Melbourne Centre for Financial Studies
Academic Research Grant

Is there market timing in the Australian Mutual funds?

Francis In, Professor Accounting and Finance, Monash University

1. Abstract

The ability of return market timing and volatility timing is critical for fund managers and investors. This project will deepen our understanding on return timing ability and volatility timing ability using various Australian mutual funds. Hence, this project will improve future investment decisions involving Australian mutual funds. The results therefore should be of interest to both investors and fund managers.

2. Background and aims of project

Following the works of Treynor and Mazuy (1966) and Henriksson and Merton (1981), many academic efforts have focused on the timing ability of professional portfolio managers.

The models proposed by Treynor and Mazuy (1966) and Henriksson and Merton (1981) show the nonlinear relationship between fund returns and benchmark returns. According to Jagannathan and Korajczyk (1986), this nonlinear relationship results from a dynamic trading effect because certain dynamic trading strategies by mutual funds may give rise to option-like features in fund returns. In addition, generally because both the timing benchmark and strategy are not observable, specification error is likely to be encountered. For instance, typically when evaluating the performance of a portfolio manager who acts according to the Treynor and Mazuy (1966) model, if he/she is evaluated using either Henriksson and Merton (1986) or Jensen models, inferences about fund manager performance and timing aptitude and selectivity ability may be *incorrect*. Thus, this project is designed to overcome those shortcomings. For instance, to examine whether or not the timing ability of the various Australian mutual fund is due to skill of a fund manager or luck, we adopt the nonparametric bootstrap approach.

The methodological advance of this project including the bootstrap analysis would contribute to improve our knowledge in many areas of risk and fund management in Australia. We adopt new Chen and Liang (2006) measures that can address many issues arising in market timing and to test return timing and volatility timing jointly.

Improved investment decisions. Practitioners and academic researchers often face the data-snooping problem in the statistical inference for the mutual fund timing tests. In addition to this characteristic, mutual fund returns possess ability the properties of serial correlation and volatility clustering. The contribution of bootstrap analysis is furthermore to find out and identify whether or not the market timing is real. This project will deepen our understanding of the dependence structure between market and mutual funds for the various Australian mutual fund types. Hence, this project will improve future investment decisions involving mutual funds. The results therefore should be of interest to both investors and fund managers.

3. Significance and innovation

The significance and innovation of this project has *three* contributions. (1) This project is the *first* paper to investigate the ability of return market timing, volatility timing, and joint timing, using the

Australian Mutual fund (general, large blend, large geared, large growth, large value, small blend, small growth, and small value) and CAPM and Fama-French three factor models. (2) We adopt the joint test proposed by Chen and Liang (2006) which allows us to test return timing and volatility timing jointly. This newly proposed test relates fund returns to the squared Sharpe ratio of the market portfolio. (3) By adopting a bootstrap analysis, we distinguish timing skills from luck. Given that fund returns are non-normally distributed, the bootstrap method provides the reliability of our inferences. The existing approaches based on multivariate normal or elliptic distributions are inappropriate for modeling the joint distribution of asset returns such as mutual funds and market returns in a portfolio. Such limitations and shortcomings could lead to incorrect estimates of risks, which in turn could have severe repercussions for the management of investment portfolios.

4. Description of approach

The project approach describes the models we use to test for timing ability including market return timing, volatility timing and joint timing.

Market return timing

Treynor and Mazuy (1966) show that if mangers possess and utilize superior timing ability, the characteristic line will be nonlinear. Therefore Treynor and Mazuy (1966) use a quadratic equation as follows:

$$R_{p,t} = a_p + b_p^{MKT} MKT_t + g_p MKT_t^2 + e_{p,t} \tag{1}$$

where a_p is the measure of selectivity (risk-adjusted return).

b_p^{MKT} is the loading to market excess returns MKT_t and

MKT_t^2 is squared excess returns on the market.

The coefficient g_p measures return timing.

According to the study of Goetzmann et al. (2000), incorporating the Fama-French factors improves the market timing model specifications by reducing measurement bias. Based on this finding, we extend the Treynor and Mazuy (1966) model by including the Fama-French factors such as SMB and HML as follows:

$$R_{p,t} = a_p + b_p^{MKT} MKT_t + g_p MKT_{m,t}^2 + b_p^{SMB} SMB_t + b_p^{HML} HML_t + e_{p,t} \tag{2}$$

Similar to equation (1), the return timing ability is measured by the coefficient g_p. The magnitude of g_p in equation (2) measures the difference between the target betas, and is positive for a manager that successfully times the market.

Market volatility model

As can be seen in equations (1) and (2), a market timer should reduce market exposure when forecasting an increase in market volatility, when we assume that other things are equal. This intuition has been firstly captured by Busse (1999). Thus, volatility timing can be captured as follows:

$$R_{p,t} = a_p + b_p^{MKT} MKT_t + g_p MKT_t (s_{mkt,t} - \overline{s}_{mkt}) + e_{p,t} \tag{3}$$

$$R_{p,t} = a_p + b_p^{MKT} MKT_t + g_p MKT_t (s_{mkt,t} - \bar{s}_{mkt}) + b_p^{SMB} SMB_t + b_p^{HML} HML_t + e_{p,t}$$

(4)

where $s_{mkt,t}$ is market volatility, which is measured by realized volatility.

In this project, we use the realized volatility estimated by EGARCH model. In this specification, a negative value for coefficient g_p indicates successful volatility timing because it indicates decreasing fund beta when the market becomes more volatile.

Joint return and volatility timing

Chen and Liang (2006) propose the market timing measure as follows:

$$R_{p,t} = a_p + b_p^{MKT} MKT_t + g_p \left(\frac{MKT_t}{s_{mkt,t}} \right)^2 + e_{p,t} \quad (5)$$

$$R_{p,t} = a_p + b_p^{MKT} MKT_t + g_p \left(\frac{MKT_t}{s_{mkt,t}} \right)^2 + b_p^{SMB} SMB_t + b_p^{HML} HML_t + e_{p,t} \quad (6)$$

where the coefficient g_p measures the timing ability of a manager who can forecast both the level and volatility of the market portfolio.

The bootstrap approach

There are a number of issues involved in statistical inference for mutual fund timing tests. When there is only one fund, the test for timing ability can be based on the *t*-statistic of the timing measure, $\hat{g}_p$. However, analogous to the data-snooping problem discussed by Lo and Mackinlay (1990) and Sullivan et al. (1999), even if none of them has timing ability, when there are a large number of funds, there will be some funds with significant timing measures based on the *t*-statistics by random chance (Jiang et al., 2007). This can be said as "luck".

To overcome this possibility or to identify whether or not market timing is real, we adopt the bootstrap approach. The bootstrap is a nonparametric method, which allows us to estimate the distribution of an estimator or test statistic by re-sampling one's data or a model estimated from the data. In general, the multivariate Student t-distribution is more preferable to a better characterization of asset returns. To obtain the distribution of $\hat{g}_p$, we re-sample the vector of mutual funds using market returns and estimated residuals. To be more specific, the procedure of using the bootstrap method is as follows (Efron and Tibshirani 1993):

1. Estimate the chosen model for each fund (separately) and save the vectors $\{\hat{a}_p, \hat{b}_p^{MKT}, e_{p,t}\}$ using the equation (1).

$$R_{p,t} = \hat{a}_p + \hat{b}_p^{MKT} MKT_t + g_p MKT_t^2 + e_{p,t} \quad (7)$$

2. For each fund *p*, draw a random sample (with replacement) of length T_p from the residuals $e_{p,t}$. While retaining the original chronological ordering of MKT_t, use these *resampled* bootstrap

residuals $\tilde{e}_{p,t}$, to generate a simulated excess return series $\tilde{R}_{p,t}$ for fund-*p*, under the null hypothesis of no timing ability (i.e. setting g_p = 0):

$$\tilde{R}_{p,t} = \hat{a} + \hat{b}_p^{MKT} MKT_t + 0 \times MKT_t^2 + \tilde{e}_{p,t} \tag{8}$$

As can be seen in equation (8), the 'true' timing ability for fund-*p* is set to zero by construction. This is then repeated for all funds.

3. Using the simulated returns on each fund, we re-estimate the equation (7) to derive $\tilde{g}_p$, which represents sampling variation around a true value of zero by construction and are entirely due to luck. Based on the simulated results, we can now compare any *ex-post* $\hat{g}_p$ with its appropriate 'luck distribution'. Suppose that we are interested in whether or not the timing ability of each fund is due to skill of a fund manager or luck. If estimated $\hat{g}_p$ is greater than the 5% upper tail cut off point from estimated distribution of simulated $\tilde{g}_p$, then we can reject the null hypothesis it timing ability is due to luck at 95% confidence level. However, our bootstrap analysis mainly focuses on the 'luck distribution' for the ***t-statistic*** of $\hat{g}_p$, $t_{\hat{g}_p}$ because it has better statistical properties (see Kosowski et al 2007 and Hall 1992 for further discussion). The intuitive reason for this is straightforward. The idiosyncratic risk of funds with few observations may have high variance and will in consequence tend to generate 'outlier $\hat{g}_p$'. These funds may disproportionately be located in the extreme tails of the bootstrapped $\tilde{g}_p$ distributions leading to a very high variance in their 'luck distribution'. However, $t_{\hat{g}_p}$, scales gamma by its estimated standard error and therefore is independent of the 'nuisance parameter' $s_{e_i}^2$ and has superior statistical properties.

4. Research Plan

This research project is divided into four stages.

Stage one: data compilation and preliminary statistical analysis (January - February 2009)
In this project we use 705 Australian mutual funds, which are categorized as General, Large Blend, Large Geared, Large Growth, Large Value, Small Blend, Small Growth, and Small Value by Morningstar. Furthermore, the sample period ranges from January 1995 to December 2007. In case of the small funds, there are three categories used by Morningstar. There are 40 Small Blend mutual funds, which consist of 31 live and 9 defunct funds. Among Small Growth funds with total number of 22 funds, there are 14 live funds and 8 defunct funds, while there are 11 live funds and 1 defunct fund among Small Value funds.

Stage two: testing the econometric models (March 2009 - June 2009)
This stage discusses the models we use to test for timing ability including market return timing, volatility timing and joint timing. We conduct and report the results of the empirical testings using the CAPM model and the Fama and French three-factor model.

Stage three: simulating *bootstrap analysis* (July 2009 – September 2009)
When we examine the timing ability, there are some issues, which should be considered. Those issues are data-snooping problem, serial correlation and volatility clustering of mutual fund returns. To consider these issues and to identify whether or not the results are real, we adopt the nonparametric bootstrap approach. We report the results from CAPM model and Fama-French three factor model.

Stage four: final stage (October2009 - December2009)
Complete a research paper and presentation of results to Finance Conferences (FMA, CQA) and prepare the submission to referred international financial journals (JFQA or JEF).

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