_{41})	Hedge Funds (24)		1.169	0.363	0.196	0.528	1.409	2.11	1.67	21	(8)	3	(0)
	GMA MFs (28)		0.207	0.016	0.175	0.215	0.244	4.32	4.24	25	(22)	0	(0)
	GMB MFs (135)		0.819	0.018	0.675	0.878	0.953	16.34	17.66	135	(135)	0	(0)
	All MFs (160)		0.723	0.024	0.533	0.822	0.928	14.46	13.73	160	(157)	0	(0)
LT Gov Bond Beta (β_{42})	Hedge Funds (24)		0.126	0.073	-0.048	0.021	0.478	0.57	0.30	15	(5)	9	(0)
	GMA MFs (28)		-0.013	0.003	-0.021	-0.014	-0.006	-0.62	-0.75	4	(0)	21	(1)
	GMB MFs (135)		0.054	0.006	0.015	0.040	0.079	2.77	2.16	117	(70)	18	(1)
	All MFs (160)		0.044	0.005	0.000	0.028	0.068	2.24	1.58	121	(70)	39	(2)
IT Gov Bond Beta (β_{43})	Hedge Funds (24)		-0.757	0.189	-1.712	-0.258	0.012	-1.44	-1.19	6	(3)	18	(10)
	GMA MFs (28)		0.051	0.015	0.016	0.042	0.074	1.27	1.04	21	(7)	4	(1)
	GMB MFs (135)		0.063	0.011	-0.004	0.046	0.148	1.44	1.05	98	(49)	37	(10)
	All MFs (160)		0.061	0.010	-0.001	0.044	0.141	1.41	1.04	119	(56)	41	(11)
Stock Market Beta (β_{44})	Hedge Funds (24)		-0.050	0.014	-0.111	-0.018	-0.004	-0.81	-0.60	5	(0)	19	(5)
	GMA MFs (28)		-0.006	0.001	-0.010	-0.007	-0.004	-1.03	-1.21	6	(0)	19	(5)
	GMB MFs (135)		-0.001	0.001	-0.006	0.000	0.005	-0.15	-0.11	64	(7)	71	(17)
	All MFs (160)		-0.002	0.001	-0.007	-0.002	0.004	-0.29	-0.26	70	(7)	90	(22)

Table 5. Cross-sectional Distribution of Risk-adjusted Performance Estimates: Two Multi-factor Models

$$R_{jt} = \alpha_{5j} + \beta_{51j} R_{mt} + \beta_{52j} BQPD_t + \beta_{53j} BHPD_t + \varepsilon_{5jt} \quad (5)$$

$$R_{jt} = \alpha_{6j} + \beta_{61j} R_{mt} + \beta_{62j} BQPD_t + \beta_{63j} BHPD_t + \beta_{64j} MRD_t + \beta_{65j} PR_t + \varepsilon_{6jt}, \quad (6)$$

where R_j and R_m, respectively, are excess returns on MBS fund j and the Lehman MBS Index, BQPD is the change in bond quality premium, BHPD is the change in bond horizon premium, MRD is the change in the 30-year mortgage rate, and PR is a prepayment propensity indicator, which measures the interaction of the change in mortgage rate with a dummy variable that equals 1 if the weighted average coupon rate of the MBS Index mortgage pool is higher than the prevailing 30-year mortgage rate.

Presented in the table below is the cross-sectional distribution for the parameter estimates for models (5) and (6). N+ (N+*) reports the number of funds with positive (positive and significant at the 5% level) parameter estimates, while N- (N-*) reports the number of funds with negative (negative and significant at the 5% level) parameter estimates.

Panel A. All funds with at least 36 months of data, equation (5)

Para-meter	Group (# of Funds)	Adj. R^2 (%)	Coefficient					*t* Ratio					
			Mean	Std Error	Q1	Median	Q3	Mean	Median	N+	N+*	N-	N-*
Alpha (α_5)	Hedge Funds (34)	4.4	0.394	0.066	0.137	0.349	0.581	2.90	2.16	33	(18)	1	(0)
	GMA MFs (68)	38.0	-0.144	0.036	-0.152	-0.065	-0.006	-1.72	-1.97	17	(6)	51	(34)
	GMB MFs (206)	87.0	-0.081	0.006	-0.137	-0.078	-0.041	-2.61	-2.62	25	(5)	181	(133)
	All MFs (274)	74.8	-0.097	0.010	-0.140	-0.075	-0.036	-2.39	-2.37	232	(167)	24	(13)
MBS Market Beta (β_{51})	Hedge Funds (34)		0.329	0.150	-0.038	0.062	0.232	1.01	0.26	24	(6)	10	(0)
	GMA MFs (68)		0.232	0.021	0.182	0.246	0.308	6.29	6.22	63	(63)	5	(0)
	GMB MFs (206)		1.003	0.014	0.933	0.994	1.073	25.25	24.18	206	(205)	0	(0)
	All MFs (274)		0.812	0.023	0.457	0.959	1.047	20.54	20.38	5	(0)	19	(6)
BQPD (β_{52})	Hedge Funds (34)		0.122	0.039	-0.022	0.099	0.291	0.38	0.51	22	(0)	12	(2)
	GMA MFs (68)		-0.030	0.018	-0.099	-0.034	-0.015	-0.94	-0.98	10	(1)	58	(9)
	GMB MFs (206)		-0.027	0.006	-0.044	-0.016	0.002	-0.54	-0.54	60	(2)	146	(24)
	All MFs (274)		-0.028	0.006	-0.055	-0.022	0.000	-0.64	-0.62	204	(33)	15	(0)
BHPD (β_{53})	Hedge Funds (34)		0.045	0.033	-0.014	0.025	0.226	0.39	0.35	22	(3)	12	(2)
	GMA MFs (68)		-0.007	0.006	-0.027	-0.010	-0.001	-0.66	-0.72	14	(2)	54	(5)
	GMB MFs (206)		0.011	0.002	0.001	0.009	0.021	0.86	0.91	157	(41)	49	(4)
	All MFs (274)		0.006	0.002	-0.007	0.006	0.018	0.48	0.46	103	(9)	14	(3)

Panel B. All funds with at least 36 months of data, equation (6)

Parameter	Group (# of Funds)	Adj. R^2 (%)	Coefficient					*t* Ratio					
			Mean	Std Error	Q1	Median	Q3	Mean	Median	N+	N+*	N-	N-*
Alpha (α_6)	Hedge Funds (34)	4.6	0.424	0.065	0.208	0.415	0.658	2.88	2.16	33	(19)	1	(0)
	GMA MFs (68)	39.4	-0.137	0.037	-0.133	-0.053	-0.004	-1.49	-1.62	15	(6)	53	(28)
	GMB MFs (206)	88.6	-0.071	0.006	-0.124	-0.074	-0.032	-2.50	-2.61	28	(5)	178	(122)
	All MFs (274)	76.4	-0.088	0.010	-0.124	-0.073	-0.026	-2.25	-2.28	43	(11)	231	(150)
MBS Market Beta (β_{61})	Hedge Funds (34)		0.377	0.211	-0.088	0.099	0.230	0.65	0.37	20	(3)	14	(0)
	GMA MFs (68)		0.171	0.023	0.145	0.210	0.267	3.55	3.78	63	(52)	5	(0)
	GMB MFs (206)		0.877	0.017	0.815	0.919	0.988	17.17	16.64	205	(203)	1	(0)
	All MFs (274)		0.702	0.023	0.341	0.874	0.961	13.79	13.18	268	(255)	6	(0)
BQPD (β_{62})	Hedge Funds (34)		0.122	0.038	-0.014	0.109	0.303	0.43	0.44	23	(2)	11	(2)
	GMA MFs (68)		0.004	0.024	-0.058	-0.028	0.001	-0.54	-0.55	18	(2)	50	(5)
	GMB MFs (206)		-0.004	0.006	-0.028	-0.003	0.011	-0.20	-0.12	87	(3)	119	(11)
	All MFs (274)		-0.002	0.007	-0.036	-0.008	0.010	-0.28	-0.27	105	(5)	169	(16)
BHPD (β_{62})	Hedge Funds (34)		0.040	0.047	-0.002	0.035	0.209	0.45	0.79	24	(1)	10	(1)
	GMA MFs (68)		0.014	0.009	-0.011	0.003	0.018	0.19	0.17	39	(4)	29	(0)
	GMB MFs (206)		0.037	0.004	0.012	0.026	0.046	1.96	1.90	181	(101)	25	(0)
	All MFs (274)		0.031	0.004	0.003	0.021	0.041	1.52	1.49	220	(105)	54	(0)
MRD (β_{64})	Hedge Funds (34)		-0.006	0.411	-0.660	-0.131	0.384	-0.22	-0.17	12	(0)	22	(2)
	GMA MFs (68)		-0.306	0.067	-0.457	-0.246	-0.059	-1.17	-1.07	12	(0)	56	(19)
	GMB MFs (206)		-0.547	0.055	-0.721	-0.399	-0.154	-1.90	-1.95	23	(1)	183	(102)
	All MFs (274)		-0.487	0.045	-0.648	-0.345	-0.132	-1.72	-1.80	35	(1)	239	(121)
PR (β_{65})	Hedge Funds (34)		2.243	1.089	-0.833	0.393	2.144	0.46	0.23	22	(5)	12	(0)
	GMA MFs (68)		0.036	0.078	-0.259	-0.002	0.335	0.19	-0.01	34	(3)	34	(1)
	GMB MFs (206)		-0.379	0.069	-0.859	-0.301	0.071	-1.17	-0.98	61	(6)	145	(62)
	All MFs (274)		-0.276	0.057	-0.657	-0.174	0.141	-0.83	-0.58	95	(9)	179	(63)

Panel C. Live funds with at least 36 months of data, equations (5) and (6)

Parameter	Group (# of Funds)	Adj. R^2 (%)	Coefficient					*t* Ratio					
			Mean	Std Error	Q1	Median	Q3	Mean	Median	N+	N+*	N-	N-*
Alpha (α_5)	Hedge Funds (24)	6.2	0.436	0.077	0.151	0.349	0.582	2.60	2.32	24	(13)	0	(0)
	GMA MFs (28)	45.1	-0.017	0.013	-0.052	-0.025	0.023	-0.77	-1.08	11	(6)	14	(8)
	GMB MFs (135)	88.3	-0.071	0.007	-0.119	-0.072	-0.031	-2.53	-2.70	19	(5)	116	(87)
	All MFs (160)	81.5	-0.063	0.007	-0.111	-0.063	-0.018	-2.25	-2.26	30	(11)	130	(95)
MBS Market Beta (β_{51})	Hedge Funds (24)		0.380	0.167	0.011	0.104	0.263	1.40	0.37	19	(6)	5	(0)
	GMA MFs (28)		0.242	0.017	0.183	0.215	0.280	8.32	8.43	25	(25)	0	(0)
	GMB MFs (135)		1.006	0.014	0.943	0.990	1.069	27.27	26.22	135	(135)	0	(0)
	All MFs (160)		0.887	0.025	0.848	0.974	1.057	24.31	23.07	160	(160)	0	(0)
BQPD (β_{52})	Hedge Funds (24)		0.084	0.044	-0.060	0.044	0.288	0.28	0.42	15	(0)	9	(2)
	GMA MFs (28)		-0.019	0.004	-0.033	-0.025	-0.008	-0.91	-1.09	4	(0)	21	(3)
	GMB MFs (135)		-0.021	0.004	-0.036	-0.012	0.002	-0.57	-0.55	40	(2)	95	(17)
	All MFs (160)		-0.021	0.004	-0.035	-0.014	0.002	-0.63	-0.61	44	(2)	116	(20)
BHPD (β_{53})	Hedge Funds (24)		0.045	0.032	-0.019	0.007	0.204	0.27	0.25	14	(3)	10	(2)
	GMA MFs (28)		-0.003	0.002	-0.009	-0.004	0.000	-0.37	-0.38	6	(2)	19	(1)
	GMB MFs (135)		0.012	0.003	0.002	0.010	0.020	1.09	1.13	109	(39)	26	(3)
	All MFs (160)		0.010	0.002	-0.001	0.009	0.018	0.86	0.92	115	(41)	45	(4)
Alpha (α_6)	Hedge Funds (24)	5.3	0.454	0.072	0.220	0.360	0.648	2.57	2.18	24	(14)	0	(0)
	GMA MFs (28)	46.6	-0.013	0.013	-0.048	-0.016	0.022	-0.55	-0.41	9	(6)	16	(4)
	GMB MFs (135)	89.6	-0.064	0.008	-0.114	-0.070	-0.022	-2.44	-2.63	21	(5)	114	(78)
	All MFs (160)	82.9	-0.056	0.007	-0.109	-0.058	-0.012	-2.15	-2.08	30	(11)	130	(82)
MBS Market Beta (β_{61})	Hedge Funds (24)		0.345	0.194	-0.077	0.119	0.232	0.85	0.45	15	(2)	9	(0)
	GMA MFs (28)		0.205	0.016	0.160	0.205	0.242	4.95	4.94	25	(24)	0	(0)
	GMB MFs (135)		0.909	0.013	0.859	0.937	1.004	18.89	18.56	135	(134)	0	(0)
	All MFs (160)		0.799	0.023	0.717	0.914	0.988	16.71	15.85	160	(158)	0	(0)
BQPD (β_{62})	Hedge Funds (24)		0.089	0.045	-0.043	0.063	0.299	0.34	0.47	16	(1)	8	(2)
	GMA MFs (28)		-0.010	0.005	-0.030	-0.015	0.002	-0.61	-0.70	8	(0)	17	(2)
	GMB MFs (135)		-0.012	0.003	-0.027	-0.005	0.010	-0.37	-0.24	49	(2)	86	(11)
	All MFs (160)		-0.012	0.003	-0.027	-0.008	0.010	-0.41	-0.38	57	(2)	103	(13)
BHPD (β_{62})	Hedge Funds (24)		0.053	0.033	-0.009	0.035	0.198	0.39	0.79	16	(0)	8	(0)
	GMA MFs (28)		0.006	0.002	-0.001	0.007	0.014	0.52	0.40	18	(3)	7	(0)
	GMB MFs (135)		0.028	0.003	0.007	0.023	0.041	2.03	2.01	116	(71)	19	(0)
	All MFs (160)		0.025	0.003	0.005	0.020	0.035	1.79	1.83	134	(74)	26	(0)
MRD (β_{64})	Hedge Funds (24)		-0.286	0.258	-0.499	-0.131	0.384	-0.30	-0.10	9	(0)	15	(2)
	GMA MFs (28)		-0.193	0.043	-0.321	-0.249	-0.025	-1.38	-1.72	5	(0)	20	(9)
	GMB MFs (135)		-0.420	0.041	-0.655	-0.307	-0.109	-1.74	-1.85	17	(0)	118	(60)
	All MFs (160)		-0.385	0.036	-0.581	-0.291	-0.101	-1.68	-1.79	22	(0)	138	(69)
PR (β_{65})	Hedge Funds (24)		0.729	0.844	-1.435	0.278	1.423	0.31	0.14	15	(3)	9	(0)
	GMA MFs (28)		-0.034	0.070	-0.221	-0.048	0.175	0.03	-0.23	11	(0)	14	(1)
	GMB MFs (135)		-0.390	0.073	-0.803	-0.226	0.041	-1.24	-0.94	36	(4)	99	(43)
	All MFs (160)		-0.334	0.063	-0.630	-0.203	0.067	-1.04	-0.77	47	(4)	113	(44)

Table 6. Cross-sectional Descriptive Statistics of MBS Mutual Fund Characteristics
Mutual fund characteristics include annual average of fund characteristic variables, including asset size, expense ratio (i.e., percentage of the total investment that shareholders pay for the mutual fund's operating expenses), age of the fund (i.e., number of years since the fund's inception), load (i.e., total of maximum front-end, back-end, deferred, and redemption fees as a percentage of the investment), and the turnover ratio (i.e., minimum of aggregate purchases of securities and aggregate sales of securities divided by the average total net assets). The t-statistics in parentheses are computed using White's heteroskedasticity-consistent variance-covariance estimator, where "**" indicates significance at the 5% level and "*" indicates significance at the 10% level.

Statistics	Asset Size (million $)	Expense Ratio (%)	Total Load (%)	Fund Age (years)	Turnover Ratio (%)
Observations[b]	273	273	274	274	273
Mean	365.553	1.111	2.323	3.005	1.633
Median	68.885	0.974	2.400	2.500	1.253
Maximum	11422.270	2.816	6.221	14.154	9.992
Minimum	0.002	0.097	0.000	0.333	0.032
Std Dev	1155.132	0.507	1.967	1.850	1.453
Std Error	69.912	0.031	0.119	0.112	0.088

[a] Annual Data on the characteristics of MBS mutual funds are averaged for each fund during the sample period. The above table presents the cross-sectional distribution of these averages.

[b] Number of funds in our sample that have available data for the listed mutual fund characteristics.

Table 7. Cross-sectional Variation in MBS Mutual Fund Performance based on Fund Characteristics

The performance indicator is a MBS mutual fund's Jensen's alpha from equation (1), measured in percent. The MBS mutual fund sample is split into two groups, depending on whether a fund's characteristic (such as asset size, expense ratio, fund age, load, and the turnover ratio) is above or below the sample median. The cross-sectional average of the funds' Jensen's alpha for each group with different fund characteristics is presented in the table below. The fund characteristic variables are defined in Table 6.

Fund Characteristic		All MBS Mutual Funds	GMA (Adjustable-Rate) MBS Mutual Funds	GMB (Fixed-Rate) MBS Mutual Funds
Asset Size	Large	**-0.081**	**-0.095**	**-0.077**
	Small	-0.125	-0.184	-0.103
Expense Ratio	High	-0.156	-0.245	-0.131
	Low	**-0.051**	**-0.068**	**-0.044**
Total Load	High	-0.143	-0.254	-0.105
	Low	**-0.062**	**-0.027**	**-0.073**
Fund Age	Old	**-0.085**	**-0.043**	**-0.093**
	Young	-0.119	-0.189	-0.084
Turnover Ratio	High	**-0.091**	**-0.100**	**-0.078**
	Low	-0.114	-0.160	-0.089

Note: Those groups in **Bold** fonts have higher Jensen's alpha.

Table 8. Cross-sectional Regression of MBS Mutual Fund Performance on Fund Characteristics

Estimated coefficients from seven cross-sectional regressions of MBS mutual fund performance indicators on five mutual fund characteristics: Performance Indicators = *f* (Asset Size, Expense ratio, Fund Load, Fund Age, Turnover Ratio). The performance indicators (i.e., dependent variables) are a fund's Sharpe Ratio and Jensen's alphas (alpha 1 through alpha 6) from the six regression models, equation (1) through (6). The independent variables are listed in Table 6. The t-statistics in parentheses are computed using White's heteroskedasticity-consistent variance-covariance estimator, where "**" indicates significance at the 5% level and "*" indicates significance at the 10% level.

Panel A. All MBS Mutual Funds

Performance Indicators	Intercept	Asset Size	Expense Ratio	Fund Load	Fund Age	Turnover Ratio	Adjusted R^2 (%)
Sharpe Ratio	0.252**	9.0E-06**	-0.116**	-0.014**	0.001	0.017**	14.3
	(7.31)	(1.99)	(-4.64)	(-2.37)	(0.18)	(2.70)	
Alpha from model 1 (α_1)	-0.019	5.0E-06	-0.088**	-0.012**	0.007	0.012**	12.2
	(-0.62)	(1.30)	(-3.89)	(-2.01)	(1.51)	(2.25)	
Alpha from model 2 (α_2)	-0.039	4.7E-06	-0.078**	-0.014**	0.009*	0.016**	11.8
	(-1.21)	(1.07)	(-3.23)	(-2.21)	(1.88)	(3.47)	
Alpha from model 3 (α_3)	-0.007	2.9E-06	-0.083**	-0.011**	0.005	0.012**	12.8
	(-0.25)	(0.91)	(-4.14)	(-1.96)	(1.27)	(2.67)	
Alpha from model 4(α_4)	-0.011	3.1E-06	-0.088**	-0.011*	0.006	0.012**	11.2
	(-0.40)	(0.98)	(-3.99)	(-1.91)	(1.37)	(2.37)	
Alpha from model 5 (α_5)	-0.017	4.7E-06	-0.081**	-0.012*	0.006	0.014**	12.3
	(-0.53)	(1.30)	(-3.87)	(-1.92)	(1.41)	(2.78)	
Alpha from model 6 (α_6)	-0.009	4.6E-06	-0.089**	-0.011*	0.007	0.013**	11.2
	(-0.29)	(1.22)	(-3.89)	(-1.74)	(1.48)	(2.52)	

Panel B. GMA (Adjustable-Rate) MBS Mutual Funds

Performance Indicators	Intercept	Asset Size	Expense Ratio	Fund Load	Fund Age	Turnover Ratio	Adjusted R^2 (%)
Sharpe Ratio	0.187**	2.0E-04	-0.188**	-0.045**	0.024	-0.022	43.3
	(2.02)	(1.46)	(-4.05)	(-2.05)	(1.24)	(-1.08)	
Alpha from model 1 (α_1)	-0.052	4.8E-05	-0.076	-0.064**	0.037	0.032	18.5
	(-0.54)	(0.61)	(-0.76)	(-2.18)	(1.51)	(1.09)	
Alpha from model 2 (α_2)	-0.063	7.3E-05	-0.042	-0.071**	0.027	0.014	16.1
	(-0.61)	(0.92)	(-0.40)	(-2.29)	(1.03)	(0.46)	
Alpha from model 3 (α_3)	-0.037	4.0E-05	-0.075	-0.056**	0.033	0.025	18.7
	(-0.43)	(0.58)	(-0.85)	(-2.16)	(1.53)	(0.97)	
Alpha from model 4(α_4)	-0.041	4.8E-05	-0.067	-0.056**	0.034	0.013	15.7
	(-0.46)	(0.67)	(-0.71)	(-2.14)	(1.54)	(0.43)	
Alpha from model 5 (α_5)	-0.056	4.7E-05	-0.073	-0.064**	0.037	0.033	19.0
	(-0.59)	(0.60)	(-0.74)	(-2.24)	(1.52)	(1.14)	
Alpha from model 6 (α_6)	-0.051	4.1E-05	-0.083	-0.063**	0.039	0.039	18.7
	(-0.51)	(0.53)	(-0.83)	(-2.14)	(1.55)	(1.31)	

Panel C. GMB (Fixed-Rate) MBS Mutual Funds

Performance Indicators	Intercept	Asset Size	Expense Ratio	Fund Load	Fund Age	Turnover Ratio	Adjusted R^2 (%)
Sharpe Ratio	0.351**	1.0E-07	-0.102**	-0.007*	-0.016**	0.007	27.4
	(13.47)	(0.04)	(-5.72)	(-1.79)	(-3.53)	(1.52)	
Alpha from model 1 (α_1)	0.012	1.3E-06	-0.092**	-0.001	-0.001	0.005	32.5
	(0.68)	(0.85)	(-11.93)	(-0.38)	(-0.52)	(1.21)	
Alpha from model 2 (α_2)	0.007	-9.9E-07	-0.089**	-0.002	0.001	0.010**	33.8
	(0.38)	(-0.31)	(-10.63)	(-0.92)	(0.31)	(3.39)	
Alpha from model 3 (α_3)	0.023	-4.1E-07	-0.087**	-0.001	-0.002	0.007*	31.8
	(1.31)	(-0.31)	(-11.62)	(-0.36)	(-1.10)	(1.82)	
Alpha from model 4(α_4)	0.021	-4.5E-07	-0.085**	-0.001	-0.002	0.007*	29.9
	(1.16)	(-0.33)	(-10.64)	(-0.35)	(-1.03)	(1.80)	
Alpha from model 5 (α_5)	0.021	6.6E-07	-0.095**	0.000	-0.002	0.007*	31.3
	(1.12)	(0.50)	(-13.13)	(-0.12)	(-0.91)	(1.76)	
Alpha from model 6 (α_6)	0.029	7.4E-07	-0.094**	0.000	-0.002	0.005	28.3
	(1.42)	(0.46)	(-11.87)	(0.16)	(-0.84)	(1.35)	

Panel D. Live MBS Mutual Funds

Performance Indicators	Intercept	Asset Size	Expense Ratio	Fund Load	Fund Age	Turnover Ratio	Adjusted R^2 (%)
Sharpe Ratio	0.375**	-1.6E-06	-0.128**	-0.004	-0.014**	0.011**	19.7
	(8.09)	(-0.51)	(-4.26)	(-0.72)	(-2.10)	(2.05)	
Alpha from model 1 (α_1)	0.058**	-9.3E-07	-0.109**	-0.004	-0.003	0.003	40.7
	(2.85)	(-0.55)	(-10.65)	(-1.39)	(-1.01)	(0.85)	
Alpha from model 2 (α_2)	0.033*	-2.5E-06	-0.101**	-0.002	0.000	0.010**	40.6
	(1.86)	(-0.74)	(-10.41)	(-0.61)	(0.00)	(3.61)	
Alpha from model 3 (α_3)	0.066**	-2.9E-06*	-0.104**	-0.003	-0.004	0.005	41.0
	(3.41)	(-1.84)	(-12.02)	(-0.98)	(-1.35)	(1.54)	
Alpha from model 4(α_4)	0.066**	-2.9E-06*	-0.102**	-0.003	-0.004	0.005	39.2
	(3.36)	(-1.81)	(-10.94)	(-1.11)	(-1.34)	(1.45)	
Alpha from model 5 (α_5)	0.062**	-1.4E-06	-0.110**	-0.003	-0.004	0.006*	39.2
	(2.91)	(-0.89)	(-12.24)	(-1.06)	(-1.23)	(1.79)	
Alpha from model 6 (α_6)	0.070**	-1.1E-06	-0.108**	-0.003	-0.004	0.004	33.8
	(3.02)	(-0.63)	(-11.23)	(-0.83)	(-1.25)	(1.10)	