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A Study on Stock-Selection and Market-Timing Performance: Evidence from Hong Kong Mandatory Provident Funds (MPF)

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This paper presents the first comprehensive study of the performance and market timing ability of the equity funds that comprise the Hong Kong Mandatory Provident Funds (MPF) scheme. In general, our results suggest that US equity funds consistently underperform relative to the market, while the other fund groups consistently outperform the market. The stock-selection ability of MPF constituent equity funds in times of changing economic condition is also investigated. The evidence is consistent with previous studies, which suggest that the conditional models decrease the individual fund traditional alpha measure. The market timing models of Treynor–Mazuy and Henriksson–Merton provide evidence of superior market timing ability.

Keywords: Pension funds; stock-selection performance evaluation; market-timing ability; conditional models.

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1. Introduction

Like many other countries, Hong Kong has an aging population — people aged 65 and over accounted for only 6.6% of the population in 1981; by 2003, this figure had risen to 11.5% and it is expected to increase to 14% by 2016 and to 24% by 2031.[1] The government is grappling with the policy implications of how best to provide for the retirement needs of this ever increasing group. The first major policy initiative has been the introduction of the Mandatory Provident Fund (MPF) system, which was implemented on December 1, 2000. Under this scheme, most employees and their employers are required by law to make monthly contributions to a MPF, which are based on the level of salary and the period of employment. These MPFs are managed by approved private organizations according to criteria set out by the government. Prior to the implementation of the MPF system, only one-third of the 3.4-million Hong Kong workforce had some form of retirement protection. With the introduction of the MPF system, this figure had risen to 86% by the end of 2001.

The launch of the MPF system has created an entirely new class of asset in the Hong Kong financial markets, which has a very broad base of investor support. These funds represent the cornerstone of the governments policy to deal with the financial burden of the retired population. Given their importance and investor interest in these funds, there is a need for research on the performance of MPFs. It is an important empirical issue — whether these funds are able to provide a reasonable rate of return to the investors whose future welfare depends so much on their performance. On this point, it is interesting to note that while there has been a substantial amount of research undertaken on Hong Kong security and futures markets, the mutual funds industry, and MPFs in particular, have received only scant attention. This paper aims to address this issue and provide an empirical investigation of the performance of the Hong Kong MPFs.

A general review of the performance of the MPFs since inception suggests that the markets have not been kind. Most equity mutual funds as well as the MPFs under performed relative to their benchmarks and some have even suffered losses. This has not gone unnoticed by the popular media, which frequently provides reports on fund performance and critical commentary of the scheme. Such casual analysis is not particularly helpful and a more academic approach is called for. Specifically, it is of interest to establish why

[1]Source: Census and Statistics Department, Hong Kong SAR Government.

their performance is so bad. Is it due to managers' inability to select stocks and/or time the market? Alternatively, is it due to participants making poor choices on which MPF they invest in? To provide some insights into these issues, this study will explore Hong Kong MPF's from three different perspectives. Firstly, this study will examine the adjusted performance of the MPFs. Secondly, it will examine the market timing ability of the MPF fund managers. Finally, this paper will incorporate public information variables to evaluate the stock-selection ability of managers.

To limit the scope of this study, only "equity" funds that are authorized by the Mandatory Provident Fund Scheme Authority are considered. The other types of MPF funds: (1) balanced funds; (2) fixed-income funds; (3) money market funds; (4) guarantee return funds; and (5) capital preservation funds, are excluded from this study. Furthermore, mutual funds that are not included in MPF scheme are excluded even though some of them are authorized by the Monetary Authority for sale in Hong Kong. The focus on pension funds to the exclusion of other types of funds is based on the observation that pension fund managers control a larger portion of the aggregate wealth than do mutual fund managers (Coggin *et al.*, 1993). Furthermore, pension fund managers and mutual fund managers operate in a different environment. For example, pension fund managers are reviewed periodically by their clients and independent pension consultants. In addition, whereas poor performing mutual fund investors may withdraw their money from the funds at any time, such withdrawals are not usually seen in pension funds (Christopherson *et al.*, 1998).

Due to the short history of the MPF scheme, only a relatively small sample of data is available. There is also a general lack of information about fund operating characteristics such as the fund size, cash flows and turnover rates. The MPF funds were not required to release this information to the public before November 2005 and prior to this date, the fund trustees treated such information as confidential. Keeping these data limitations in mind, we argue that while the data is not as comprehensive as would be the case for other markets, a sufficient amount of data is available to allow some preliminary insights into the MPF performance and behaviour.

This paper is organized as follows. Section 2 summarizes the literature reviews on some issues in mutual fund studies. Section 3 outlines the models employed to evaluate the risk-adjusted return, stock-selection and market-timing performances. Section 4 describes the data that the author will use in this study. Section 5 presents the empirical results of the empirical analysis, while the last section provides a summary and conclusions.

2. Literature Review

2.1. *Mutual fund performance*

Numerous studies on fund performance relative to a benchmark have been undertaken in the last 30 years. These studies typically employ the traditional Jensen measure (Jensen, 1968), Fama–French three-factor model (Fama and French, 1993), Grinblatt–Titman positive period weighting measure (Grinblatt and Titman, 1989), and Ferson–Schadt conditional Jensen measure that incorporates conditional information directly into the performance measure to control for the biases arising from fund managers responding to public information (Ferson and Schadt, 1996). In general, the results of this literature typically finds that many funds underperform when compared to a buy-and-hold strategy.

In his seminal paper, Jensen (1968) generalizes the CAPM to evaluate the performance of 115 mutual funds over the period 1945–1964 and finds that the funds on average were not able to outperform the market or a buy-and-hold strategy. The author used a generalized version of the CAPM in the following form:

$$R_{i,t} - R_{f,t} = \alpha + \beta(R_{m,t} - R_{f,t}) + e_t, \tag{1}$$

where α is known as Jensen's measure and is used to test whether a fund is able to outperform the market. Jensen's test results exhibited a negative α and the average value of β was less than one, indicating that the fund managers hold securities that are less risky than the market portfolio. Chang and Lewellen (1985) specify a procedure that is derived from Roll's (1978) APT model to test the performance of a sample of 67 equity funds over the period 1971–1979 and found that funds did do not outperform the market. Lehmann and Modest (1987) evaluate the performance of 130 mutual funds over the period 1968–1982 and find that most of the Jensen alphas and Treynor–Black appraisal ratios were negative. This indicates that the mutual funds in the sample on average underperform the market and this result was not sensitive to the choice of method used to constructing the APT model. Grinblatt and Titman (1989) study the performance of 157 funds over the period from 1975 to 1984. The authors classify the funds by their investment objectives and find that the actual mutual fund returns on average do not demonstrate positive abnormal performance as measured by the Jensen alpha. Malkiel (1995) argues the reported overperformance of funds during the 1980s is due to the inappropriate use of benchmarks. The author utilizes a data set of equity mutual funds over the period 1971 to 1991. The summary statistics of Jensen measure during the period 1971–1991 with Standard and Poor 500 Market Index return as the benchmark show that the funds have negative means. Cai *et al.* (1997) provide the first comprehensive examination of the performance of Japanese open-type stock mutual funds for the 1981–1992 period. They document that regardless of the performance measures and benchmarks used, most of the Japanese mutual funds underperform and the fund-house study shows the Jensen measures for these nine individual companies all underperform the market index. Drakos (2002) examines the performance of 77 Greek mutual funds from January 1, 1997 through January 31, 2001 and produced evidence that the sample funds outperform the market. Bauer *et al.* (2006) show that New Zealand mutual funds may not outperform the market and further, find that funds performance is positively related to size and expense ratio but negatively related to load charges.

The use of unconditional models in this literature has a weakness in that superior fund performance may be incorrectly attributed to manager skill rather than abnormal performance and the use of public information. Ferson and Schadt (1996) was the first study to determine whether conditioning on public information has an impact on performance evaluation. The authors use five predetermined variables to proxy public information. These variables include: (1) the lagged level of the one-month Treasury bill yield; (2) the lagged dividend yield of the CRSP value-weighted New York Stock Exchange (NYSE) and American Stock Exchange (AMEX) stock index; (3) a lagged measure of the slope of the term structure; (4) a lagged quality spread in the corporate bond market; and (5) a dummy variable for the month of January. The dataset that the authors use includes the monthly returns for 67 open-end mutual funds during the period 1968–1990. The authors suggest that when the covariance between the excess return on the market portfolio and conditional beta is negative, the traditional Jensen measure will be negatively biased. In support of this hypothesis, Ferson and Schadt's (1996) generate estimates of alpha that are insignificant, which suggests that the negative mutual fund alphas documented in the previous literature may be a function of the model specification. Among the five predetermined public information variables, they found that the coefficients on lagged dividend yield of the CRSP value-weighted NYSE and AMEX index and lagged one-month Treasury bill yield are significant at 5% level.

Ferson and Warther (1996) discuss the rationale of using conditional measures and evaluate the performance of 63 open-end mutual funds during the period 1968–1990 using a conditional estimate of Jensen's alpha.

They find that similar to Ferson and Schadt (1996), the estimated alphas become more positive when conditional model is employed. In contrast to Ferson and Schadt (1996); however, Cai *et al.* (1997) find that a conditional Jensen measure does not account for the negative alphas found for Japanese mutual funds. In contrast, their conditional model Jensen measures shift the distribution of alphas left and make the average Jensen measures more negative. Gregoriou (2003) uses the conditional approach as well as the traditional Jensen measure to evaluate the performance of funds of hedge funds (FOF) over the period 1993–2001 and finds that the conditional version of the Jensen model provides a more accurate picture of the selection skills of FOF managers. Gregoriou (2004) updates his earlier work by including a set of public information variables, namely: (1) the change in the corporate bond default-related yield spread; (2) the change in the term premium; and (3) the change in the intra-month implied volatility index of the S&P100 Index. The empirical results show that the conditional models are preferable to the unconditional models given higher values of adjusted R^2.

2.2. *Market timing ability*

Identifying funds that are successful and the reasons for their success is an important and interesting academic question. Empirical research has typically focussed on whether any evidence can be found to suggest that fund managers possess the ability to time the market. A brief survey of the literature suggests that the results are mixed. While most studies have found no evidence of market timing ability, some of the more recent studies have found evidence of positive market timing ability among a limited selection of funds.

The seminal contribution in this area is that of Treynor and Mazuy (T-M) (1966), who tested for evidence of the market timing ability of fund managers by augmenting the market model with a quadratic risk term. The authors found that among the 57 funds, only one displayed a significant market timing coefficient and so, virtually the entire sample of managers did not exhibit any market timing ability. Kon and Jen (1979) used the Quandt (1972) switching regression model to evaluate the market-timing ability of 49 mutual funds over the period 1960–1971 and find that most funds are captured by a mixture of two or three regression equations rather than one unique linear model. Chen and Stockum (1986) developed a quadratic model to measure the timing ability that is similar to that developed by

Treynor and Mazuy but allowed the fund beta to be a random coefficient, and documented that none of the 43 funds quarterly rates of return in the sample had significant positive market timing performances over the period beginning with the second quarter of 1975 and ending with the fourth quarter of 1982. Admati *et al.* (1986) is the first study to show that the T-M model is an appropriate model to identify the existence of market timing ability under some specific assumptions by proving that the timing coefficient γ is significant positive if the manager increases his sensitivity to stocks when the market return is increasing. Cumby and Glen (1990) documented that the managers of 15 US-based internationally diversified funds all exhibited perverse market timing ability during the period January 1982 through June 1988, if the T-M model with Capital International World Index as benchmark was employed. Henriksson and Merton (H-M) (1981) introduced a dual-beta excess returns market model which have been used extensively to test the market timing ability of fund managers. Henriksson (1984) found that three funds had significant positive market-timing ability across a sample of 116 mutual fund managers over the period 1968–1980 using both the parametric and nonparametric tests developed by H-M (1981). Lee and Rahman (1990) used the H-M model to examine the market timing and stock selection ability of a sample of 93 mutual fund with monthly return data provided by Center for Research in Security Prices (CRSP) from January 1977 to March 1984 and found that 17.2% of the sample funds exhibit significant market timing coefficient. Jagannathan and Korajczyk (1986) showed that it was possible to construct a portfolio that showed artificial market timing ability even where no true market timing ability existed, and proposed a test to distinguish spurious from true market timing ability. They found evidence that the greater the representation of low quality "option-like" stocks in the portfolio, the more likely evidence of market timing ability may be found even though any true market-timing ability does not exist. Their results explained why most funds have negative measures of market timing as these funds invest primarily in "higher-quality" (i.e. less option-like) stocks. Ferson and Schadt (1996) documented that the estimation results are sensitive to the inclusion of public information using monthly return data for 67 mutual funds from 1968 to 1990. They assumed that the mutual fund managers trade based on monthly horizon and the returns included reinvestment of dividends and were net of expenses excluding load charges and exit fees. The evidence for market timing was improved in this model where the market timing is conditional on public economic information variables.

Ferson and Warther (1996) tested a conditional version of T-M model to evaluate the existence of evidence of market timing ability in 63 open-end mutual funds during the period 1968–1990. When conditional TM model was employed to evaluate the market timing ability, the authors found evidence similar to Ferson and Schadt (1996) in that the sample funds which exhibit negative market timing coefficients is reduced. Hallahan and Faff (1999) documented that little evidence of market-timing ability exists in the data of a sample of 65 Australian equity trusts from January 1988 to September 1997. Hallahan and Faff (1999) also showed that one version of the market-timing model did not dominate another, although the cubic market model specification augmented by Jagannathan and Korajczyk (1986) was found to fit the data well. Fung *et al.* (2002) studied the market timing ability of a sample of 311 global hedge funds, which mostly invested in equities over the period 1994–2000. The authors documented that the global hedge fund managers did not demonstrate positive market-timing ability, which did not support the widely held belief that the hedge funds are more aggressive in hedging and diversifying market risk. Gregoriou (2004) used monthly data of 227 live and 210 dead offshore and onshore funds of hedge funds (FOFs) over the period 1993–2001 to compare the adequacy of unconditional and conditional versions of T-M and H-M models. The results showed that the conditional models are preferable over unconditional as the conditional models, based on a comparison of their R^2 values. The market timing effects of the FOFs were often positive and significant in the unconditional models, however, they were no longer significant when conditional models were specified. This change was due to the strong predictive power of the conditional variables introduced into the models. The magnitude of the alphas was smaller when conditional models were employed. Overall, the authors concluded that including conditioning variables may help in analyzing hedge fund performance, including the FOFs.

This literature on the market-timing ability of fund managers is ongoing and a number of issues remain unresolved. For example, it is still not clear which model is the best to capture the mutual fund managers' market-timing ability, nor whether the timing ability makes the Jensen measure (α) spuriously negative even though the fund managers have stock selection ability. The focus of this study is on the Hong Kong MPFs, a number of whom claim to use a strategy of market-timing. This it is interesting to provide further insights into this debate by considering whether any evidence can be found of Hong Kong MPF scheme managers who are able to time the market.

3. Research Method

3.1. *Jensen alpha measure*

The starting point for most studies in this area is to evaluate the performance of funds using Jensen's alpha obtained from a basic CAPM model which assumes that funds have no market timing ability. Suppose $R_{i,t}$ is the monthly return of the funds in the tth month, and $R_{m,t}$ is the monthly return on the mean-variance efficient market portfolio; the Jensen measure refers to the intercept α in the regression model of return of the fund, i, in excess of the one-month risk-free rate on the excess return on the market portfolio, i.e.,

$$R_{i,t} - R_{f,t} = \alpha_i + \beta(R_{m,t} - R_{f,t}) + e_t. \tag{1}$$

If the CAPM is correct, a fund should lie on the security market line and the value of Jensen's alpha, α_i in Equation (1), should be zero. Therefore, a significant positive Jensen alpha indicates superior performance if a fund manager possesses stock selection ability to outperform the market. The Jensen alpha may be estimated by the least squares regression of Equation (1) and it represents the constant periodic return that the fund manager is able to earn above an passively managed portfolio of equal risk.

3.2. *Conditional Jensen alpha measure*

Following Shanken (1990) and Ferson and Schadt (1996), a conditional model is specified in which beta is assumed to be a linear function of public information vector Z_t that captures changing economic conditions, and is given by:

$$\beta_i(Z_t) = b_{1,i} + b'_{2,i} Z_t, \tag{2}$$

where $b_{1,i}$ is the unconditional average of the conditional beta estimate $E[\beta_i(Z_t)]$. The coefficient $b_{2,i}$ tracks how b_i varies with the innovation of the conditioning variable vector $z_t = Z_t - E(Z_t)$. $\beta_i(Z_t)$ may be incorporated in Equation (2) to give the following modified version of the regression model:

$$R_{i,t} - R_{f,t} = \alpha + b_{1,i}(R_{m,t} - R_{f,t}) + b'_{2,i}[Z_t(R_{m,t} - R_{f,t})] + e_t. \tag{3}$$

The additional factor may be interpreted as the returns on self-financing dynamic strategy that purchases z_t units of market portfolio by borrowing on the risk-free market.

The conditional Jensen model uses public information variables that are similar to those have been identified as useful for predicting risks and security returns over time in previous studies, but will be adjusted to comply with Hong Kong investment market. The following public information variables are used: (1) the lagged level of one-month MPFA prescribed saving rate that is closest to one month to maturity at the end of the previous month (SAV_{t-1}); (2) the dummy variable for the month of January (JAN_t); (3) the lagged dividend yield in the Hang Seng Index at the end of the previous month (DIV_{t-1}); (4) the lagged measure of the slope of the term structure that is the change in the term spread and the difference between the maturity 10-year HKMA Exchange Fund Note and the 91-day HKMA Exchange Fund Bill, both of which are annualized monthly averages ($TERM_{t-1}$); and (5) the lagged quality spread in the corporate bond market that is the change in the corporate bond default-related yield spread and the difference between the Moody's BAA-rated corporate bond yield and the AAA-rated corporate bond yield, using the monthly average yields for the previous month (DEF_{t-1}).

These five economic variables constitute the public information vector, Z_t, and the product $b'_{2,i} \cdot Z_t$ will be a linear combination of these five variables as follows:

$$\begin{aligned} b'_{2j} \cdot Z_t = {} & b_{SAV,t} \cdot SAV_{t-1} + b_{JAN,t} \cdot JAN_{t-1} + b_{DIV,t} \cdot DIV_{t-1} \\ & + b_{TERM,t} \cdot TERM_{t-1} + b_{DEF,t} \cdot DEF_{t-1}, \end{aligned} \tag{4}$$

where $b_{SAV,t}$, $b_{JAN,t}$, $b_{DIV,t}$, $b_{TERM,t}$, and $b_{DEF,t}$ measure the extent to which the conditional beta varies in response to changes in these market indicators.

Equation (3) may be modified to incorporate Equation (4) to derive the following conditional Jensen measure:

$$\begin{aligned} R_{i,t} - R_{f,t} = {} & a + (b_{1,i} + b_{SAV,t} \cdot SAV_{t-1} + b_{JAN,t} \cdot JAN_{t-1} + b_{DIV,t} \\ & \cdot DIV_{t-1} + b_{TERM,t} \cdot TERM_{t-1} + b_{DEF,t} \cdot DEF_{t-1}) \\ & \times (R_{m,t} - R_{f,t}) + e_t. \end{aligned} \tag{5}$$

3.3. *Unconditional Treynor and Mazuy (T-M) model*

The T-M model assumes that if fund managers forecast the market returns successfully, they would bias their portfolio in favour of the market when conditions are bullish and against the market when conditions are bearish. Treynor and Mazuy (1966) argued that the existence of any market timing ability would manifest itself as a curvature of a characteristic line that plots the rate of return of a fund against the rate of return of the market. When the fund manager increases the portfolio's exposure to market index during an up market, and vice versa, the portfolio will be more volatile, which will manifest itself as a nonlinearity in the characteristic line for the respective fund. Thus, the unconditional T-M regression model may be specified as:

$$R_{i,t} - R_{f,t} = \alpha + \beta \cdot (R_{m,t} - R_{f,t}) + \gamma \cdot (R_{m,t} - R_{f,t})^2 + e_t, \qquad (6)$$

where $R_{i,t}$ is the periodic rate of return on the fund i in period t, $R_{m,t}$ is the periodic rate of return on the market index in period t, $R_{f,t}$ is the risk-free rate at the start of period t. A positive value of γ represents superior market-timing skill because it implies that portfolio returns respond more positively to upswings than to downturns in the market. However, $\gamma = 0$ implies no market-timing and a negative γ coefficient indicates inferior market-timing.

While Treynor and Mazuy (1966) did not derive their postulated relationship theoretically, Admati *et al.* (1986) rectified this omission and produced a proof to show that the relationship in Equation (6) is appropriate under specific assumptions. Specificially, Admati *et al.* (1986) showed that if the fund manager increases the sensitivity to stocks when the market return is increasing, the coefficient γ will be positive.

3.4. *Unconditional Henriksson and Merton (H-M) model*

Henriksson and Merton (1981) developed the "dual-beta" model for evaluating the market timing ability of fund managers. Their model takes into account any potential asymmetry in the forecasting skills of fund managers, i.e., their ability to forecast the market may be different in up versus down markets. The model distinguishes between up markets when the fund outperforms the risk-free return rate and down markets in case of underperformance by including a dummy variable, such that their estimated equation takes the form:

$$R_{i,t} - R_{f,t} = \alpha + \beta \cdot (R_{m,t} - R_{f,t}) + \gamma \cdot [D \cdot (R_{m,t} - R_{f,t})] + e_t, \qquad (7)$$

where D is a dummy variable given a value of -1 for periods in which $R_{m,t} - R_{f,t}$ is negative (i.e., down market) or a value of zero otherwise. The assumption behind the H-M model is that the fund manager may forecast correctly where market returns exceed the risk-free rate. The intercept α in Equation (7) is the risk-adjusted return which measures the stock-selection ability. The coefficient β is the systematic risk of the fund which represents the beta of the portfolio in up markets, while the coefficient γ measures the market-timing skill.

4. Data

The data set consists of monthly prices of MPF constituent equity funds, from the launch of MPF scheme on December 1, 2000 to December 31, 2006, giving a total of 72 monthly observations. All of these data were provided by Lipper Asia Limited.[2] The net asset value (NAV) of these equity funds is reduced by the exact amount of dividends or capital gain distributions paid to the shareholders. Thus, the monthly prices in the database have been adjusted and are inclusive of these distributions. Most previous studies suggest that using monthly data for mutual fund performance studies is appropriate as their distribution is closer to normal than the distribution of daily returns. According to the categories specified by Hong Kong Investment Fund Association (HKIFA), the sample equity funds are separated into Hong Kong Equity, US Equity, Japanese Equity, Asia Excluding Japan Equity, Asia Excluding Japan and Hong Kong Equity, European Equity, and Global Equity. This study excludes the category "other equity", which includes only one Korean equity fund and four China equity funds as there are no benchmarks designed for this category. Separating the funds is important when using risk-adjusted alphas to benchmark performance, because the risk-adjusted measures include different benchmarks for different fund types.

Continuously compounded monthly returns are computed for each fund by taking the natural logarithm of the change in monthly NAV for each month in the sample, i.e.,

$$R_{i,t} = \ln \frac{NAV_{i,t}}{NAV_{i,t-1}}, \tag{8}$$

where $R_{i,t}$ is the return on fund i during the month t, $NAV_{i,t}$ is the net asset value of fund i at month t, and $NAV_{i,t-1}$ is the net asset value of fund i at month $t-1$. The natural logarithmic monthly returns are then compounded to create quarterly and annual cumulative returns under the assumption of reinvestment of all distributions such as dividends and are net of all expenses except front-end or redemption load charges.

Seven equally-weighted style portfolios are constructed according to the classification scheme specified by HKIFA. They are: (1) HKEQ — a portfolio of Hong Kong Equity funds; (2) USEQ — a portfolio of US Equity funds; (3) JPEQ — a portfolio of Japan Equity funds; (4) ASJEQ — a portfolio

[2]Source: www.lipperweb.com

Table 1. Numbers of constituent equity funds with complete data by type.

	Number of Funds as at					
Fund Groups	31/12/01	31/12/02	31/12/03	31/12/04	31/12/05	31/12/06
HKEQ	16	20	22	23	24	26
USEQ	5	7	8	8	8	7
JPEQ	1	3	3	3	3	5
ASJEQ	5	5	5	8	8	11
ASJHKEQ	3	3	3	5	5	5
EUEQ	3	5	5	5	5	5
GBEQ	12	14	17	17	17	18
Total	**45**	**57**	**63**	**69**	**70**	**77**

The numbers in the table are the number of equity funds in the respective portfolio as at the date shown on the column headings. The equity funds are separated into seven groups according to the classification scheme specified by the Hong Kong Investment Fund Association (HKIFA) as at December 2006. The fund group titles stand for: (1) HKEQ: Hong Kong Equity Funds; (2) USEQ: US Equity Funds; (3) JPEQ: Japan Equity Funds; (4) ASJEQ: Asia excluding Japan Equity Funds; (5) ASJHKEQ: Asia excluding Japan and Hong Kong Equity Funds; (6) EUEQ: European Equity Funds; and (7) GBEQ: Global Equity Funds. The portfolios of funds for each fund group are equally weighted of all the funds that existed during the period January 2001 to December 2006.

of Asia Excluding Japan Equity funds; (5) ASJHKEQ — a portfolio of Asia Excluding Japan and Hong Kong Equity funds; (6) EUEQ — a portfolio of European Equity funds; and (7) GBEQ — a portfolio of Global Equity funds.

The MPFA prescribed saving rates quoted by the Mandatory Provident Fund Scheme Authority is used as a proxy for the risk-free rate ($R_{f,t}$). The source of the quotes is the official webpage of MPFA. As monthly returns are required, it is appropriate to convert the stated percent per annum to continuous monthly rates as follows:

$$R_{f,t} = \frac{\ln[1 + R_{\text{annum},f,t}]}{12} \tag{9}$$

where $R_{\text{annum},f,t}$ is the annual MPFA prescribed saving rates at month t.

Previous research has shown that choosing a suitable benchmark is critical when evaluating equity fund manager performance. The performance of the benchmark should represent the performance that the investors would earn in the same class of securities. In this study, each portfolio is matched to an appropriate index which is expressed in Hong Kong dollars. Specifically, for each portfolio they are: (1) FTSE MPF Hong Kong Index for HKEQ portfolio; (2) FTSE MPF USA (35% HK$ Hedged) Index for USEQ portfolio; (3) FTSE MPF Japan (35% HK$ Hedged) Index for JPEQ portfolio; (4) FTSE MPF Asia Pacific ex Japan and AU and NZ Index for ASJEQ portfolio; (5) FTSE MPF Asia Pacific ex Japan ex HK Index for ASJHKEQ portfolio; (6) FTSE MPF Europe (35% HK$ Hedged) Index for EUEQ portfolio; and (7) FTSE MPF All-World (35% HK$ Hedged) Index for GBEQ portfolio. The data of the quotes of the series of these benchmark indices are obtained from the DataStream.

Table 2 presents an overview of the monthly return performance for each portfolio over the period 2001–2006 and the funds in ASJEQ category provide the highest average monthly return (1.7879% per month) while the funds in the USEQ category perform the worst (0.1283% per month). Table 2 also shows that although the funds perform poorly during the first year of operation (2001), most of the categories generated a positive average return between 2002 and 2006. Table 3 presents a quarterly breakdown of the returns to the sample of equity funds over the sample period. The effect of the September 11, attacks and the outbreak of SARS are clearly evident in these returns data in the third quarter of 2001 and the first quarter of 2003. Table 4 presents a summary of the annual returns to each fund

Table 2. Descriptive statistics of monthly returns for fund style categories.

Fund Groups	Mean Return (%)	Standard Deviation	Maximum	Minimum
HKEQ	1.3610	1.0056	5.2650	0.5359
USEQ	0.1283	0.3349	0.8203	−0.1393
JPEQ	1.1731	0.6236	2.1654	0.4543
ASJEQ	1.7879	0.8039	3.4707	0.8034
ASJHKEQ	1.3931	0.4343	1.8952	1.0388
EUEQ	0.6661	0.5559	1.2654	0.0116
GBEQ	0.8248	0.8964	3.7463	0.0424

The 73 equity funds are separated into seven fund groups according to the classification scheme specified by the Hong Kong Investment Fund Association (HKIFA), where the fund group titles stand for the following fund groups: (1) HKEQ: Hong Kong Equity Funds; (2) USEQ: US Equity Funds; (3) JPEQ: Japan Equity Funds; (4) ASJEQ: Asia excluding Japan Equity Funds; (5) ASJHKEQ: Asia excluding Japan and Hong Kong Equity Funds; (6) EUEQ: European Equity Funds; and (7) GBEQ: Global Equity Funds. The portfolios of funds for each fund group are equally weighted of all the funds that existed during the period January 2001 to December 2006. The numbers in the table are monthly returns in percentage rates per month. The monthly return of every fund group portfolio is the average of the monthly returns of the equity funds in that group. The mean return for each fund group is the average of the monthly returns of respective fund group portfolio over the period January 2001 to December 2006. The standard deviation measures the spread of the monthly returns of respective fund group portfolio.

Table 3. An overview of MPF equity fund quarter performance.

Fund Groups	Measures	2001 Q1	2001 Q2	2001 Q3	2001 Q4	2002 Q1	2002 Q2	2002 Q3	2002 Q4
HKEQ	Mean return (%)	−4.0646	0.9483	−8.5518	4.5821	−0.8891	−1.0339	−5.1916	0.3877
USEQ	Mean return (%)	−5.8466	1.7146	−5.9401	2.8120	−0.8196	−5.1479	−6.2950	1.7801
JPEQ	Mean return (%)	−1.2670	1.0386	−7.8831	−1.2794	0.7089	1.1490	−4.9941	−1.5816
ASJEQ	Mean return (%)	−3.7628	0.5627	−8.0056	7.8984	2.6789	−1.7344	−5.7014	0.7510
ASJHKEQ	Mean return (%)	−3.1986	1.0605	−7.0312	8.4609	5.6775	−2.0341	−6.4456	−0.0406
EUEQ	Mean return (%)	−4.6870	−0.0825	−5.5502	2.8348	−0.1162	−1.7905	−8.2516	2.1805
GBEQ	Mean return (%)	−3.8410	0.1715	−5.4865	2.9016	−0.0908	−3.3900	−6.3794	1.6497
Fund Groups	**Measures**	**2003 Q1**	**2003 Q2**	**2003 Q3**	**2003 Q4**	**2004 Q1**	**2004 Q2**	**2004 Q3**	**2004 Q4**
HKEQ	Mean return (%)	−1.7371	3.7624	5.9701	3.8243	1.1297	−1.8112	2.9430	3.0367
USEQ	Mean return (%)	−1.2408	4.4395	0.6705	3.4539	0.4013	0.0775	−0.9658	2.7842
JPEQ	Mean return (%)	−3.1114	5.1038	6.4021	2.6990	4.9807	−0.8118	−2.6516	3.1537
ASJEQ	Mean return (%)	−2.6188	5.7563	5.0933	3.8643	2.3479	−3.3238	1.7126	3.4251
ASJHKEQ	Mean return (%)	−2.2065	5.4191	3.7833	3.9034	1.7070	−3.9809	1.2341	2.7037
EUEQ	Mean return (%)	−3.8080	6.2355	0.9067	5.4096	0.0926	0.4832	0.2438	4.0923
GBEQ	Mean return (%)	−2.4845	5.0483	1.9224	4.1938	0.9425	−0.4414	−0.1609	3.6906

Table 3. (*Continued*)

Fund Groups	Measures	2005 Q1	2005 Q2	2005 Q3	2005 Q4	2006 Q1	2006 Q2	2006 Q3	2006 Q4
HKEQ	Mean return (%)	−1.0192	1.6712	2.3068	−0.1408	3.4110	0.3036	2.5825	5.2905
USEQ	Mean return (%)	−0.7045	0.2696	1.2178	0.5621	1.0370	−0.8932	1.7005	1.8217
JPEQ	Mean return (%)	0.2520	−0.7324	5.5980	4.0147	2.1587	−3.2777	−0.9696	0.9259
ASJEQ	Mean return (%)	0.3829	0.8462	2.0968	2.9108	2.7543	−0.3831	2.1110	4.8128
ASJHKEQ	Mean return (%)	0.4757	0.6259	3.1942	3.6286	2.1582	−0.7299	1.0850	3.7048
EUEQ	Mean return (%)	0.1816	−0.2128	2.5523	0.5967	4.0471	0.0021	1.2828	3.3192
GBEQ	Mean return (%)	−0.3594	−0.0926	2.4005	1.2947	1.8945	−0.4799	1.6440	2.8277

The 73 equity funds are separated into seven fund groups according to the classification scheme specified by the Hong Kong Investment Fund Association (HKIFA). The portfolios of funds for each fund group are equally weighted of all the funds that existed during the period January 2001 to December 2006. The numbers in the table are quarterly returns in percentage rates per quarter. The quarterly return of every fund group portfolio is the average of the quarterly returns of the equity funds in that group as at the specified quarter.

Table 4. An overview of MPF equity fund annual performance (2001–2006).

Fund Groups	Measures	2001	2002	2003	2004	2005	2006
HKEQ	Mean return (%)	−1.9293	−1.7052	2.9183	1.3047	0.6922	2.8695
USEQ	Mean return (%)	−1.9061	−2.6758	1.8055	0.5648	0.3337	0.9106
JPEQ	Mean return (%)	−2.4058	−1.2111	2.7073	1.1220	2.2497	−0.3348
ASJEQ	Mean return (%)	−1.0032	−1.0533	2.9683	1.0193	1.5516	2.3428
ASJHKEQ	Mean return (%)	−0.2440	−0.8087	2.6817	0.3816	1.9692	1.5403
EUEQ	Mean return (%)	−1.9321	−2.0753	2.1054	1.2145	0.7737	2.1500
GBEQ	Mean return (%)	−1.6009	−2.1037	2.1361	0.9933	0.8029	1.4781

The 73 equity funds are separated into seven fund groups according to the classification scheme specified by the Hong Kong Investment Fund Association (HKIFA). The portfolio of funds for each fund group is equally weighted of all the funds that existed during the period January 2001 to December 2006. The numbers in the table are annual returns in percentage rates per year. The annual return of every fund group portfolio is the average of the annual returns of the equity funds in that group as at the end of the specified year.

style during the sample period. The annual returns reveal that most of the equity funds provide negative annual average returns in the first two years of operations (2001 and 2002). After that however, the returns are generally positive.

The conditional models described in Section 3.2 include additional variables that are used to proxy the public information. The third additional variable, (DIV_{t-1}) represents the lagged dividend yield in the Hang Seng Index, which is sourced from HSI Services Ltd.[3] The fourth variable, ($TERM_{t-1}$) is proxied using interest rates of the HKMA Exchange Fund Note and the HKMA Exchange Fund Bill. These data are provided by the Hong Kong Monetary Authority and obtained from the DataStream. The last additional variable, (DEF_{t-1}) which uses the series of Moody's BAA-rated and AAA-rated corporate bond yields, are provided by Moody's Investor Service.

One of the key issues when considering mutual fund performance is the potential survivor bias, which may bias the test results to some degree, depending upon the attrition rate of the population. In this study, it is argued that any potential survivorship bias is minimal. Only one equity fund operated by Chamber CMG Choice, ceased operations during the sample period as the trustee ceased providing MPF services. The data from this MPF is not available and so this fund is excluded from the sample.

[3]Source: www.hsi.com.hk

5. Empirical Results

5.1. *Stock-selection ability*

5.1.1. *Traditional Jensen measure*

Table 5 summarizes the traditional Jensen measures that are used to evaluate the performance of the seven equity fund portfolios. The results show that most of the equity fund groups outperform the market indices, except the USEQ portfolio which has a Jensen alpha of −0.0014 with a t-statistic −3.2681. Thus, while this portfolio provides positive average monthly return

Table 5. Measures of performance: traditional Jensen measure.

Traditional Jensen measure: $R_{i,t} - R_{f,t} = \alpha_i + \beta(R_{m,t} - R_{f,t}) + e_t$					
Fund Group	Regression Output	α	β	F-statistic	Adj. R^2
		Panel A			
HKEQ	Coefficient	0.0013	0.9106	13,361.81*	0.8976
	t-statistic	3.2253*	115.5933*		
USEQ	Coefficient	−0.0014	1.0081	9,373.97*	0.9485
	t-statistic	−3.2681*	96.8193*		
JPEQ	Coefficient	0.0003	1.0697	1,925.24*	0.9080
	t-statistic	0.2660	43.8775*		
ASJEQ	Coefficient	0.0016	0.9181	3,255.84*	0.8764
	t-statistic	1.8656***	57.0599*		
ASJHKEQ	Coefficient	0.0008	1.1133	1,794.16*	0.8721
	t-statistic	0.6503	42.3575*		
EUEQ	Coefficient	0.0014	0.9633	5,753.17*	0.9450
	t-statistic	2.4202**	75.8497*		
GBEQ	Coefficient	0.0007	0.9479	6,386.99*	0.8537
	t-statistic	1.3716	79.9186*		
		Panel B			
All funds	Coefficient	0.0008	0.9497	35,617.65*	0.8904
	t-statistic	3.1773*	188.7264*		

Panels A and B report the regression estimates of the traditional Jensen measure, from the Jensen single-index model for the portfolios of equity funds in different fund groups and all-equity-fund portfolios, respectively. The intercept α is the measure of the traditional alpha that indicates superior performance if it is positive and the coefficient β is an unconditional beta from the following regression:

$$R_{i,t} - R_{f,t} = \alpha_i + \beta(R_{m,t} - R_{f,t}) + e_t$$

where $R_{i,t}$ is the monthly return of the funds in the tth month, and $R_{m,t}$ is the monthly return on the mean-variance efficient market portfolio, i.e., the benchmark indices. Asterisks * indicate significant at 1% level; ** indicate significant at 5% level, and *** indicate significant at 10% level.

0.0915% (Table 2), it generates a negative Jensen measure after adjusting for risk. The ASJEQ portfolio provides the highest alpha of 0.0016, which is positive and significant. This shows that the fund managers of the Asia Excluding Japan equity funds have superior stock selection skills compared with the fund managers in the other fund groups. Without risk-adjustment, the ASJEQ portfolio also provides the highest mean average monthly returns, 1.7188% per month (shown in Table 2), compared to the other fund groups. This reveals that the funds in that group perform well due to not only good performance of the market but also due to the stock-selection skills of the fund managers.

5.1.2. *Conditional Jensen measures*

A Jensen model may be estimated that is conditioning on public information and the results are summarized in Table 6. Panel A of Table 6 shows that the USEQ and JPEQ equity fund portfolios have a higher average alphas generated using a conditional model (−0.14% to −0.06% and 0.03% to 0.25%, respectively). On the other hand, the other portfolios have lower values of alphas when a conditional model is employed; HKEQ (from 0.13% to 0.12%), ASJEQ (0.16% to −0.04%), ASJHKEQ (0.08% to −0.1%), EUEQ (0.14% to 0.1%), and GBEQ (0.07% to 0.00%). These results show that the fund managers in these categories rationally respond to the public economic information and adjust their portfolios accordingly. The results in these portfolios contrast with that of Ferson and Schadt (1996) who found that the alphas became more positive when the conditional model was used to test US mutual funds. Ferson and Schadt (1996) argued that this result was a function of a negative covariance between the excess return on the market portfolio and conditional beta. For the data sampled in this study, a significant negative correlation between the conditional betas and the excess market return in the fund groups which have same or less average alpha values is not found, which explains why the Jensen measures in these fund groups do not become more positive when conditional models are employed.

Table 6 reveals that the five information variables enhance the ability of the model to explain the dynamics in the returns of MPF funds. The F-statistic for the significance of the public information variables are all significant at 5% level of significance. Tables 5 and 6 also present the adjusted R^2 from the two traditional and conditional models, respectively, and the public information variables may provide additional explanatory power of 0.03% to 4.56%.

Table 6. Regression estimates of measures of performance: conditional Jensen measure.

Conditional Jensen measure: $R_{i,t} - R_{f,t} = a + (b_{1,i} + b_{SAV,t} \cdot SAV_{t-1} + b_{JAN,t} \cdot JAN_{t-1} + b_{DIV,t} \cdot DIV_{t-1} + b_{TERM,t} \cdot TERM_{t-1} + b_{DEF,t} \cdot DEF_{t-1}) \times (R_{m,t} - R_{f,t}) + e_t$

Fund Group	Regression Output	α	β	$b_{SAV,t}$	$b_{JAN,t}$	$b_{DIV,t}$	$b_{TERM,t}$	$b_{DEF,t}$	F-statistic	Adj. R^2
					Panel A					
HKEQ	Coefficient	0.0012	0.1660	8.9424	−0.1053	13.0424	9.1191	1.8522	2,345.22*	0.9022
	t-statistic	2.7846*	1.4923	5.7756*	−3.3151*	4.3364*	7.0890*	0.2782		
USEQ	Coefficient	−0.0006	0.7408	7.4720	0.3100	2.0008	3.1013	3.1668	1,756.07*	0.9539
	t-statistic	−1.4737	4.6318*	3.0726*	4.0562*	0.5067	1.3981	0.3370		
JPEQ	Coefficient	0.0025	0.3134	8.7992	−0.3073	11.2134	7.1750	−1.2734	562.68*	0.8801
	t-statistic	2.7650*	1.3561	2.7533*	−3.5729*	1.8131***	2.5395**	−0.0950		
ASJEQ	Coefficient	−0.0004	0.9519	−2.3029	0.2662	17.8042	3.5946	−48.0910	312.77*	0.8767
	t-statistic	−0.3417	2.5205**	−0.4445	1.5874	1.7928***	0.7471	−2.1869**		
ASJHKEQ	Coefficient	−0.0010	0.2902	4.1969	−0.3469	10.5789	6.0525	25.7071	363.48*	0.9177
	t-statistic	−0.9443	0.8358	0.8447	−3.4905*	1.2480	1.3971	1.3654		
EUEQ	Coefficient	0.0010	0.6627	2.3237	0.1134	2.9917	−3.5657	29.2724	1,043.85*	0.9492
	t-statistic	1.6989**	3.6439*	0.8206	1.8893***	0.6867	−1.2845	2.7742*		
GBEQ	Coefficient	0.0000	0.7825	−1.6412	0.2065	−0.3704	−0.8440	22.7717	1,089.75*	0.8566
	t-statistic	0.0260	4.2743*	−0.5937	2.7132*	−0.0856	−0.3173	2.1658**		
					Panel B					
All Funds	Coefficient	0.0005	0.3931	6.2113	−0.0624	8.8630	5.8624	6.7320	6,058.82*	0.8923
	t-statistic	2.0429**	5.4811*	6.0406*	−2.6157*	4.8314*	6.4818*	1.5936***		

Panels A and B report the regression estimates of the conditional Jensen measure from the single-index model for the portfolios of equity funds in different fund groups and all-equity-fund portfolio respectively. The intercept α is the measure of the traditional alpha that indicates superior performance if it is positive and the coefficient β is an unconditional beta from the following regression:

$$R_{i,t} - R_{f,t} = \alpha + b_{1,i}(R_{m,t} - R_{f,t}) + b'_{2,i}[Z_t(R_{m,t} - R_{f,t})] + e_t$$

where $R_{i,t}$ is the monthly return of the funds in the tth month, and $R_{m,t}$ is the monthly return on the mean-variance efficient market portfolio, i.e., the benchmark indices. The vector of information variables, Z, includes the 1-month MPFA saving rate, January dummy variable, HSI dividend yield, maturity spread, and quality spread; $b'_{2,i} = (b_{SAV}, b_{JAN}, b_{DIV}, b_{TERM}, b_{DEF})'$. Asterisks * indicate significant at 1% level; ** indicate significant at 5% level, and *** indicate significant at 10% level.

The results provide evidence that the individual public information variables are related to the excess return of the funds in the sample. Panel B of Table 6 presents the conditional Jensen measures for a portfolio of all equity funds combined. The regression output indicates that all five predetermined public information variables are significant at a 5% significant level. The results are somewhat different when compared to the conditional models applied to the returns of the different fund groups. For HKEQ and JPEQ portfolios, all public information variables except the lagged quality spread in the corporate bond market (DEF_{t-1}) are significant at the 10% level. Two public information variables are significant at either 1% or 10% level for USEQ, ASJEQ, EUEQ, and GBEQ portfolios. The worst case is found in the conditional models for ASJHKEQ portfolio, only the January dummy variable is significant at 1% significance level. Our result contrasts with that of Ferson and Schadt (1996), who found that the lagged dividend yield on stock market and lagged one-month risk-free Treasury bill are usually significant regardless of fund styles.

5.1.3. *Comparison of two measures*

To test if the conditional Jensen measure of individual fund is significantly different from the traditional Jensen measure, parametric paired t-test and nonparametric Wilcoxon matched-pairs test are employed. Table 7 presents the results of both tests. The null hypothesis is that there is no significant difference between the traditional alphas and conditional alphas of individual funds, for portfolios of all funds and seven respective equity fund portfolios. Both t-test and Wilcoxon z-test provide consistent results which suggest that for the all-fund portfolio the traditional alphas are not different from the conditional alphas. When the tests are performed separately for seven portfolios, three portfolios HKEQ, EUEQ and GBEQ still suggest that there are no significant differences between the traditional and conditional alphas at 5% level.

To compare the distributions of traditional- and conditional-alphas, a binomial test is employed. The null hypothesis is that there is no significant difference between the proportions of positive traditional- and conditional-alphas. The results are summarized in Table 8. Panel A presents the binomial test of null hypothesis that the respective proportion of positive individual traditional alphas in portfolio of all funds and that of positive individual conditional alphas in all-fund portfolio equals to 0.5. The number of positive (> 0.000) traditional- and conditional-alphas are 45 (59.21%) and 34

Table 7. Test for the differences between Jensen measures.

Null Hypothesis: H_0:$\mu_{\text{traditional}\,\alpha} = \mu_{\text{conditional}\,\alpha}$ for All Funds and Respective Equity fund Portfolios								
	All Funds ($n = 72$)	HKEQ ($n = 25$)	USEQ ($n = 8$)	JPEQ ($n = 3$)	ASJEQ ($n = 9$)	ASJHKEQ ($n = 5$)	EUEQ ($n = 5$)	GBEQ ($n = 17$)
Parametric test								
t-statistic	0.7807	0.2724	−2.6292	10.5393	−2.9034	7.7256	1.5097	1.1740
p-value (two-tailed)	0.4377	0.7876	0.0391**	0.0089*	0.0229**	0.0015*	0.2056	0.2600
Nonparametric test								
Wilcoxon z-statistic	−0.6024	−0.5262	−1.8660	−1.6036	−2.3133	2.0319	−1.2191	−1.0520
p-value (two-tailed)	0.5469	0.5988	0.0620***	0.1088	0.0207**	0.0422**	0.2228	0.2928

The table presents the result of testing the hypothesis that the conditional Jensen measure is significantly different from the traditional Jensen measure of individual fund for the portfolio of all funds and respective portfolios of equity funds in different fund groups by parametric paired t-test and nonparametric Wilcoxon matched-pairs test. The null hypothesis is set to be H_0:$\mu_{\text{traditional}\,\alpha} = \mu_{\text{conditional}\,\alpha}$ against the alternative H_a:$\mu_{\text{traditional}\,\alpha} \neq \mu_{\text{conditional}\,\alpha}$. Asterisks * indicate significant difference at 1% level; ** indicate significant difference at 5% level, and *** indicate significant difference at 10% level.

Table 8. Test for proportions of positive alphas.

Panel A: Null hypothesis: $H_0{:}p_{+\alpha} = 0.5$ for portfolio of all funds		
	Traditional Alphas ($n = 76$)	Conditional Alphas ($n = 68$)
Number of positive alphas		
Proportion	0.5921	0.5000
p-value (two-tailed)	0.1354	1.0000

Panel B: Null hypothesis: $H_0{:}p_{+\text{traditional}\,\alpha} = p_{+\text{conditional}\,\alpha}$	
	All Funds ($n = 68$)
Mean difference of proportions	0.0921
p-value (two-tailed)	0.2675

The hypothesis that the number of positive traditional alphas and that of positive conditional alphas equal 50% of the total number of equity funds ($H_0{:}p_{+\alpha} = 0.5$) is tested by nonparametric binomial test. The test is conducted by comparing the probability of the observed distribution and the expected probability, and the test statistic is approximated by the asymptotic normal distribution.

(50%) respectively. This implies that incorporating public information into the performance measure, shifts the distribution of the alphas to the left. The finding contrasts with the finding of Ferson and Schadt (1996). Figure 1 presents the respective histogram for the distributions of traditional- and conditional-alphas. The histograms illustrate that the distributions shift to the left when conditional approach is employed, and the values of skewness coefficient also provide a consistent conclusion (skewness coefficient changes from 1.639 to 0.409 when incorporating public information). The binomial test shows that both previous indicated proportions are found not to be significantly different from 50% (p-value is 0.1354 and 1.000 for traditional- and conditional-alphas respectively). Ferson and Warther (1996) show that the conditional alphas will be higher than the traditional alphas when there is a positive correlation between expected market returns and the new money flow into mutual funds over time combined with a negative relation between new money flow and mutual fund betas. It shows that the flow of MPF contributing monies and the cash holdings of these funds do not seem to respond to expected market returns as in the case of US mutual funds.

Panel B of Table 8 presents the binomial test to null hypothesis that there is no difference between the distributions of traditional- and conditional-alphas. The asymptotic z-statistic 0.0921 with p-value 0.2675 provides a result consistent with paired t-test and Wilcoxon z-test on the difference between the means of traditional- and conditional-alphas. The binomial test

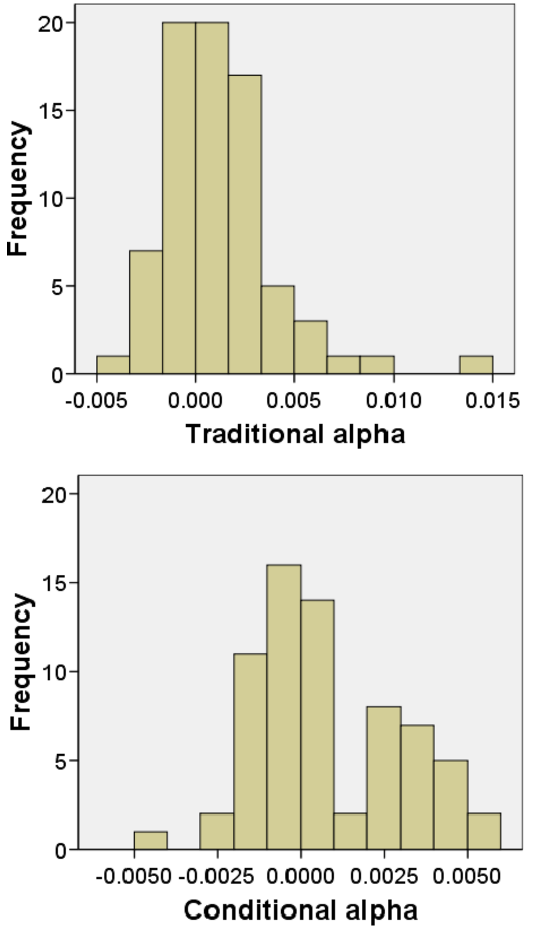

Fig. 1. Distribution of Alphas.

shows that there is no significant difference in the distributions of traditional- and conditional-alphas for the portfolio of all funds.

5.2. *Market timing performances*

The results for the unconditional Treynor and Mazuy (T-M) model [Equation (6)] for each respective portfolio of MPF funds are summarized in Table 9. Compared to Table 5, the unconditional T-M model indicates that two more portfolios, JPEQ and ASJHKEQ, besides USEQ possess negative alphas, albeit statistically insignificant. When investigating the average market timing performance by running T-M model on an all-fund portfolio, the

Table 9. Regression estimates for unconditional Treynor and Mazuy model.

T-M model: $R_{i,t} - R_{f,t} = \alpha + \beta \cdot (R_{m,t} - R_{f,t}) + \gamma \cdot (R_{m,t} - R_{f,t})^2 + e_t$

Fund Group	Regression Output	α	β (beta)	γ (timing coefficient)	F-statistic	Adj. R^2
			Panel A			
HKEQ	Coefficient	0.0019	0.9049	−0.2041	6,694.41*	0.8977
	t-statistic	3.7413*	107.5033*	−1.9136***		
USEQ	Coefficient	−0.0006	0.9857	−0.5892	4,821.54*	0.9499
	t-statistic	−1.1750	83.3799*	−3.8448*		
JPEQ	Coefficient	−0.0025	1.0676	1.4032	1,018.33*	0.9125
	t-statistic	−1.8603***	44.9016*	3.3329*		
ASJEQ	Coefficient	0.0018	0.9161	−0.0610	1,624.74*	0.8762
	t-statistic	1.7150***	52.6352*	−0.3051		
ASJHKEQ	Coefficient	−0.0005	1.1355	0.5836	902.63*	0.8727
	t-statistic	−0.3181	37.7840*	1.5120		
EUEQ	Coefficient	0.0008	0.9754	0.3184	2,907.40*	0.9455
	t-statistic	1.1888	70.0687*	2.0799**		
GBEQ	Coefficient	0.0001	0.9627	0.3860	3,204.53*	0.8542
	t-statistic	0.1880	69.1149*	2.0195**		
			Panel B			
All funds	Coefficient	0.0007	0.9508	0.0355	17,805.99*	0.8903
	t-statistic	2.4232**	174.1462*	0.5187		

Panels A and B report the regression estimates of the unconditional TM model to investigate the existence of market-timing ability for the respective portfolios of different fund groups and all-fund portfolio respectively. The intercept α is the measure of the alpha that indicates superior performance if it is positive, the coefficient β is an unconditional beta and the coefficient γ is the measure of the market-timing ability that indicates superior market-timing if it is positive and inferior if negative, from the following regression:

$$R_{i,t} - R_{f,t} = \alpha + \beta \cdot (R_{m,t} - R_{f,t}) + \gamma \cdot (R_{m,t} - R_{f,t})^2 + e_t$$

where $R_{i,t}$ is the monthly return of the funds in the tth month, and $R_{m,t}$ is the monthly return on the mean-variance efficient market portfolio, i.e., the benchmark indices. Asterisks * indicate significant at 1% level; ** indicate significant at 5% level, and *** indicate significant at 10% level.

T-M model shows that the market timing coefficient is not statistically significant ($\gamma = 0.0355$ with t-statistic $= 0.5187$). When the T-M model is run on the different fund portfolios, we find that four out of seven equity fund portfolios (JPEQ, ASJHKEQ, EUEQ, and GBEQ) exhibit some market timing ability. However, the timing coefficient for ASJHKEQ is statistically insignificant. If comparing the traditional Jensen alphas summarized in Table 5 with the alphas found by the unconditional T-M model, the traditional Jensen alphas of the four portfolios mentioned above are found to be higher than the alphas found by the T-M market timing model. On the other hand, the traditional Jensen alphas of the three portfolios that exhibit inferior market timing ability (HKEQ, USEQ, and ASEQ) are found to be lower than the alphas found by unconditional T-M model. These findings suggest that the unconditional T-M model may capture the existence of market timing ability in the MPF fund managers. In general, these results tell us that the Japanese equity funds, Asia excluding Japan and Hong Kong equity funds, European equity funds, and global equity funds in the MPF scheme may outperform the benchmark and that their managers possess superior market timing ability.

Table 11 shows the distribution of timing coefficients of individual funds by running a separate market timing model for each fund. The second column of Table 11 presents the distribution of T-M timing coefficients of individual funds and a larger proportion of positive timing coefficient than that previously documented in literature is found in the sample. Of the 72 individual equity funds (five do not have sufficient monthly returns to generate the T-M model), 32 (44.44% of effective samples) funds exhibit positive timing coefficients when T-M model is used to evaluate the market timing ability. Table 12 summarizes the number of funds with positive and negative timing coefficients classified by different fund groups. The second column of the table presents the number of timing coefficients run by the unconditional T-M model. Among the 32 funds with positive timing coefficient, only eight of them are significant at level of 10% or less. All of them exhibit negative but not significant stock selection coefficient, which is consistent with the findings documented in previous literature. These cases are: (1) AIA-JF MPF Scheme — Japan Equity; (2) AIA-JF MPF Scheme — Asian Equity; (3) AIA-JF Premium MPF — Asian Equity; (4) HSBC MPF — Supertrust Plus — European Equity; (5) Hang Seng MPF — Supertrust Plus — European Equity; (6) ING MPF Master Trust Basic — International Equity PF; (7) ING MPF Master Trust Comprehensive — International Equity PF; and (8) Standard Chartered MPF — Advanced — Templeton Global Equity.

Table 10 summarizes the results obtained using unconditional Henriksson and Merton (H-M) model [Equation (7)]. Consistent with Gregoriou (2004), the timing coefficient of the H-M model applied to an all-fund portfolio exhibits a sign that is opposite to that estimated using the T-M model. The H-M model indicates that the MPF equity fund managers, on average possess a negative market timing ability. This finding shows that the fund managers

Table 10. Regression estimate of unconditional Henriksson and Merton model.

H-M model: $R_{i,t} - R_{f,t} = \alpha + \beta \cdot (R_{m,t} - R_{f,t}) + \gamma \cdot [D \cdot (R_{m,t} - R_{f,t})] + e_t$

Fund Group	Regression Output	α	β (beta)	γ (timing coefficient)	F-statistic	Adj. R^2
			Panel A			
HKEQ	Coefficient	0.0028	0.8694	−0.0714	6,715.10*	0.8980
	t-statistic	4.2162*	52.2211*	−2.8104*		
USEQ	Coefficient	0.0002	0.9369	−0.1117	4,790.90*	0.9495
	t-statistic	0.2930	40.2043*	−3.4107*		
JPEQ	Coefficient	−0.0041	1.1870	0.2382	1,002.81*	0.9113
	t-statistic	−2.1899**	25.0951*	2.8751*		
ASJEQ	Coefficient	0.0026	0.8926	−0.0445	1,627.02*	0.8763
	t-statistic	1.7556***	25.2615*	−0.8100		
ASJHKEQ	Coefficient	−0.0028	1.2297	0.1919	910.56*	0.8737
	t-statistic	−1.3176	19.8794*	2.0752**		
EUEQ	Coefficient	0.0006	0.9951	0.0514	2,884.24*	0.9451
	t-statistic	0.7002	36.8878*	1.3361		
GBEQ	Coefficient	0.0007	0.9472	−0.0010	3,190.57*	0.8536
	t-statistic	0.9304	34.8856*	−0.0258		
			Panel B			
All funds	Coefficient	0.0011	0.9394	−0.0173	17,810.11*	0.8904
	t-statistic	2.8744*	87.6288*	−1.0826		

Panels A and B report the regression estimates of the unconditional HM model to investigate the existence of market-timing ability for the respective portfolios of different fund groups and all-fund portfolio respectively. The intercept α is the measure of the alpha that indicates superior performance if it is positive, the coefficient β is an unconditional beta and the coefficient γ is the measure of the market-timing ability that indicates superior market-timing if it is positive and inferior if negative, from the following regression:

$$R_{i,t} - R_{f,t} = \alpha + \beta \cdot (R_{m,t} - R_{f,t}) + \gamma \cdot [D \cdot (R_{m,t} - R_{f,t})] + e_t$$

where $R_{i,t}$ is the monthly return of the funds in the tth month, $R_{m,t}$ is the monthly return on the mean-variance efficient market portfolio, i.e., the benchmark indices, and D is the dummy variable equals −1 if $R_{m,t} - R_{i,t}$ is negative and 0 otherwise. Asterisks * indicate significant at 1% level; ** indicate significant at 5% level, and *** indicate significant at 10% level.

unsuccessfully time the market when the market declines, especially during the years 2001 and 2002. Similar to the findings in T-M model, the portfolios HKEQ, USEQ, and ASJEQ exhibit negative market timing coefficients. Besides these three portfolios, the GBEQ portfolio exhibits a negative timing coefficient in the H-M model, while the T-M model indicated a superior timing ability. Compared to Table 5, the H-M model seems to produce evidence

Table 11. Distribution of timing coefficients.

	Unconditional T-M ($n = 72$)	Unconditional H-M ($n = 72$)
Positive %	44.44	44.44
Negative %	55.56	55.56

The table presents the distribution of the timing coefficients of individual funds. The parenthetic numbers in the heading cells show the number of funds with sufficient monthly returns to run the respective models.

Table 12. Distribution of timing coefficients classified by fund groups.

	Unconditional T-M	Unconditional H-M
HKEQ	($n = 26$)	($n = 21$)
Positive %	23.08	19.23
Negative %	76.92	80.77
USEQ	($n = 7$)	($n = 7$)
Positive %	28.57	28.57
Negative %	71.43	71.43
JPEQ	($n = 3$)	($n = 3$)
Positive %	100.00	100.00
Negative %	0.00	0.00
ASJEQ	($n = 9$)	($n = 9$)
Positive %	44.44	55.56
Negative %	55.56	44.44
ASJHKEQ	($n = 5$)	($n = 5$)
Positive %	100.00	100.00
Negative %	0.00	0.00
EUEQ	($n = 5$)	($n = 5$)
Positive %	80.00	80.00
Negative %	20.00	20.00
GBEQ	($n = 17$)	($n = 17$)
Positive %	47.06	47.06
Negative %	52.94	52.94

The table presents the distribution of the timing coefficients of individual funds, split into different fund groups. The parenthetic numbers in the heading cells show the number of funds in the fund groups with sufficient monthly returns to run the respective models.

that is more consistent with the Jensen results. The portfolios with negative market timing coefficients in the H-M model exhibit smaller traditional Jensen alphas than alphas run by the H-M model. On the other hand, those having positive market timing coefficients may produce a higher traditional Jensen alpha. The distribution of positive and negative timing coefficients found by H-M model is shown in the third column of Table 11, which shows that the proportion of negative H-M timing coefficients is same to that obtained when running T-M timing model.

A comparison of timing coefficients generated by the T-M and H-M models for individual funds indicates that all of the funds that are superior market timers by the H-M model are also regarded as superior market timing performers by T-M model, and vice versa. On the other hand, only four funds which are identified as inferior market timing performers by H-M model are identified as having superior market timing ability by T-M model. These are: (1) Fidelity Retirement Master Trust — Hong Kong Equity; (2) HSBC MPF — Supertrust Plus — Hong Kong Equity; (3) Hang Seng MPF — Supertrust Plus — Hong Kong Equity; and (4) Schroder MPF Asian Portfolio.

The number of funds with positive and negative timing coefficients from unconditional H-M model classified by fund group is summarized in the second column of Table 11. Among the 32 funds that exhibit positive H-M timing coefficients, seven of them are significant at the 10% level. These seven equity funds which possess significant positive H-M timing coefficients are found to be offset by poor stock selection performance and all of them are also detected as having positive timing ability by T-M model. These seven funds are: (1) AIA-JF MPF Scheme — Japan Equity; (2) Fidelity Retirement Master Trust — Asia Equity; (3) HSBC MPF — Supertrust Plus — Asian Equity; (4) Hang Seng MPF — Supertrust Plus — Asian Equity; (2) HSBC MPF — Supertrust Plus — European Equity; (6) Hang Seng MPF — Supertrust Plus — European Equity; and (7) Standard and Chartered Bank MPF — Advanced — Templeton Global Equity Fund.

Evidence of a negative association between the stock selection ability (measured by alpha) and market timing performance (measured by gamma) has been documented in the previous literature. The evaluation result of the relation between the alpha- and gamma-measures of individual fund by correlation coefficient is summarized in Table 13. The result shows that the

Table 13. Association between stock selection and market timing performance.

	Unconditional T-M	Unconditional H-M
Correlation coefficient	−0.0224	−0.1512

The table presents the Pearson correlation coefficient computed to evaluate the association between the MPF fund managers' stock selection skill (measured by Jensen alpha) and market timing ability (measured by gamma run by different market timing model).

correlation coefficient is negative regardless of which model is being used to evaluate the market timing performance (−0.0224 for T-M and −0.1512 for H-M), which is consistent with the previously literature.

6. Conclusion

There has been substantial amount of research that focuses on the Hong Kong securities and futures markets. The research on the mutual fund industry in Hong Kong however, is just beginning to emerge. The Mandatory Provident Fund scheme was implemented on December 1, 2000 and a large portion of the Hong Kong workforce are bound to participate in this scheme. This paper represents the first comprehensive study on the performance (raw and risk-adjusted) and market timing ability of Hong Kong Mandatory Provident Funds (MPF) during the period 2001–2006.

The traditional Jensen alpha measure indicates that the MPF constituent equity funds on average may outperform their benchmark. If the performance is evaluated according to the fund groups however, the Jensen measure shows that the US equity funds underperform the market and the Asia excluding Japan equity funds possess the highest risk-adjusted returns. This study examined the ability of public economic information, including lagged MPFA prescribed saving rate, January effect, lagged dividend yield, lagged term spread, and lagged quality spread, to explain MPF equity fund performance. These information variables are all statistically significant and increase the explanatory power of the model. The conditional Jensen measure for both portfolios and also individual MPF equity funds are smaller on average and the distribution of alphas is shifted to the left.

Regarding the market timing performance, the Treynor and Mazuy, and Henriksson and Merton models provide consistent conclusions on the market timing performance for a portfolio of all funds. Both models indicate the MPF equity funds on the average possess significantly positive market timing ability. That implies the fund managers time the market especially during declines. For the individual funds groups, there is some evidence that certain fund groups possess inferior market timing ability. The timing coefficient obtained from these two different models consistently indicates that Japan equity funds and Asia excluding Japan and Hong Kong equity funds possess inferior market timing performance. Regarding the market timing abilities of individual equity funds, the proportion of individual Hong Kong MPF equity funds with negative timing coefficients is higher than that of individual funds with positive timing coefficient, which is consistent with the previous findings in US. These two market timing models produce results which are consistent with the Jensen measure. Specifically, the funds that possess superior market timing ability are shown to have higher traditional Jensen alpha values when compared to the alpha value of the market-timing models; those with inferior market timing ability show lower value of Jensen alpha. A negative association between the Jensen alpha measure and market timing performance measure is found, which is consistent with findings previously documented.

Much work remains to be done for the study on the performance of Hong Kong MPF. While active equity funds are the dominant type of fund, they consistently perform worse than the passively managed index funds. Thus, identifying the characteristics of successful equity fund managers is an important direction for future research. As time passes, more information on the fund operating characteristics (such as fund cash flows, fund size, fund expense level, and turnover rates) will be available which will enable research in this area to be undertaken. A substantial amount of US based research has been undertaken and the evidence suggests that large unexpected cash inflows may cause the fund managers make irrational investment decisions and thus influence the manager's stock selection record. Agarwal and Naik (2000) extended the performance persistence framework for fund evaluation from the traditional two-period framework to a multi-period framework and produced similar results. Given the rapid growth in the Hong Kong MPF scheme, it is possible that these lessons may be relevant. However, only after sufficient time has passed to accumulate the necessary information can such an analysis be undertaken and comparisons be made to the results for hedge funds and Asian hedge funds presented by Agarwal and Naik (2000), and Koh *et al.* (2003).

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