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Portfolio Preferences and Performance: Evidence from Domestic and Foreign Mutual Funds in Taiwan

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Abstract

We set out in this study to analyze the portfolio preferences of domestic and foreign mutual fund managers in Taiwan and to compare the overall investment performance of their mutual funds. Our empirical findings reveal a greater likelihood for both domestic and foreign mutual fund mangers to invest in larger firms and stocks with higher dividend yields and lower financial leverage, with foreign mutual fund managers also being more likely to invest in high growth stocks. Further analysis of investment allocation weighting decisions reveals that both domestic and foreign mutual fund mangers tend to hold more shares in profitable and small firms. Finally, we find that domestic and foreign mutual funds outperform their benchmarks, indicating either a strong information advantage or superior stock selection ability.

JEL Classification: G11; G15; G23
Keywords: Mutual funds; Domestic investors; Foreign investors; Portfolio preferences;

1. Introduction

We set out in this paper to examine the preferences for various stock characteristics revealed by mutual fund managers within the Taiwanese stock market, and then go on to investigate the investment performance of mutual funds over the 1994-2006 period. Since foreign asset management companies are allowed to acquire domestic investment trust companies in Taiwan, it may be of interest to compare the differences in preferences and investment performance between the mutual funds managed by domestic investment trust companies and those managed by foreign asset management companies.

The availability of the Taiwan Economic Journal (TEJ) Mutual Fund datasets on the net values of portfolio holdings facilitates a firm-level, cross-sectional examination of the ownership of mutual fund holdings. Therefore, in this study, we assess the portfolios of all mutual funds in Taiwan, those managed by domestic investment trust companies (hereafter, domestic mutual funds) and those managed by foreign asset management companies (hereafter, foreign mutual funds). We are also able to calculate the monthly investment returns for each mutual fund, as well as the overall investment performance for the total, domestic and foreign mutual fund portfolios.

Portfolio theory suggests that within a frictionless capital market, investors should aim to diversify their wealth between a domestic market portfolio, a global market portfolio and risk-free assets, which implies that mutual fund managers will either establish domestic market portfolios or hold global market portfolios. In the real world, in their attempts to beat the market or complete the market, most fund managers will tend to justify their active management of index funds by revealing their holding preferences for particular stocks, thereby effectively distinguishing themselves from passively-managed funds. Falkenstein (1996), for example, notes that there is a preference amongst US mutual fund managers for large cap firms with high liquidity, low information asymmetry and low transaction costs. Similarly, Chen, Jegadeesh and Wermers (2000) find that US

mutual fund managers afford greater weight to large cap stocks with superior prior growth and performance.

The prior studies within the extant literature include an examination of the investment allocation choices of actively-managed US mutual funds in 30 emerging markets (Aggarwal, Klapper and Wysocki, 2005) and an analysis of the way in which mutual fund managers from 26 countries allocate their investment between domestic and foreign equity markets, as well as the factors affecting their asset allocation worldwide (Chan, Covrig and Ng, 2005). Both of these studies reveal the existence of the phenomenon of 'home bias' in the allocation of assets in mutual funds.

Furthermore, the empirical evidence from cross-border investment suggests that mutual fund managers tend to hold more shares in markets or stocks which present lower transaction costs and greater information advantages (or fewer information disadvantages), whilst they also tend to avoid markets or stocks which are regarded as 'unfriendly'. The 'home-bias' phenomenon reveals itself not only in cross-border investment, but also in the domestic holdings of mutual funds; indeed, Coval and Moskowitz (1999) reveal that the domestic portfolios of many US mutual funds tend to include more shares in local firms.

An understanding of the holding preferences of mutual fund managers is of benefit to investors when determining their investment decisions. Cohen, Coval and Pastor (2005), for example, argue that performance measures which use information on historical returns and holdings of mutual funds are useful when ranking mutual fund managers, since these performance measures provide information on future fund returns. Levis and Liodakis (1999) and Bauer, Derwall and Molenaar (2004) both demonstrate that style-rotation investment strategies can be extremely profitable, indicating that investors are able to profit from the information on mutual fund asset allocations. Using the available datasets on mutual fund holdings in Taiwan, we are able to examine whether

the holding preferences of domestic mutual fund managers differ from those of foreign mutual fund managers.

A wealth of literature is already available on the evaluation of actively-managed mutual funds. For example, Ippolito (1989), Grinblatt and Titman (1989; 1993) and Chen et al. (2000) all reveal that mutual funds outperform the benchmarks, whilst Coval and Moskowitz (2001) demonstrate that mutual fund managers are able to 'pick the winners' amongst local stocks, although Shu, Chen and Tu (2003) provide contradictory evidence in the Taiwanese stock market. It is, however, clear that the extant literature comprises mainly of evaluations of a single country, with very few studies exploring the questions relating to cross-border investment performance. The only two exceptions, to the best of our knowledge, are Shukla and van Inwegen (1995) and Engstrom (2003), both of which show that when investing in local equity markets, foreign fund managers are generally outperformed by local fund managers.

The precise classification of domestic and foreign mutual funds in the Taiwanese mutual fund industry, combined with the available datasets on fund performance, enables us to compare the performances of domestic and foreign mutual funds and fund managers in Taiwan. Such evaluations of domestic and foreign mutual funds are of particular interest when examining the various hypotheses on information asymmetry between domestic and foreign investors.

Domestic investors may clearly have an advantage over foreign investors in terms of greater knowledge of the local environment or of the domestic firms operating locally; on the other hand, foreigners may have better industry- and global-level information. Thus, foreign investors may possess an information advantage over domestic investors, particularly with regard to those domestic firms which are faced with competition from both home and abroad. Such advantages are also more pronounced for foreign institutional investors, as well as in those cases where the domestic investors are located

in the emerging markets.

The existing literature remains divided as to whether there is an information advantage for domestic or foreign investors. For example, whilst Grinblatt and Keloharju (2000) find that foreigners investing in Finnish stocks are better informed than domestic individuals, Choe, Kho and Stulz (2005) find the opposite to be the case for South Korean stocks. Interestingly, however, Dvorak (2005) demonstrates that despite the fact that domestic individual investors in Indonesian stocks reveal better trading performance over foreign investors, those domestic individual investors who are served by global brokerages demonstrate superior performance, thereby suggesting that local knowledge in conjunction with global and industry information provides improved investment performance.

Foreign mutual funds in Taiwan are managed by foreign asset management companies, with many such companies also having local branches within Taiwan. Although domestic mutual fund managers may have some information advantage over their foreign counterparts on the local environment, foreign fund managers may have global and industry-level information which is not available to domestic mutual fund managers. Thus, an information set comprising of industry and global knowledge combined with local knowledge may provide foreign mutual fund investors in Taiwan with a clear information advantage over local investors in some specific stocks. An evaluation and comparison between the performance of foreign mutual funds and the performance of domestic mutual funds will provide a direct test of the hypothesis that local knowledge in conjunction with global and industry information can produce superior performance.

The empirical results of this study are summarized as follows. Our analysis of the decisions on whether or not to invest in the first place suggests that both domestic and foreign mutual fund managers are more likely to invest in larger firms, as well as stocks

with higher dividend yields and lower financial leverage, whilst foreign mutual fund managers are also more likely to invest in high growth stocks. Further analysis and comparison of the investment allocation weighting decisions reveals that both domestic and foreign mutual fund managers tend to have greater holdings of profitable and small firms. This of course differs from the decision of whether or not to invest in the first place.

We also find that domestic mutual fund mangers have a preference for higher leveraged stocks with high growth opportunities. Finally, our evaluation of mutual fund performance in Taiwan between the years 1994 and 2006 indicates that both domestic and foreign mutual funds outperformed the benchmarks in the Taiwanese stock market, with the overall differences between the performance of domestic and foreign mutual fund portfolios being insignificant.

This study contributes to two strands of the literature, the first of which is the holding preferences of mutual fund managers. To the best of our knowledge, this is the first study of its kind to compare the stock preferences of domestic and foreign mutual fund managers. We also contribute to the ongoing debate within the literature on international investment, as to whether domestic or foreign investors have a long-run information advantage, by examining and comparing the performance of local and foreign mutual fund portfolios.

The remainder of this paper is organized as follows. An introduction to the sample used in our empirical study is provided in Section 2. Section 3 presents our analysis of the preferences of mutual fund managers, followed in Section 4 by presentation of our evaluation of both the domestic and foreign mutual fund portfolios. Finally, the conclusions drawn from this study are presented and summarized in Section 5.

2. Data and Methodology

2.1 Mutual Fund Sample

Taiwan's asset management market was first opened in 1990; immediately after the opening of the market, foreign asset management companies began acquiring local investment trust companies (local asset management companies), opening up local branch offices in Taiwan, and engaging in joint ventures with local banks.[1] This scenario provides us with an excellent opportunity to examine the holding preferences of mutual fund managers, and to compare the investment performance of mutual funds managed by local investment trust companies vis-à-vis those managed by foreign asset management companies.[2]

The data used in the analyses conducted in this study comprises of mutual fund holdings and investment returns, with the data sources being provided by the TEJ Equity, TEJ Finance, TEJ Mutual Fund and TEJ Macro databases. Our sample period runs from January 1994 to December 2006, with our analysis focusing on active portfolio allocation decisions and the subsequent performance of mutual funds in Taiwan. Money market funds, bond funds, balanced funds, specialty equity funds, exchange-traded funds and funds which explicitly follow passive indexing strategies are therefore specifically excluded from the study sample; we also exclude funds for which no holding or performance information is available (i.e., those funds that are not included in TEJ Mutual Fund database).

We use the year 2006 to illustrate our case, a year in which there were 514 mutual funds. We exclude 56 specialty funds, 66 balanced mutual funds, three money-market

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[1] For example, Invesco Ltd set up a local branch office in 1986 and subsequently acquired Chinatrust Investment Trust Company, a local investment asset company. JP Morgan, which had already set up a local branch office in 1985, went on to establish JF Asset Management (Taiwan) Limited, whilst Franklin Templeton Investments set up a joint venture with the First Commercial Bank of Taiwan in 2002, establishing the Franklin Templeton First Taiwan Limited.

[2] In Taiwan, domestic mutual funds are managed by local investment trust companies, whilst foreign mutual funds are managed by foreign asset management companies.

funds, four index or exchange-traded funds, and 263 funds for which holding information is unavailable, thereby providing us with a final sample of 122 mutual funds. All of these 122 funds are actively-managed mutual funds, and of these, 86 funds are domestic mutual funds and 36 are foreign mutual funds.

2.2 Sample Descriptive Statistics

Table 1 reports the descriptive statistics for domestic and foreign mutual funds for the 1994-2006 period. As the table shows, there are fewer foreign mutual funds than domestic mutual funds; for example, in 1994, there were 36 domestic mutual funds but only ten foreign mutual funds, and indeed, the number of domestic mutual funds remains overwhelmingly greater than the number of foreign mutual funds for every year from 1994 to 2006.

<Table 1 is inserted here>

Nevertheless, greater assets are managed by foreign mutual funds than domestic mutual funds. In 1994, the mean (median) net assets managed by foreign mutual funds was NT$5,696 million (NT$7,261 million), whilst the mean (median) for domestic mutual funds was only NT$4,513 million (NT$4,110 million). In contrast to the total number of mutual funds, for every year from 1994 to 2006, the net assets managed by foreign mutual funds were greater than those managed by domestic mutual funds.

The discernible trend in the net assets under management is worth noting, with a dramatic decrease being evident between 1994 and 2000, and a slight reversal in the subsequent years; furthermore, this trend is revealed in both domestic and foreign mutual funds. Details of the proportional domestic and foreign mutual fund investment within each industry in the years 1994, 2000 and 2006 are provided in Table 2, along with their industrial weighting within the Taiwanese stock market. The first column in each of the year panels represents the weighting for a specific industry within the total market value, whilst the second and third columns represent the respective weighting of domestic and

foreign mutual fund investment in that specific industry.

<Table 2 is inserted here>

As Table 2 shows, there were dramatic changes in the industry market value weighting between 1994 and 2006; for example, the electronics industry, which had accounted for only 11.07 percent of the market value in 1994, had risen to 56.87 percent by 2000, and was accounting for the greatest weighting in 2006, at 58.30 percent of the total market value. Conversely, whilst the weighting of the banking industry was 36.47 percent in 1994, the largest at that time, this proportion subsequently fell to just 14.85 percent by 2006.

The preferences of mutual fund managers are also revealed by Table 2. In 1994, domestic (foreign) mutual fund managers invested 33.07 percent (23.75 percent) of their funds in electronics, and 17.43 percent (22.18 percent) in plastics. However, the proportional weights of the total market value for these two industries at that time were just 11.07 percent for electronics and 8.59 percent for plastics, thereby indicating substantial over-investment in these two industries by both domestic and foreign mutual fund mangers. Such over-investment in the electronics industry by domestic (foreign) fund managers was 22 percent (12.68 percent) whilst in the plastics industry, the level of over-investment was 8.84 percent (13.59 percent).

Conversely, Table 2 also reveals that both domestic and foreign mutual fund managers have tended to under-invest within the banking sector; the investment weighting for domestic mutual fund managers was only 10.60 percent (an under-investment of 25.87 percent) whilst the weighting for foreign mutual fund managers was 17.65 percent (an under-investment of 18.82 percent).

The preferences of mutual fund managers have remained constant throughout the period from 2000 and 2006, with the one exception of the steady withdrawal from the plastics industry by both domestic and foreign mutual fund managers. Foreign fund

managers demonstrated a reduction in investment within this particular industry in both 2000 and 2006, whilst domestic mutual fund managers revealed a reduction in investment in 2006, a time when the preferences of the latter shifted slightly towards iron and steel industry stocks.

3. Mutual Fund Ownership and Firm Characteristics

In this section, we examine the correlations between mutual fund ownership and various firm characteristics (the portfolio holdings of the mutual funds are taken from the end of each year). To calculate the percentage ownership of a particular stock by the mutual funds in a particular year, we add up the number of shares held by the mutual funds at the end of that year, and then divide the total shareholding by the number of shares outstanding on that date. This effectively calculates the total, domestic and foreign mutual fund ownership levels. Specifically, the mutual fund ownership for a specific stock in a specific year, $own_{i,t}$, is defined as:

$$own_{i,t} = \sum_{m=1}^{m} \frac{\text{shares owned of stock } i \text{ by fund } m \text{ at the end of year } t}{\text{shares outstanding of stock } i \text{ at the end of year } t} \quad (1)$$

3.1 Static Analysis of Mutual Fund Ownership

Table 3 presents a static analysis comparison between the characteristics of firms with zero mutual fund ownership and those classified in this study as ‘high mutual fund ownership’ (ownership above the median of non-zero mutual fund ownership for that year) with those which we classify as ‘low mutual fund ownership’ (ownership below the median). Panel A reports the results for total mutual fund ownership, whilst panels B and C report the results for domestic and foreign mutual fund ownership.

<Table 3 is inserted here>

As Table 3 shows, portfolios with low mutual fund holdings account for just 0.53 percent of all mutual fund ownership, 0.40 percent of domestic mutual fund ownership and 0.29 percent of foreign mutual fund ownership. Conversely, portfolios with high

mutual fund holdings account for 4.67 percent of all mutual fund ownership, 3.68 percent of domestic mutual fund ownership and 2.22 percent of foreign mutual fund ownership.

As regards firm characteristics, we select several independent variables which may be related to mutual fund ownership: dividend yield (*Div Yield*) is measured as the total cash dividend disbursed by the firm divided by the total market value of the equity at the end of that year; total debt ratio (*Leverage*) is calculated as the total debt divided by the total book value of the assets at the end of the year; return on assets (*ROA*) is the ratio of net income to total assets; and growth opportunities (*MB*), is measured by the market-to-book value. We also select a variable for the total book value of asset (*Assets*), and an ADR dummy variable (*ADR*), which takes the value of 1 if the firm had issued ADRs during that year (either by means of public offering or via Rule 144a), otherwise 0.

We begin by examining the differences between those firms with zero mutual fund ownership and those in the other groups. As compared with zero mutual fund ownership firms, those with mutual fund ownership tend to have lower debt ratios, higher returns on assets, higher growth opportunities and larger asset values (Table 3). Comparisons between the low and zero portfolios, and between the high and zero portfolios, reveal that most of the differences in the abovementioned variables are significantly different from zero, irrespective of whether we examine total mutual fund, domestic mutual fund or foreign mutual fund ownership. For example, the difference in leverage between the zero portfolio firms and low portfolio firms is –2.74 percent (*t*-statistic = –5.72), whilst the difference between zero portfolio firms and high portfolio firms is –3.64 percent (*t*-statistic = -7.55). Tests for the differences between zero mutual fund ownership firms and those in the other groups are similar to the examination of the aggregated decisions by mutual fund managers; that is, the decision on whether or not to invest in a specific stock.

Next, we turn to the investigation of the differences between low and high mutual

fund ownership firms. This differentiation test is similar to the examination of the investment allocation weighting decision on a specific stock which takes place once a mutual fund manager has decided to engage in investment. The test results suggest that mutual fund managers allocate a greater weight to firms with greater profit or growth opportunity levels. The results also reveal that domestic mutual fund managers prefer stocks with high dividend yields, whereas foreign mutual fund managers have a preference for low-leveraged firms.

Interestingly, we find that all mutual fund managers allocate greater weights to smaller stocks, a result which is inconsistent with the differences found between the zero mutual fund ownership firms and those in the other groups; that is, the results suggest that mutual fund managers will tend to stay away from smaller stocks until they have selected their investment targets, although they will then tend to allocate greater weight to such smaller stocks.

3.2 Multivariate Analysis

The above analysis of the holding preferences of mutual fund managers is portrayed in a static manner; however, such a static analysis may potentially suffer from an inherent inability to control for other variables. Thus, we go on to provide a multivariate analysis in this sub-section. Similar to the static analysis framework, we begin with an examination of the decisions by mutual fund managers on whether or not to invest in a particular stock, and then go on to investigate the investment allocation weighting decision on that particular stock.

A decision by mutual fund managers on whether or not to invest in a particular is a simple binary choice; we therefore determine whether or not a particular firm is included within the mutual fund portfolio (indicating positive mutual fund ownership vis-à-vis zero mutual fund ownership) by estimating a logistic regression with robust standard errors. In our model of all mutual funds, the dependent variable is equal to 1 if a

particular firm is included within the portfolio of any of the mutual funds, otherwise 0. In our domestic (foreign) mutual fund models, the dependent variable is equal to 1 if a particular firm is considered in any of the domestic (foreign) mutual fund portfolios, otherwise 0.

As noted in Section 3.1 (above), we include several independent variables which may be related to mutual fund ownership; these are dividend yield (*Div Yield*), total debt ratio (*Leverage*), return on assets (*ROA*), growth opportunities (*MB*), the logarithm of total assets (*Ln_assets*) and an ADR dummy variable (*ADR*). We also include industry and year dummies to eliminate certain aspects of cross-industry heterogeneity or time clustering.

The logistic regression results, which are reported in Panel A of Table 4, differ in some respects from those obtained from the static analysis. All of the coefficients on *Leverage* are significantly negative, whilst all of the coefficients on *Ln_Assets* are significantly positive. The coefficient on *Div Yield* is significantly positive for both domestic and foreign mutual funds, although this coefficient is insignificantly positive for all mutual funds.

<Table 4 is inserted here>

These results suggest that all fund managers have a strong preference for investment in large size firms with low leverage or high dividend yields. This is consistent with the findings of the prior studies which found that, as a result of the regulations on holdings, managers of actively-managed mutual funds will tend to focus their investment on larger firms (essentially because the information of larger firms is less asymmetric to outside investors), low leveraged firms (since such investment is accompanied by a lower risk of financial distress) and stocks with high dividend yields (the tax arbitrage of mutual funds, and the requirement of the rules of the 'Prudent Man'). Furthermore, the coefficient on *MB* is significantly positive for the foreign mutual funds regression, indicating that

foreign fund managers are more likely to invest in stocks with higher growth opportunities.

We now go on to examine the determinants of mutual fund ownership using a Tobit model to estimate the cross-sectional regressions in order to investigate the characteristics of the firms relating to their mutual fund ownership. Within these regressions, the total mutual fund, domestic mutual fund or foreign mutual fund ownership is regressed on several variables which have a potential correlation with mutual fund investment; these are also used in the logistic regressions.

We adopt the Tobit model as a result of the significant number of zero observations for mutual fund ownership (Table 3), since this model implies that the observed value of the dependent variable is censored at 0. There are, however, at least two reasons why the mutual fund ownership could be censored. Firstly, if there are costs associated with investment in the mutual funds of a specific firm, the mutual fund ownership will be censored at 0. Secondly, if the mutual fund managers anticipate that a particular stock is grossly overvalued, then the mutual fund ownership of this particular firm will also be censored, specifically because mutual fund managers are not allowed to short sell.

The estimation results of the Tobit model are reported in Panel B of Table 4, from which we can see that there are also differences between the Tobit and logistic regression model results in certain respects. The coefficients on *ROA* are significantly positive in all three of the Tobit models, indicating that mutual fund managers tend to hold greater shares in more profitable firms. In addition, the coefficients on *Ln_Assets* are significantly negative, indicating that mutual fund managers tend to allocate less weight to larger firms. These results are confirmed for all mutual funds, domestic mutual funds and foreign mutual funds. Furthermore, within the Tobit model for domestic mutual funds, the coefficients on both *Leverage* and *MB* are significantly positive, suggesting that domestic fund managers prefer firms with higher leverage or higher growth opportunities.

4. Mutual Fund Performance

In this section, we examine mutual fund investment performance in order to determine the existence of any differential information or whether mutual fund managers demonstrate any specific stock selection skills. Not only do we examine the return performance of the total mutual funds, but we also compare the performance of domestic fund portfolios with those of foreign fund portfolios, a performance comparison which simultaneously addresses a cross-border investment issue; as already noted, it is suggested in some of the prior studies that domestic investors have a superior information advantage, whereas other studies have demonstrated that the opposite is the case. However, given that mutual fund managers are professional investors, it is naturally expected that they will have sufficient stock market information.

Since our comparison between the performance of domestic mutual fund managers and foreign mutual fund managers is undertaken on an equitable basis, our evaluation of the return performance of domestic and foreign fund portfolios should clearly enhance our understanding of the controversial issue of whether domestic investors have an information advantage over foreign investors within the local market.

4.1 Four-factor Model and Mutual Fund Portfolios

We adopt the Fama-French (1993, 1996) three-factor model, complementing their three factors with an additional momentum factor. Jegadeesh and Titman (1993) and Carhart (1997) both highlight the importance of including this fourth factor. The four-factor model can be stated as:

$$R_{i,t} - RF_t = \alpha + \beta_{RMRF} RMRF_t + \beta_{SMB} SMB_t + \beta_{HML} HML_t + \beta_{PR1YR} PR1YR_t + \varepsilon_{i,t} \quad (2)$$

where $R_{i,t}$ are the monthly returns of the total, domestic and foreign mutual fund portfolios, i, at month t; RF_t is the corresponding risk-free rate at month t; $RMRF_t$ are the returns on excess market portfolios at month t; SMB_t is the return on the factor-mimicking size portfolio at month t; HML_t is the return on factor-mimicking

book-to-market equity portfolio at month t, and $PR1YR_t$ is the return on Carhart's (1997) factor-mimicking portfolio for one-year return momentum at month t. The constant term, α, is Jensen's alpha, and β_{RMRF},β_{SMB}, β_{HML} and β_{PR1YR} are the respective factor loadings for $RMRF$, SMB, HML and $PR1YR$. The estimation of Equation (2) requires a time-series regression of monthly mutual fund portfolio excess returns on $RMRF$, SMB, HML and $PR1YR$.

We next describe the construction of the four-factor model, followed by the construction of the mutual fund portfolios. In constructing these four factors, only those firms with ordinary common stocks which have been listed for at least two years on the Taiwan Stock Exchange (TSE) or the Taiwan OTC market are included in our portfolios. This excludes all Taiwan Depositary Receipts, convertible bonds, units of beneficial interest and newly-listed securities.

The excess market portfolio return, $RMRF$, is computed as the monthly return on a value-weighted portfolio of all TSE and OTC stocks minus the one-month time deposit rate offered by the Bank of Taiwan.[3] The portfolios are formed on the basis of size and book-to-market in order to obtain the size factor, SMB, and the value factor, HML. All TSE stocks are ranked by size as at the end of June in each year t from 1993 to 2006. Size, or market equity (ME), is calculated as the share price multiplied by the total shares outstanding. The stocks are divided into two groups, small (S) and big (B), using the TSE median as the division point for all observations. Book-to-market equity (BE/ME) is book common equity (BE) for the fiscal year ending in the calendar year $t-1$, divided by market equity (ME) at the end of December in year $t-1$.[4]

Here, BE is the book value of the stockholder's equity, plus the balance sheet deferred taxes and investment tax credit, minus the book value of the preferred stock. The

[3] Since there is no actively traded T-bond market in Taiwan, we use the one-month time deposit rate offered by the Bank of Taiwan as a proxy for the risk-free rate.

[4] The fiscal year ends in December for most Taiwanese firms.

groups are formed by categorizing each of the two size-ranked groups (S and B) into three groups ranked by book-to-market, the bottom 30 percent (L for low), the middle 40 percent (M for medium) and the top 30 percent (H for high). This provides us with the following six size/book-to-market portfolios, S/L, S/M, S/H, B/L, B/M and B/H. Finally, the monthly value-weighted returns of the six portfolios are calculated from the beginning of July of year t to the end of June of year $t + 1$, and the portfolios are rebalanced at the end of June of year $t + 1$. The size factor, *SMB*, and the value factor, *HML*, are then computed for the six portfolios.

The *SMB* factor is the difference between the simple average of monthly returns on the three small-stock portfolios and the matching big-stock portfolios: S/L – B/L, S/M – B/M and S/H – B/H. The *HML* factor is the difference between the simple average of monthly returns for the two high BE/ME portfolios (S/H and B/H) and the matching low BE/ME portfolios (S/L and B/L), S/H – S/L and B/H – B/L. The fourth factor, the momentum factor ($PR1YR$), is the difference between the equal-weighted average of firms with the highest 30 percent 11-month returns, lagged by one month, minus the equal weighted average of firms with the lowest 30 percent 11-month returns, lagged by one month. The portfolios, which include all TSE and OTC stocks, are rebalanced monthly.

The mutual fund portfolios are constructed by adjusting the dividend for each fund, and then calculating the total monthly investment return, and the equal-weighted and value-weighted monthly returns for the total, domestic and foreign mutual fund portfolios. The descriptive statistics for the portfolios of the total, domestic and foreign mutual funds are presented in Panel A of Table 5, with the sample period covering the 156 monthly returns from January 1994 to December 2006.

<Table 5 is inserted here>

The domestic mutual fund portfolio demonstrates better return performance than the

foreign mutual fund portfolio for the equal-weighted monthly returns; conversely, the foreign mutual fund portfolio demonstrates better return performance than the domestic mutual fund portfolio for value-weighted returns. Panel B of Table 5 presents the summary statistics of the four factors needed to estimate Equation (2).

4.2 Portfolio Performance

The results of the four-factor model are presented in Table 6, with the sample period covering the 156 monthly returns from January 1994 to December 2006. The portfolios used in the four-factor model are the equal-weighted and value-weighted portfolios of the total, domestic and foreign mutual funds. As the table shows, the adjusted R^2 for all six models exceeds 80 percent, indicating that the four-factor model provides a very good means of explaining our portfolio returns.

The factor loadings on SMB are all found to be significantly positive, whilst the factor loadings on HML are all found to be significantly negative, suggesting that both domestic and foreign mutual fund managers have a preference for small and high-growth stocks; this is consistent with our previous findings. Furthermore, the factor loadings are all significantly positive, indicating that mutual fund managers tend to pursue momentum strategies, and that such momentum strategies potentially lead to greater persistency in mutual fund performance. This is consistent with the findings reported by Carhart (1997).

<Table 6 is inserted here>

We also find from Table 6 that for both equal-weighted and value-weighted portfolios, domestic and foreign mutual funds outperform their benchmarks. The equal-weighted and value-weighted portfolios formed by the domestic and foreign mutual funds display significantly positive Jensen alphas, each with huge magnitudes. For example, the value-weighted domestic mutual fund portfolio has a monthly alpha of 78 basis points, whilst the comparable foreign mutual fund portfolio has a monthly alpha which is even higher, at 84 basis points. These figures suggest superior investment performance for both

domestic and foreign mutual funds over the 1994-2006 period.

5. Conclusions

In this paper, we first of all set out to examine the holding preferences of domestic and foreign mutual fund managers; both the domestic and foreign funds examined in this study are actively-managed mutual funds, with the managers of these funds believed to be professional investors. Our analysis of the initial decision on whether or not to invest in the first place suggests a greater likelihood for both domestic and foreign mutual fund managers to invest in larger firms, and stocks with higher dividend yields and lower financial leverage. Foreign mutual fund managers are also more likely to invest in high-growth stocks.

Further analysis of the investment allocation weighting decision suggests that both domestic and foreign mutual fund managers will tend to hold more shares in profitable and small firms, a result which clearly differs from the decision on whether or not to invest in the first place. Domestic mutual fund managers also appear to have a preference for stocks with higher leverage and higher growth opportunities.

We next examine the investment performance of domestic and foreign mutual funds and find that both domestic and foreign mutual funds outperform their benchmarks, a finding which is consistent with the findings of Ippolito (1989), Grinblatt and Titman (1989; 1993) and Chen et al. (2000), each of which demonstrate that mutual fund managers have specific stock-selection talents or abilities.

In conclusion, this study provides new evidence on cross-border investment. It is argued by both Shukla and van Inwegen (1995) and Engstrom (2003) that foreign investors are unable to achieve superior performance over their local counterparts when investing in local stocks; however, we find that both domestic and foreign mutual fund managers are capable of achieving superior investment performance. Although domestic investors may be more knowledgeable than their foreign counterparts with regard to the

local environment or domestic firms operating locally, foreign investors may have superior global and industry-level information, which may well result in foreign investors having an overall information advantage over domestic investors in those cases where domestic firms are operating in conditions where the competition arises from both home and overseas.

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Table 1 Descriptive statistics of mutual funds [a]

Year	Domestic Mutual Funds			Foreign Mutual Funds		
	No. of Funds	Total Net Assets [b] (NT$ millions)		No. of Funds	Total Net Assets [b] (NT$ millions)	
		Mean	Median		Mean	Median
1994	36	4,512.6	4,110.0	10	5,695.6	7,260.5
1995	44	2,792.8	1,594.5	11	3,822.4	4,644.0
1996	57	2,896.6	1,384.0	12	4,340.8	3,413.3
1997	72	2,830.7	1,549.8	15	3,519.2	1,812.4
1998	87	1,840.8	1,095.4	17	2,170.0	991.5
1999	99	1,904.8	1,270.3	22	2,327.3	1,877.9
2000	96	947.9	575.3	38	1,128.2	608.3
2001	86	1,104.5	775.7	46	1,687.4	953.7
2002	89	992.4	687.2	42	1,562.2	1,289.2
2003	91	1,077.7	727.8	39	1,819.6	1,427.8
2004	91	1,036.9	773.5	38	1,801.2	1,455.5
2005	87	1,031.5	625.2	36	1,955.3	1,414.6
2006	86	1,077.1	652.7	36	2,006.4	1,607.7

Notes:

[a] Within the Taiwan stock market, mutual funds are classified as domestic funds if they are raised by domestic investment trust corporations; and foreign funds if they are raised by foreign corporations.

[b] Total net assets refers to the net year-end value of the assets being managed by mutual funds.

Table 2 Domestic and foreign fund investment, by industry and market value weighting [a]

Industry	SIC Code [b]	1994 [c]			2000 [c]			2006 [c]		
		Domestic Investment	Foreign Investment	Value Weighting	Domestic Investment	Foreign Investment	Value Weighting	Domestic Investment	Foreign Investment	Value Weighting
Cement	11	0.20	0.84	2.83	0.08	0.08	0.98	0.10	0.60	0.96
Foods	12	1.21	1.58	3.44	0.79	0.82	1.33	0.72	1.06	0.85
Plastics	13	17.43	22.18	8.59	6.52	2.87	5.79	0.55	2.05	5.20
Textiles	14	9.92	5.61	6.99	1.88	0.98	2.04	0.53	1.59	1.43
Electric Machinery	15	2.25	1.55	1.75	1.60	0.20	1.04	1.07	0.97	1.08
Electric Appliance	16	2.41	–	2.21	0.78	0.60	1.12	0.12	0.12	0.53
Chemicals	17	2.20	1.62	2.02	1.51	0.24	1.08	1.50	1.91	4.70
Glass & Ceramics	18	1.27	3.21	1.76	0.46	0.39	0.44	0.11	–	0.29
Paper & Pulp	19	6.22	5.12	2.08	0.36	0.28	0.39	0.19	0.63	0.34
Iron & Steel	20	5.53	7.73	5.78	1.64	0.49	2.50	3.73	2.42	2.96
Rubber	21	1.53	2.13	1.33	0.68	0.39	0.40	1.40	1.72	0.61
Automobile	22	0.08	–	1.02	0.86	1.15	1.02	0.57	0.71	0.85
Electronics	23	33.07	23.75	11.07	67.10	78.78	56.87	79.69	72.44	58.30
Construction	25	1.84	0.95	3.90	–	–	1.30	1.67	2.59	1.79
Transportation	26	3.48	4.73	3.91	2.06	0.56	2.40	2.84	1.59	2.19
Tourism	27	0.05	0.63	0.64	–	–	0.40	0.26	0.43	0.32
Banking	28	10.60	17.65	36.47	8.99	9.77	18.12	2.58	5.30	14.85
Trade & Merchandise	29	0.09	0.51	1.70	1.41	0.54	1.21	0.60	0.24	0.80
Other	99	0.62	0.18	2.48	3.27	1.88	1.60	1.77	3.62	1.95

Notes:

[a] Investment and market value weightings are calculated (in percentage terms) for the end of years 1994, 2000 and 2006.

[b] SIC Code is the industry code used by the Taiwan Stock Exchange.

[c] Domestic Investment represents the domestic fund portfolio holdings in that industry; Foreign Investment indicates foreign fund portfolio holdings; and Value Weighting is the market value of the firms within the industry relative to that of the total market.

Table 3 Static statistics for portfolios, ranked by mutual fund holdings

Variables	Portfolios Ranked by Mutual Fund Holdings[a]			Difference between Low and Zero		Difference between High and Zero		Difference between High and Low	
	Zero	Low	High	Mean	*t*-stat.	Mean	*t*-stat.	Mean	*t*-stat.
Panel A: All Mutual Fund Holdings[b]									
Mutual Fund Holdings	0.000	0.530	4.667	0.530	56.72	4.667	60.20	4.137	52.98
Div Yield	3.394	3.258	3.473	–0.137	–1.62	0.078	0.96	0.215	2.22
Leverage (%)	43.725	40.981	40.086	–2.744	–5.72	–3.638	–7.55	–0.895	–1.69
ROA (%)	1.802	3.269	4.285	1.468	4.86	2.483	7.41	1.015	2.70
MB	1.582	1.804	2.096	0.222	4.99	0.514	10.76	0.292	6.08
Assets (NT$ millions)	9,238	16,492	10,440	7,253	7.42	1,202	1.75	–6,051	–5.70
Cap (NT$ millions)	8,803	18,875	13,836	10,072	6.37	5,033	3.76	–5,039	–2.68
No. of ADRs	148	120	78	–	–	–	–	–	–
No. of Obs.	6,157	2,004	2,019	–	–	–	–	–	–
Panel B: Domestic Mutual Fund Holdings[b]									
Mutual Fund Holdings	0.000	0.397	3.677	0.397	51.57	3.677	54.94	3.280	48.69
Div Yield	3.394	3.242	3.483	–0.153	–1.79	0.089	1.07	0.242	2.41
Leverage (%)	43.610	40.783	40.053	–2.827	–5.80	–3.556	–7.29	–0.729	–1.31
ROA (%)	1.782	3.557	4.465	1.775	6.04	2.682	7.96	0.908	2.43
MB	1.583	1.846	2.125	0.263	5.91	0.542	11.08	0.279	5.46
Assets (NT$ millions)	9,285	16,880	10,726	7,595	7.40	1,441	2.01	–6,154	–5.43
Cap (NT$ millions)	8,821	19,407	14,748	10,586	6.35	5,927	4.10	–4,659	–2.28
No. of ADRs	158	117	71	–	–	–	–	–	–
No. of Obs.	6,524	1,823	1,833	–	–	–	–	–	–

Table 3 (Contd.)

Variables	Portfolios Ranked by Mutual Fund Holdings[a]			Difference between Low and Zero		Difference between High and Zero		Difference between High and Low	
	Zero	Low	High	Mean	*t*-stat.	Mean	*t*-stat.	Mean	*t*-stat.
Panel C: Foreign Mutual Fund Holdings[b]									
Mutual Fund Holdings	0.000	0.288	2.216	0.288	48.19	2.216	44.51	1.928	38.45
Div Yield	3.357	3.419	3.513	0.062	0.61	0.156	1.62	0.094	0.74
Leverage (%)	43.063	41.436	39.623	–1.626	–3.05	–3.439	–6.33	–1.813	–2.71
ROA (%)	2.174	3.299	4.507	1.125	2.99	2.333	6.26	1.208	2.50
MB	1.655	1.837	2.087	0.182	3.82	0.432	8.07	0.250	4.07
Assets (NT$ millions)	9,837	19,033	9,732	9,196	7.65	–104	–0.14	–9,301	–7.07
Cap (NT$ millions)	9,966	21,910	13,461	11,944	7.51	3,495	1.89	–8,449	–3.68
No. of ADRs	212	80	54	–	–	–	–	–	–
No. of Obs.	7,775	1,196	1,209	–	–	–	–	–	–

Notes:

[a] The portfolio static statistics, ranked by mutual fund holdings, refers to the ratio of the total shares held by the mutual funds to the total shares outstanding. All firms listed in the Taiwan stock market are first of all separated into three groups based on their mutual fund holdings at the end of each year from 1994 to 2006. Any firms which are not held by any of the mutual funds are designated as 'Zero' portfolio firms. The remaining firms are then divided into 'Low' and 'High' portfolio groups with the split providing a roughly equal numbers of firms in each of these two portfolios. The means and standard deviations of the firm characteristics are calculated from the pool sample.

[b] *Div Yield* is the dividend yield; *Leverage* is defined as total debt/ total assets (book value); *ROA* is the return on total assets; *MB* is the market-to-book ratio; *Cap* is the market capitalization of equity; No. of ADRs is the proportion of firms issuing ADRs from the total number of observations.

Table 4 Firm characteristics and mutual fund holdings [a]

Variables	All Mutual Funds		Domestic Mutual Funds		Foreign Mutual Funds	
	Coeff.	*p*-value	Coeff.	*p*-value	Coeff.	*p*-value
Panel A: Logistic Regression [b]						
Intercept	–5.130	0.00	–5.283	0.00	–5.730	0.00
Div Yield	0.011	0.15	0.014	0.08	0.015	0.07
Leverage	–0.004	0.00	–0.005	0.00	–0.003	0.04
ROA	0.001	0.69	0.002	0.52	–0.001	0.60
MB	0.016	0.24	0.021	0.14	0.034	0.03
Ln_Assets	0.290	0.00	0.285	0.00	0.278	0.01
ADR	–0.143	0.27	–0.067	0.60	–0.153	0.25
No. of Obs.	10,162		10,162		10,162	
Pseudo-R^2	0.107		0.113		0.054	
Log-likelihood	–6,254		–6,034		–5,290	
Panel B: Tobit Model Regression [b]						
Intercept	7.892	0.00	6.473	0.00	4.899	0.00
Div Yield	–0.001	0.92	–0.006	0.57	–0.007	0.30
Leverage	0.003	0.12	0.003	0.07	0.001	0.51
ROA	0.008	0.03	0.007	0.04	0.005	0.01
MB	0.145	0.00	0.086	0.00	0.019	0.21
Ln_Assets	–0.365	0.00	–0.290	0.00	–0.215	0.00
ADR	0.164	0.41	0.029	0.86	0.135	0.19
No. of Obs.	10,162		10,162		10,162	
Log-likelihood	–11,291		–9,631		–5,342	

Notes:

[a] The table presents the determinants of firm-level mutual fund holdings; the logistic regression results reported in Panel A examine whether or not there is any mutual fund investment in the firms; the Tobit model estimation results reported in Panel B investigate the relationship between the characteristics of the firms and their mutual fund ownership.

[b] The dependent variable in Panel A is a dummy variable which takes a value of 1 if a mutual fund is investing in this firm; otherwise 0; the dependent variable in Panel B is the ownership of mutual fund holdings. The independent variables are: dividend yield (*Div Yield*); total debt ratio (Leverage) which is defined as total debt/total book value of assets; return on assets (*ROA*); market-to-book ratio (*MB*); assets (*Ln_Assets*) which is calculated as the logarithm of total assets; capitalization (*Ln_Cap*) which is defined as the logarithm of market equity value), and an ADR dummy (*ADR*) which takes a value of 1 if this firm has issued an ADR; otherwise 0. Year dummies and industry dummies are included in all of the models.

Table 5 Descriptive statistics for mutual fund portfolio returns and four factor returns[a]

Portfolios/Variables	Mean	Median	Std. Dev.	Max.	Min.
Panel A: Mutual Fund Portfolio Monthly Returns[a]					
Equally-weighted					
All Funds	0.821	0.031	7.770	23.998	–22.218
Domestic Funds	0.843	–0.058	7.788	24.472	–21.984
Foreign Funds	0.762	0.168	7.783	24.373	–23.421
Value-weighted					
All Funds	0.917	0.042	7.848	24.517	–22.066
Domestic Funds	0.922	–0.105	7.805	24.362	–21.894
Foreign Funds	0.963	–0.103	8.021	26.293	–22.727
Panel B: Four Factors and Risk-less Monthly Returns[a]					
RMRF	0.130	–0.376	7.908	26.971	–20.732
SMB	–0.311	–0.355	4.209	10.918	–13.351
HML	1.033	0.060	6.750	27.496	–14.119
PR1YR	–0.182	0.058	5.292	15.397	–24.033
RF	0.350	0.407	0.175	0.612	0.118

Notes:

[a] The table presents the descriptive statistics of the mutual fund portfolio returns, four factor returns and risk-less returns (in percentage terms); the sample period runs from January 1994 to December 2006.

[b] *RMRF*, *SMB* and *HML* are the monthly excess market portfolio returns and factor-mimicking portfolio returns for size and book-to-market equity in the Taiwan stock markets, as proposed by Fama and French (1993); *PR1YR* refers to the monthly returns of factor-mimicking portfolios for one-year momentum, as proposed by Carhart (1997); *RF* is the risk-free rate.

Table 6 Mutual fund portfolio performance [a]

Portfolios	Alpha [b]		*RMRF* [c]		*SMB* [c]		*HML* [c]		*PR*1*YR* [c]		Adj. R^2
	Mean	*t*-stat.	Mean	*t*-stat.	Mean	*t*-stat.	Mean	*t*-stat.	Mean	*t*-stat.	
Equally weighted											
All Mutual Funds	0.687	2.52	0.942	26.12	0.247	3.66	0.221	−4.52	0.184	3.13	0.817
Domestic Funds	0.715	2.56	0.940	25.48	0.260	3.75	0.222	−4.43	0.190	3.16	0.809
Foreign Funds	0.616	2.28	0.945	26.51	0.225	3.36	0.218	−4.50	0.175	3.01	0.822
Value-Weighted											
All Mutual Funds	0.779	2.92	0.958	27.16	0.225	3.41	0.228	−4.77	0.172	2.99	0.829
Domestic Funds	0.782	2.85	0.946	26.05	0.235	3.45	0.220	−4.46	0.180	3.04	0.816
Foreign Funds	0.838	3.09	0.979	27.33	0.218	3.25	0.244	−5.02	0.180	3.07	0.831

Notes:

[a] The monthly excess returns of all mutual funds, domestic mutual funds and foreign mutual funds, are respectively regressed on the *RMRF*, *SMB*, *HML* and *PR*1*YR*; the sample period runs from January 1994 to December 2006. The monthly portfolio excess return is the portfolio's monthly return minus the one-month time deposit rate offered by the Bank of Taiwan.

[b] Alpha is the model intercept.

[c] *RMRF*, *SMB* and *HML* are the monthly excess market portfolio returns and factor-mimicking portfolio returns for size and book-to-market equity in the Taiwan stock markets, as proposed by Fama and French (1993); *PR*1*YR* refers to the monthly returns of factor-mimicking portfolios for one-year momentum, as proposed by Carhart (1997).