# “Inflows and outflows of mutual funds: a performance comparison of funds offered by traditional banks, insurance companies and mutual fund companies”


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# INFLOWS AND OUTFLOWS OF MUTUAL FUNDS: A PERFORMANCE COMPARISON OF FUNDS OFFERED BY TRADITIONAL BANKS, INSURANCE COMPANIES AND MUTUAL FUND COMPANIES

## Abstract

The transformations in internet technology and financial innovation have led to the prevalence of direct finance, causing indirect finance to contract and concerns among traditional banks and insurance channel operators to seek transformation to innovate traditional services with advanced technology applications. The research compares the sales revenue flows of traditional banks, insurance companies, and mutual fund institutions, using quantile regression methods with five mutual fund factors: Jensen's indexes, expenses, risks, sizes, and turnover rates. The sample statistics from 2001 to 2016 were evident, showing the results that sales revenue flows of bank and insurance companies did not decrease when compared to institutional fund investors, but instead, grew substantially, owing to the significant relationship of better technological services and financial innovation by banks and insurance companies. The research contribution is to point out that financial industry should focus, review and strengthen its most competitive core services inside, which are less challenged by outside competitors. By adhering to financial innovation and internet technology, it is still possible for traditional banks and insurance channels to gain substantial market shares with concentration on their core competitive services.

**Keywords** mutual funds, fund performance, fund characteristics, mutual fund sale flows, quantile regression

**JEL Classification** G21, G22, G23

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## INTRODUCTION

In recent years, network technology and financial innovation have caused direct finance to prevail over indirect finance. An investor can buy mutual funds directly through internet sales or through traditional channels of banks, financial and insurance agents or brokers. This effect has aroused the concern of traditional banks and insurance companies and prompted them to transform and strengthen their services with innovative financial technology.

A bank may have lower account credit financing requirements than those of a brokerage firm, thus making financing investment possible for more individuals. In some instances, traditional banks even cooperate with brokerage firms to provide customers convenient access to a full range of mutual fund products and other investments. Customers find this arrangement convenient, because investors can check their mutual fund balances while banking and



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later on, receive mutual fund statements together with their bank statements. Banking customers are encouraged to use their in-house financial advisors so that bank may gain access to a bigger share of customer investments. Bank tellers and employees are trained to cross-sell and fill a daily quota by attracting customers not only to open checking accounts, but also mortgages, personal loans, savings and investment accounts with the bank. In a business culture valuing convenience and quality, traditional banks, insurance companies, and other financial institutions are all racing to offer one-stop shopping services to fulfil investors' demand because of heightened competition.

Many international scholars focused on changes in interest rates, regulations or price factors. Jank and Wedon (2013), Shu, Yeh, and Yamada (2002) used fund samples to analyze performance and flow. They found that when the size of a fund was different, it directly affected investment behaviors; in other words, the sizes of fund changed the relationship of fund's purchases, redemptions and flow performances.

Rakowski (2010) argued that when fund flows were unstable, it would affect performance. It meant that the high-frequency trading behavior would cause the fund flow to fluctuate drastically, which had a negative impact on the fund, inducing investors to hold funds in the short term. In other words, fund managers often increased the cash holding ratios of the fund's investment portfolio in order to avoid less liquid trading behavior in response to sudden fund redemptions by investors. Fund portfolio with positive pay often came with low cash return because of poor fund performance, a phenomenon Rakowski (2010) called "Cash Drag".

Chen et al. (2007) compared the performance of funds linked to insurance companies with the performance of unlinked funds and analyzed whether investment policies had higher return on investment, lower risks, and different fund analysis of cross-selling pipelines. Chen verified the effect of fund erosion by cross-marketing, and costs erosion on fund performance itself, a result due to the prudent investment principles that institutional investors must invest their funds in high-liquidity and low-return investment targets, making institutional investors unable to obtain excess returns because of risk aversion and liquidity requirement.

Turnover ratio, as its name implies, represents the frequency of buying and selling of different securities during the year. The higher the ratio, the higher the turnover of different securities inside the portfolio. Portfolio turnover can impact a mutual fund's overall performance in several ways. The most obvious effect of high turnover is the corresponding increase in transaction cost. Mutual funds have to pay commissions on their buy and sell trades just like individual investors do, thus lowering the fund returns in a similar manner.

In this research, sales revenue flows of quantile regression were not the major part of the analysis. We compared sales revenue flows of traditional banks, insurance companies, and mutual fund institutions with quantile regression methods to analyze the relationship that sales revenue flows of bank and insurance companies did not decrease when compared to fund institutional investors, but instead, grew substantially, owing to the significant relationship of better technological services and financial innovation by banks and insurance companies.

The remainder of this study is organized as follows: section 1 describes literature review; section 2 discusses data and methodology to examine sales revenue flows of traditional banks, insurance companies, and mutual fund institutions using quantile regression methods and five mutual fund factors; section 3 is the empirical result; final section provides the conclusion.

## 1. LITERATURE REVIEW

This study mainly compared the effect of different fund purchasing channels by individual investors on funds' trading volume by referring to Rakowski's (2010) fund performance model and past literature on Jensen's indicators and used the variables of fund flows, sizes, expenses, risks, and turnover rates to represent fund characteristics in the empirical model.

The flows, as defined by Rakowski (2010), referred to the daily net purchases or redemptions amount of the fund investor. The fund's flow influences not only its transaction cost, but also the cash holding rate. When average fund flow is large, the fund manager's trading behavior is more frequent, thus increasing transaction costs, taxes, handling fees, and possible spread losses. Jank and Wedow's (2013) survey of the subscription and redemption status of German index funds found that investors not only dealt with underperforming funds by selling off holding positions, but also switch to buy good performance funds for profit.

Shu et al. (2002) found that the outflows of large funds were positively correlated with their performance in the previous period. Empirical evidence also showed that large fund investors tended to redeem funds with poor performance and switch to buy funds with better performance. This study also shows that large fund investors, following past performance closely from fund inflows and outflows, preferred short-term transaction for immediate profit, while small funds behaved differently because of size limitations and high cost.

Fund turnover reflects the proactive degree of fund managers operation. Amihud and Goyenko (2013), Grinblatt and Titman (1994), Lee and Swaminathan (2000) all showed a positive relationship between fund turnover and performance in their studies. However, there were also studies showing that high turnover might result in higher transaction costs and expense rates. Proactive trading strategies did not necessarily bring in higher rewards. Carhart (1997), Chalmers, Edelen, and Kadlec (1999) found that a higher fund turnover rate did not pay a higher fund reward and was negatively correlated with performance. Chevalier and Ellison (1997) showed that low cost ratios and turnover rates had an indirect relationship for managers of large funds, but some scholars believed that proactive operation of managers will help fund performance because of the managers' better private information and stock selection ability to increase the fund turnover rates (Dahlquist, Engstrom, & Soderlind, 2000).

Small fund investors tend to have longer holding strategy and, therefore, were less concerned about the fund's past performance; even if recent performance improves, they may continue to hold the investment for a longer period, implying a buy and hold strategy not to seek short-term redemption, but long-term profit. For example, Banz (1981) proposed the earliest transaction scale effect for small-scale portfolio risk adjustment, making smaller size funds more likely to receive excess returns when compared with large funds (Pollet & Wilson, 2008).

Many scholars confirmed the impact of fund risk on trading volume in their studies. O'Neal (2004) used fund risk as an explanatory variable of redemption rate and found that investors prefer to redeem high-risk funds due to the fact that risk-reward rates of high-risk funds fluctuated greatly and were more susceptible to sharp declines, while low-risk funds had less impact on investment returns. When the fund turned profitable, the redemption would happen only if the investor found it large enough to ensure realized income of the book (Frazzini, 2006).

Our samples from the Taiwan Economic Journal use the average value of buy and sell volume to obtain the fund turnover rate indicator. High turnover rate reflects investor's investment sentiment of market fluctuation and showed that Taiwan investors' short-term trading behavior.

Carhart's (1997) empirical results showed that fees and fund turnover had a negative impact on fund performance and were estimated to reduce the market value of performance by 0.95% per transaction. Some scholars studied the impact of the expense rate by setting the expense rate as control variable in the regression model to reduce the information cost of fund investor according to its influence degree. After controlling the expense ratio, they found that high expense rates led to a


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decrease in fund flows, while lower rates attracted more new investors (Huang et al., 2007). However, other scholars believed that fund fees were helpful for the growth of the fund, and, if other conditions remained the same, high expense rates help generate high fund subscription rates (Barber et al., 2005; Jank & Wedow, 2013), implying that the expense ratio could be used as a proxy variable for marketing expenses, and that high cost increased fund's promotion, encouraging more people to purchase funds, a finding seemed inconsistent to common sense.

Huang et al. (2007) used original rates of return in the four-factor analysis of fund risk and flow, respectively. Under two different performance criteria, fund risk and flow were negatively correlated. However, fund risk was not important factor of consideration in purchase and redemption when investors faced heavy promotion by fund advertising funds, because fund advertisements change investors risk attitude.

In many cases, funds with better performance tend to attract capital inflows. Such massive inflows will force fund to diversified investment; otherwise, fund net assets may swell and thus affect the fund's investment performance. The positive element of increased inflows, on the other hand, can help fund managers invest in new and profitable stocks or other financial assets, without selling existing portfolio at a loss, a strategy to keep the turnover ratio low. Heavy outflows may be a poor predictor indicating fund underperformance and thus welcome the possibility of fund merger or liquidation. It is tempting for fund managers to sell off scores of poor-performing funds, because such actions may make the subsequent performance of new incoming funds look better. Our study offers evidence that large inflows or outflows can affect a fund's future performance. Large outflows may jeopardize the viability of funds, causing impatient fund manager of large families to adopt buying strategy to pull the price, which are suffering from heavy redemptions pressure rather than waiting for rebounds. Large inflows, while increasing the funds' odds of survival, may signal a mediocre future performance because of poor investment allocation. Heavy inflows and outflows may not be the definitively selling signals, but they become the signs for fund managers to pay closer attention.

Risk is one of the main factors to measure the performance of a managed portfolio. Empirical evidences, such as Jank and Wedow study of fund-related performance in 2013, developed standards for measuring risk-reward. Using the performance of 34 mutual funds between 1954 and 1963, they tried to find out the reason why some funds outperform others in the market. Empirically, differences in fund performance could be explained by excessive cost rates (Sharpe, 1966). Using more mutual funds to test in similar period (1955–1964), Jensen (1968) found that funds with beta value on average less than 1 had smaller risk and that fund's income became worse when adjusting systemic risk.

Indro et al. (1999) proposed that fund size impacted performance as the size of mutual funds grew larger, their marginal benefits became smaller, making managers incapable to respond timely to interpret appropriate information. As asset size increased, large transactions were increasingly restricted, because larger funds might receive more attention, and market warning signals.

## 2. DATA

The research samples are from the Taiwan Economic Journal (TEJ), a financial database in the Greater China region. It was created in April 1990 to provide the information needed for the basic security analysis of the financial market. The main business is to provide general economic data on domestic and foreign financial industries and consulting services in economic analysis, model design and database construction. Samples from 2001 to 2016 include a total of 126,021 items extracted from TEJ. Excluding 63,171 unqualified samples outside our study scope, a total of 62,850 samples are analyzed accordingly. Our effective samples divide the fund into three categories according to the source of investment: Group A comprised 22,836 funds managed by bank institutional investor; Group B comprised 12,241 funds managed by insurance company investor, and Group C comprised 27,773 funds managed by mutual fund investor.

Table 1 presents descriptive statistics on Cumulative Number, Size, and Risk Statistics. The period of 2001 to 2016 shows that Group A increased from

892 funds to 1,847 funds, and the average fund size was NT$ 1,529.11 million; Group B has risen from 464 funds to 1,003 funds, and the average fund size has been NT$ 1,810.04 million. Funds showing investment-type policy links have a tendency to increase year by year, even if they have experienced financial crisis, there is no significant reduction. But Group C has risen from the 966 funds to 2,867 funds, and the average fund size was NT$ 1,652.34 million, but the size of the fund is shrinking. In terms of fund risk, Group A's 16-year average risk is 20.70%; Group B's 16-year average risk is 20.14%, which is higher than Group C, indicating that it can have lower risk through institutional investment professional managers purchasing funds. It is shown that Taiwan's fund investment does grow fast, because the foreign fund is issued by the legal person. So it is the first entry into the Taiwan fund market and the financial management will be a legal person investment. Then the bank is open and the insurance company is monitored by the law. So the amount of bank and insurance company are small. But from Table 1 shows that the quantity is increasing by years.

Table 2 contained descriptive statistics on fund performance, average size, risk, expenses, and turnover rates with Jarque-Bera statistics indicating little skewness to the right and showing a trend that their overall rates was higher than market average and that most of the fund under study had the characteristics of large-scale, high expenses, and high turnover rates in Taiwan.

In this study, net inflow and net outflow are used as variables. The net inflow volume is obtained from the purchase amount and the previous scale of the fund in the database of the Taiwan Economic Journal. The net outflow volume is obtained from the redemption amount and the previous scale of the fund in the same database. The empirical model is as follows:

$$Inflow_{i,t} = \frac{Purchase_{i,t}}{TotalNetAssets_{i,t-1}}, \quad (1)$$

$$Outflow_{i,t} = \frac{Redemption_{i,t}}{TotalNetAssets_{i,t-1}}, \quad (2)$$

where $Inflow_{i,t}$ – the inflow of fund $i$ in month $t$, $Outflow_{i,t}$ – the outflow of fund $i$ in month $t$, $Purchase_{i,t}$ – the amount of the subscription for fund $i$ in month $t$, $Redemption_{i,t}$ – the redemption amount for fund $i$ in month $t$, $TotalNetAssets_{i,t-1}$ – the total net assets for fund $i$ in the prior month $(t-1)$.

**Table 1.** Fund cumulative number, size, and risk statistics

| Year \ Group | Cumulative | | | Size (NT$ million) | | | Risk (%) | | |
|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | A | B | C | A | B | C |
| 2001 | 892 | 464 | 966 | 1,079 | 1,058 | 1,551 | 37.02 | 38.21 | 37.15 |
| 2002 | 971 | 512 | 1,124 | 1,136 | 1,158 | 1,5475 | 34.82 | 35.77 | 33.23 |
| 2003 | 1,014 | 588 | 1,253 | 1,085 | 1,075 | 1,472 | 22.29 | 22.07 | 20.49 |
| 2004 | 1,165 | 658 | 1,437 | 1,251 | 1,153 | 1,684 | 17.16 | 17.41 | 15.29 |
| 2005 | 1,285 | 734 | 1,564 | 1,331 | 1,296 | 1,510 | 14.82 | 14.96 | 12.99 |
| 2006 | 1,324 | 778 | 1,544 | 1,189 | 1,480 | 1,507 | 21.76 | 18.19 | 16.06 |
| 2007 | 1,355 | 750 | 1,601 | 1,846 | 2,372 | 2,328 | 17.10 | 14.67 | 14.19 |
| 2008 | 1,419 | 757 | 1,626 | 1,905 | 2,497 | 2,127 | 28.84 | 26.13 | 25.91 |
| 2009 | 1,511 | 803 | 1,699 | 1,839 | 2,329 | 1,935 | 27.81 | 27.61 | 27.98 |
| 2010 | 1,574 | 818 | 1,816 | 1,834 | 2,515 | 1,934 | 21.48 | 20.60 | 20.73 |
| 2011 | 1,653 | 848 | 1,895 | 1,944 | 2,386 | 1,723 | 16.38 | 15.72 | 15.52 |
| 2012 | 1,765 | 897 | 2,059 | 1,743 | 2,036 | 1,545 | 20.18 | 19.63 | 18.70 |
| 2013 | 1,785 | 907 | 2,089 | 1,616 | 1,947 | 1,501 | 11.73 | 11.80 | 11.74 |
| 2014 | 1,646 | 871 | 2,040 | 1,612 | 1,957 | 1,533 | 11.56 | 11.50 | 11.72 |
| 2015 | 1,630 | 854 | 2,193 | 1,520 | 1,970 | 1,427 | 13.70 | 13.49 | 12.86 |
| 2016 | 1,847 | 1,003 | 2,867 | 1,536 | 1,810 | 1,114 | 14.50 | 14.40 | 13.26 |
| Total | 22,836 | 12,242 | 27,773 | – | – | – | – | – | – |
| Avg | – | – | – | 1,529.11 | 1,815.04 | 1,652.34 | 20.70 | 20.14 | 19.24 |

*Note:* This study divided the fund into three categories according to the source of investment: Group A represented a bank institutional investor; Group B was an insurance company investor; and Group C was a mutual fund investor.


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**Table 2.** Fund performance statistics

| Coefficient / Variables | Inflow | Outflow | Jensen Index | Expense ratio | Fund risk | Dlog (fund size) | Turnover |
|---|---|---|---|---|---|---|---|
| **Group A** | | | | | | | |
| Average | 4.95 | 4.99 | 0.05 | 0.15 | 19.45 | 6.20 | 143.84 |
| Median | 4.19 | 4.45 | 0.03 | 0.15 | 17.44 | 5.86 | 93.72 |
| St. Dev. | 5.84 | 5.77 | 1.08 | 0.06 | 10.06 | 6.71 | 154.93 |
| Jarque-Bera | 948.05*** | 1568.12*** | 5862.12*** | 140965.10*** | 3208.31*** | 5106.72*** | 59539.22*** |
| **Group B** | | | | | | | |
| Average | 4.93 | 4.98 | 0.09 | 0.16 | 19.05 | 6.27 | 108.88 |
| Median | 4.26 | 4.52 | 0.06 | 0.15 | 16.81 | 6.71 | 146.08 |
| St. Dev. | 5.61 | 5.55 | 1.05 | 0.05 | 10.11 | 6.48 | 146.08 |
| Jarque-Bera | 184.32*** | 749.38*** | 2781.61*** | 102281.90*** | 3319.69*** | 93.77*** | 59900.30*** |
| **Group C** | | | | | | | |
| Average | 4.91 | 4.96 | 0.09 | 0.16 | 17.95 | 6.21 | 109.02 |
| Median | 4.31 | 4.55 | 0.08 | 0.15 | 15.57 | 5.96 | 65.88 |
| St. Dev. | 5.35 | 5.28 | 1.04 | 0.46 | 9.84 | 6.31 | 127.94 |
| Jarque-Bera | 1332.26*** | 2907.56*** | 7141.72*** | 1725739.00*** | 8784.99*** | 530.38*** | 235335.00*** |

*Note:* This study divided the fund into three categories according to the source of investment: Group A represented a bank institutional investor; Group B was an insurance company investor; and Group C was a mutual fund investor.

Table 3 contained fund performance statistics of Sharpe, Jensen and the rate of return since their establishment for the period 2001–2016, showing that Group A had lower performance than those from Group B and C and Group B is roughly in line with Group C according to Sharpe and Jensen indicators. The Sharpe indicator is used as an example to indicate the excess compensation per unit of the mutual fund linked to the investment policy. The Jensen indicator represents whether the fund manager has the ability to select the target of investment, and whether or not to have excess remuneration ability. The rate of return indicators showed that the performance of Group A is higher than those of Groups B and C, indicating that the net value of the mutual fund linked by the investment policy is higher than of those ones.

**Table 3.** Fund performance comparison table

| Group / Year | Sharpe | | | Jensen | | | Fund performance | | |
|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | A | B | C | A | B | C |
| 2001 | –0.33 | –0.30 | –0.29 | –038 | –0.18 | –0.05 | 20.10 | 18.14 | 5.75 |
| 2002 | 0.01 | 0.03 | 0.01 | –0.16 | –0.11 | –0.24 | 21.24 | 13.78 | 9.08 |
| 2003 | –0.09 | –0.07 | –0.08 | –0.62 | –0.51 | –0.58 | 11.17 | 5.53 | 2.82 |
| 2004 | 0.24 | 0.25 | 0.24 | 0.24 | 0.16 | 0.19 | 26.58 | 19.93 | 14.81 |
| 2005 | 0.09 | 0.16 | 0.08 | 0.54 | 0.74 | 0.38 | 34.23 | 31.32 | 22.01 |
| 2006 | 0.10 | 0.33 | 0.30 | 0.21 | 1.06 | 0.83 | 31.91 | 64.52 | 50.19 |
| 2007 | 0.41 | 0.42 | 0.43 | 0.58 | 0.59 | 0.61 | 111.81 | 107.93 | 86.92 |
| 2008 | –0.26 | –0.29 | –0.28 | –0.60 | –0.61 | –0.59 | 58.24 | 55.41 | 41.87 |
| 2009 | –0.03 | –0.04 | –0.03 | –0.14 | –0.27 | 0.14 | 45.76 | 39.81 | 32.36 |
| 2010 | 0.21 | 0.22 | 0.20 | –0.21 | –0.04 | 0.02 | 66.75 | 61.93 | 52.66 |
| 2011 | 0.02 | 0.02 | 0.02 | –0.20 | –0.05 | –0.13 | 66.59 | 62.33 | 51.30 |
| 2012 | –0.09 | –0.08 | –0.06 | –0.05 | –0.02 | 0.11 | 45.85 | 46.33 | 38.57 |
| 2013 | 0.24 | 0.26 | 0.31 | 0.22 | 0.43 | 0.45 | 59.84 | 62.46 | 55.43 |
| 2014 | 0.30 | 0.25 | 0.30 | 0.12 | 0.04 | 0.12 | 84.47 | 83.70 | 76.93 |
| 2015 | 0.09 | 0.08 | 0.09 | 0.34 | 0.31 | 0.29 | 90.79 | 93.60 | 78.24 |
| 2016 | –0.03 | 0.04 | –0.03 | –0.12 | –0.24 | –0.12 | 75.35 | 75.30 | 57.24 |
| Avg. | 0.06 | 0.08 | 0.08 | –0.01 | 0.08 | 0.09 | 53.17 | 52.63 | 42.26 |

*Note:* This study divided the fund into three categories according to the source of investment: Group A represented a bank institutional investor; Group B was an insurance company investor; and Group C was a mutual fund investor. The Sharpe indicator indicates the excess compensation per unit of the mutual fund linked to the investment policy. The Jensen indicator represents whether the fund manager has the ability to select investment targets and whether he has excess compensation.

The average performance of Jensen fund performance during the whole sample period was –0.01 for Group A, approaching zero, indicating negative fund performance from the impact of the financial tsunami during the sample period. The Group B is 0.08, the Group C is 0.09, and the Sharpe average is 0.06 and 0.08.

The average number of Sharpe fund performance is 0.41, –0.33, Group B is 0.42, –0.29, and Group C is 0.43, –0.28, also indicating the negative impact of financial tsunami on performance. The average performance of fund performance during 2010 was 0.21 for Group A, 0.22 for Group B, and 0.20 for Group C, showing that fund performance was recovering from poor zero performance.

# 3. METHODOLOGY

## 3.1. Quantile Regression (QR)

Our research uses the component regression proposed by Koenker and Bassett (1978) and uses the empirical result of the component value as the explanatory variable. The empirical result shows a significant difference between the explanatory variable and the interpreted variable by assigning weights. In addition to estimating the central tendency of the data, we analyze the marginal effect of each specific component under the conditional allocation; that is, to explain the different effects of the variables on the explained variables under different quantiles.

Koenker and Hallock (2001) pointed out that in the face of the study of the relationship between the conditional assignment of explanatory variables and the interpretation of variables, sometimes researchers would take the entire sample into several small samples or group the samples, and then estimate the least squares regression coefficient. However, this method not only loses useful sample information, but may also result in sample selection bias.

Koenker and Bassett (1978) proposed the component regression (Quantile Regression), which had the advantage that the analysis needed not to assume the population distribution to estimate the influence of explanatory variables on the explained variables under each condition component. The least squares method and the component regression yield different results when the explanatory variables have different effects on the conditional allocation of the explanatory variables.

In sum, component regression represents a robust regression. The basic idea is that different sample points are assigned different weights, enabling component regression to avoid interference with extreme values in linear regression analysis with uneven squared differences.

Our research used the quantitative regression method for empirical research. It is expected to provide useful reference through the establishment of the model to effectively control interference, achieve early warning, and improve investment performance.

Most of the research methods used in the past to explore the of fund were OLS linear regression methods with few different quantile research methods. In addition to applying the quantitative regression to estimate the central tendency of the data, this study also analyzes the marginal effects under each specific component to obtain more detailed research findings. The 2008 financial turmoil has caused a turbulent impact on the global investment market and financial market unrest for the period. This study analyzes the results of different types of mutual funds based on flow volume and performance. In spite of the financial crisis, this study enables investors to better understand the performance pattern of fund market and provided important references for academics and industry.

QR model structure is $y_t = x_t'\beta_\theta + \varepsilon_{t\theta}$. In this model, $\theta$ is a quantile between 0 and 1, $\beta_\theta$ is the parameter vector, $\varepsilon_{t\theta}$ is the corresponding error. To summarize, the QR represents a robust regression. The basic idea is to give different weights to different sample points, so when the interference of extreme value exists or the square difference of linear regression analysis is not homogeneous, the QR can also be used. Based on the merit mentioned, we adopt the QR regression in this study.


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## 3.2. Fund characteristics analysis

To avoid using only one single performance index that would cause potential measurement errors, we use Sharpe and Jensen's performance index to measure and compare the funds.

The model is as follows:

$$J_p = R_p - \left[ R_f + \left( R_m - R_f \right) \beta_p \right], \quad (3)$$

$$S_p = R_p - \frac{R_f}{\sigma_p}, \quad (4)$$

where $S_p$ – the Sharpe performance index: it is the fund investment portfolio undertaking the excess remuneration obtained by the total risk of each unit, $J_p$ – the Jensen performance index: it calculates the excess remuneration of the fund according to the average rate of return and the market risk of the fund, and represents the ability of the fund manager to select the target of the investment, $R_p$ – the expense rate of fund return portfolio, $R_f$ – the risk-free interest rate, $\beta_p$ – the systematic risks of fund investment portfolio, $\sigma_p$ – the standard deviation of fund investment portfolio, $R_m$ – the return rate of market portfolio.

Sharpe (1966) thought the risk of the fund consisted of two parts: the risk of the system and the unique risk. The Capital Market Line (CML) is the basis for the evaluation. If the Sharpe ratio of fund portfolio is higher than the Sharpe index of market portfolio M, then the portfolio is located above the CML, and the performance is better than the market. Conversely, if the Sharpe ratio of fund portfolio P is less than the Sharpe index of the market portfolio M, then the portfolio is located under the CML, and its performance is inferior to the market performance. A more significant Sharpe index means better fund performance. Conversely, a less significant Sharpe index means the fund performance will be worse. Sharpe index represents the excess remuneration that an investor can obtain for the total risk of each unit.

The expense rate of a fund is the fund's accounting expense. It does not include the direct cost of the transaction (handling fees and transaction taxes), or the total cost of the fund manager, custodial and other expenses. This cost is deducted from the net value of the fund and does not need additional payments by the investor. Therefore, when the investor is charged a higher rate of fees, it means that investors will not get a better return on investment because of the higher cost, but rather that the cost will offset the performance. The expense rate for this study is calculated as follows:

$$\begin{aligned} &Fund\ expense\ ratio = \left( manager\ cost \right) + \\ &+ \left( custodial\ fee \right) + \\ &+ \left( other\ expenses\ fund\ net\ assets \right) \cdot 100\%. \end{aligned} \quad (5)$$

The fund risk measurement standard for this study is the annual standard deviation calculated from the monthly rate of return in the last 12 months; those established for less than 12 months are not calculated. This method can be used to study the effect of the fund risk on the flow rate. The formula of the standard deviation is:

$$\sigma_i \cdot \sqrt{12}, \quad (6)$$

where $\sigma_i$ is the standard deviation of monthly ROI for 12 months.

This paper studies the monthly net assets of each fund as the fund size, and empirically analyzes the natural logarithm of the fund's net asset value. The calculation method is as follows:

$$\begin{aligned} &Dlog\left( SIZE_{i,t} \right) = \\ &= In\left( \text{net asset value of fund } i \text{ in phase } t \right). \end{aligned} \quad (7)$$

Managers often buy or sell a fund combination in a full period of time. The fund turnover rate can represent the positive degree of the manager's operation. However a high turnover rate also relatively increases the cost and reduces the performance of the fund. Taiwanese Funds at home are generally in a high turnover rate situation. This study is based on the average turnover rate of buying and selling announced by the Securities Investment Trust and Consultant Business Association of the Republic of China. The calculation method is as follows:

$$Turnover_{i,m} = \frac{P_Turnover_{i,m} + S_Turnover_{i,m}}{2}, \quad (8)$$

where $Turnover_{i,m}$ – fund turnover rate for the $i$-term fund in the $m$-month, $P_Turnover_{i,m}$ – purchasing turnover rate for the $i$-term fund in the $m$-month, $S_Turnover_{i,m}$ – selling turnover rate for $i$-term fund in the month of the fund.

The fund purchasing and selling turnover rate data are derived from the "TEJ Fund Turnover Database".

# 4. EMPIRICAL RESULT

## 4.1. Robustness analysis

Tables 4, 9 show is the result of fund inflow/outflow multiple regression analysis, it shows that the fund characteristics such as Jensen index, Expense ratio, Fund risk, Fund size and Turnover are all statistically significant at 1%. Tables 5-7 are correlations of Groups A, B and C. In this study, we also use the Variance Inflation Factor (VIF) to test collinearity. Table 8 shows the coefficient of variation for Groups A, B and C. VIF value greater than 10 is used to detect collinearity. The results show that Group A has the highest VIF value of 6.125, and the average VIF is only 2.249, Group B has the highest VIF value of 2.008, and the average VIF is only 1.466, and Group C has the highest VIF value of 5.077, and the average VIF is only 2.009. These statistics indicate that there is no approximate linear coincidence problem. Table 10 shows the Jarque-Bera statistics, the calculations find that all variables rejected the null hypothesis of skewness at a significant level of 1%.

**Table 5.** Group A correlations

| Variables | Jensen index | Expense ratio | Dlog (fund size) | Fund risk | Turnover |
|---|---|---|---|---|---|
| Jensen index | 1.000 | – | – | – | – |
| Expense ratio | –0.062 | 1.000 | – | – | – |
| Dlog (fund size) | 0.042 | –0.150 | 1.000 | – | – |
| Fund risk | –0.047 | –0.022 | 0.021 | 1.000 | – |
| Turnover | –0.087 | –0.041 | –0.095 | 0.342 | 1.000 |

**Table 4.** Groups regression model of fund inflow

| Dependent variables | Group A | Group B | Group C |
|---|---|---|---|
| Intercept | 4.02*** | 3.82*** | 3.67*** |
| | (163.23) | (119.46) | (164.98) |
| Jensen index | 0.22*** | 0.22*** | 0.21*** |
| | (51.72) | (40.55) | (50.72) |
| Expense ratio | –1.32*** | 0.64*** | 0.21*** |
| | (–12.09) | (5.09) | (2.29) |
| Fund risk | 0.02*** | 0.01*** | 0.01*** |
| | (41.06) | (18.12) | (21.70) |
| Dlog (fund size) | 0.05*** | 0.13*** | 0.23*** |
| | (48.86) | (64.69) | (108.08) |
| Turnover | –0.05*** | –0.07*** | –0.02*** |
| | (–6.34) | (–6.51) | (–2.90) |
| N | 22,836 | 12,241 | 27,773 |
| Adj. $R^2$, % | 26.38 | 37.52 | 37.52 |

*Notes:* The variables for Group A (bank institutional investor), Group B (insurance company investor) and Group C (mutual fund investor) regression model are as follows:

$$(Fund\ inflow)_i = (\text{Intercept})_i + \beta_{1i}^{*}(Jensen\ index)_i + \beta_{2i}^{*}(Expense\ ratio)_i + \beta_{3i}(Fund\ risk)_i + \beta_{4i}^{*}Dlog(fund\ size)_i +$$

$$+\beta_{5i}^{*}(Turnover)_i + \varepsilon_i.$$

*The* variables in model are defined in subsection 3.2. The research sample came from the monthly data of the Taiwan Economic Journal (TEJ) from January 1, 2001 to December 31, 2016, with a total of 192 monthly data samples. Variables include Jensen index, Expense ratio, Dlog (fund size), Fund risk and Turnover; statistical significance of 10%, 5%, 1% is represented by *, **, ***, respectively.


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**Table 6.** Group B correlations

| Variables | Jensen index | Expense ratio | Dlog (fund size) | Fund risk | Turnover |
|---|---|---|---|---|---|
| Jensen index | 1.000 | – | – | – | – |
| Expense ratio | –0.011 | 1.000 | – | – | – |
| Dlog (fund size) | 0.068 | –0.015 | 1.000 | – | – |
| Fund risk | –0.039 | –0.078 | 0.087 | 1.000 | – |
| Turnover | –0.0850 | –0.115 | –0.153 | 0.318 | 1.000 |

**Table 7.** Group C correlations

| Variables | Jensen index | Expense ratio | Dlog (fund size) | Fund risk | Turnover |
|---|---|---|---|---|---|
| Jensen index | 1.000 | – | – | – | – |
| Expense ratio | –0.000 | 1.000 | – | – | – |
| Dlog (fund size) | 0.079 | –0.006 | 1.000 | – | – |
| Fund risk | –0.046 | –0.006 | 0.038 | 1.000 | – |
| Turnover | –0.047 | –0.020 | –0.119 | 0.335 | 1.000 |

**Table 8.** Variance Inflation Factor analysis

| Variance Inflation Factor | Jensen index | Expense ratio | Dlog (fund size) | Fund risk | Turnover |
|---|---|---|---|---|---|
| **Group A** | | | | | |
| 1/VIF | 0.880 | 0.855 | 0.999 | 0.551 | 0.163 |
| VIF | 1.136 | 1.170 | 1.001 | 1.815 | 6.125 |
| **Group B** | | | | | |
| 1/VIF | 0.850 | 0.928 | 0.794 | 0.553 | 0.498 |
| VIF | 1.177 | 1.077 | 1.260 | 1.807 | 2.008 |
| **Group C** | | | | | |
| 1/VIF | 0.894 | 1.000 | 0.988 | 0.544 | 0.197 |
| VIF | 1.118 | 1.000 | 1.012 | 1.838 | 5.077 |

**Table 9.** Groups regression model of fund outflow

| Dependent variables | Group A | Group B | Group C |
|---|---|---|---|
| Intercept | 4.26*** | 4.12*** | 3.98*** |
| | (200.61) | (151.90) | (222.08) |
| Jensen index | 0.18*** | 0.18*** | 0.15*** |
| | (48.64) | (37.76) | (44.78) |
| Expense ratio | 0.29*** | 1.36*** | 1.05*** |
| | (3.09) | (12.66) | (14.40) |
| Fund risk | 0.01*** | 0.00 | 0.00 |
| | (17.21) | (–0.72) | (–0.57) |
| Dlog (fund size) | 0.04*** | 0.00*** | 0.20*** |
| | (51.22) | (68.85) | (114.78) |
| Turnover | –0.05*** | –0.03*** | 0.01 |
| | (–6.49) | (–3.54) | (0.97) |
| N | 22,836 | 12,241 | 27,773 |
| Adj. $R^2$, % | 20.90 | 35.60 | 38.01 |

*Notes:* The variables for Group A (bank institutional investor), Group B (insurance company investor) and Group C (mutual fund investor) regression model are as follows:

$$\left(Fund\ inflow\right)_i = \left(\text{Intercept}\right)_i + \beta_{1i}^{*}\left(Jensen\ index\right)_i + \beta_{2i}^{*}\left(Expense\ ratio\right)_i +$$

$$+\beta_{3i}\left(Fund\ risk\right)_i + \beta_{4i}^{*}Dlog\left(fund\ size\right)_i + \beta_{5i}^{*}\left(Turnover\right)_i + \varepsilon_i.$$

The variables in model are defined in subsection 3.2. The research sample came from the monthly data of the Taiwan Economic Journal (TEJ) from January 1, 2001 to December 31, 2016, with a total of 192 monthly data samples. Variables include Jensen index, Expense ratio, Dlog (fund size), Fund risk and Turnover; statistical significance of 10%, 5%, 1% is represented by *, **, ***, respectively.

**Table 10.** Fund Jarque-Bera table statistics

Source: Taiwan Economic Reporting Database (Taiwan Economic Journal, available at https://www.tej.com.tw/twsite/).

| Coefficient / Variables | Average | | | Median | | | St. Dev. | | | Jarque-Bera | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | A | B | C | A | B | C | A | B | C |
| Inflow | 4.95 | 4.93 | 4.91 | 4.19 | 4.26 | 4.31 | 5.84 | 5.61 | 5.75 | 948.05*** | 184.32*** | 1332.26*** |
| Outflow | 4.99 | 4.98 | 4.96 | 4.45 | 4.52 | 4.55 | 5.77 | 5.55 | 5.28 | 1568.12*** | 749.38*** | 2907.56*** |
| Jensen index | 0.05 | 0.09 | 0.09 | 0.03 | 0.06 | 0.08 | 1.08 | 1.05 | 1.04 | 5862.12*** | 2781.61*** | 7141.72*** |
| Expense ratio | 0.15 | 0.16 | 0.16 | 0.15 | 0.15 | 0.15 | 0.06 | 0.05 | 0.46 | 140965.10*** | 102281.9*** | 172573.90*** |
| Fund risk | 19.45 | 19.05 | 17.95 | 17.44 | 16.81 | 15.57 | 10.06 | 10.11 | 9.84 | 3208.31*** | 3319.69*** | 8784.99*** |
| Dlog (fund size) | 6.20 | 6.27 | 6.21 | 5.86 | 6.71 | 5.96 | 6.71 | 6.48 | 6.31 | 5106.72*** | 93.77*** | 530.38*** |
| Turnover | 143.84 | 108.88 | 109.02 | 93.72 | 146.08 | 65.88 | 154.93 | 146.08 | 127.94 | 59539.22*** | 59900.30*** | 235335.00*** |

*Note:* The sample of this study was taken from the Taiwan Economic Reporting Database (TEJ). The sample data was from January 1, 2001 to December 31, 2016, Group A represented a bank institutional investor; Group B was an insurance company investor; and Group C was a mutual fund investor. Variables include Jensen Index, Expense Ratio, Fund Size, Fund Risk and Turnover; statistical significance of 10%, 5%, 1% is represented by *, **, ***, respectively.

## 4.2. QR analysis

In this study, we used 3 structures instead of more detailed 9 structures to categorize and to find out the sample characteristics. Although these two methods seem to be different, the results are similar, indicating that the same effect can be obtained by using simpler methods with the following benefits:

1) with the descriptive data and estimate parameters in normal distribution, we are much more confident to the statistical results obtained from the dependent variables;

2) we adopt parsimony and efficiency to predict and estimate the value of dependent variables to better understand the measurement value.

Tables 11, 12 show the fund inflow/outflow, performance, and fund characteristics.

## 4.3.The relationship between fund inflow and performance

As shown in Table 11, when the fund inflow of Groups A and B is higher, the performance is stronger. The results of 0.1 to 0.3 quantile are mostly statistically significant. This means that Groups A and B are statistically significant, meaning that the investors will actively redeem good performance funds, following the so-called disposition effect, where stock investors quickly sell profitable stock, and prefer to hold on to the losing stock for a long time. This discovery has the same validation results as in the study of Ippolito (1992). Why are investors actively redeeming good performance funds? It may be because they prefer to dispose of capital gains assets (Kahneman & Tversky, 1979; Ferrini, 2006) to ensure an accounting profit.

The fund outflow of Group B is positively correlated with the performance, and the 0.1 to 0.3 quantiles have statistical significance. This shows that the investors redeem funds not only in times of bad performance, but also in times of good performance, since large-scale fund investors often redeem for short-term profit from the funds, a result similar to the finding obtained by Ippolito (1992), Jank and Wedow (2013), Shu et al. (2002), arguing that large-scale fund investors tend to buy and sell funds with a short-term profit mindset, chasing past performance of minor changes.

In Group C, the higher the outflow of funds, the stronger the response to performance. The results are partly statistically significant and also meet the meaning of the disposition effect. This indicates that whether or not the mutual fund is linked to an institution, the investor's redemption behavior is not the same. The general fund outflow (0.1-0.3 quantile) is significant, showing a strong response of Group A in fund inflow. When large-scale fund investors in Group C redeem their investment, the strength of the fund inflow does not affect the performance of the fund.


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**Table 11.** Fund inflow, performance and fund characteristics

| Characteristics | Component | Group A | | | Group B | | | Group C | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Coefficient | T | P | Coefficient | T | P | Coefficient | T | P |
| Jensen index | 0.30 | 0.21*** | 32.08 | 0.00 | 0.22*** | 28.98 | 0.00 | 0.23*** | 34.17 | 0.00 |
| | 0.60 | 0.25*** | 31.54 | 0.00 | 0.26*** | 24.97 | 0.00 | 0.16*** | 21.92 | 0.00 |
| | 0.90 | 0.20*** | 23.64 | 0.00 | 0.15*** | 14.97 | 0.00 | 0.19*** | 26.11 | 0.00 |
| Expense ratio | 0.30 | –0.90*** | –4.72 | 0.00 | –1.55*** | –4.30 | 0.00 | –0.36** | –1.99 | 0.04 |
| | 0.60 | –0.46** | –2.06 | 0.03 | 0.33 | 1.29 | 0.19 | 0.67*** | 21.92 | 0.00 |
| | 0.90 | –2.14*** | –12.76 | 0.00 | 1.22*** | 8.09 | 0.00 | 0.09 | 0.70 | 0.47 |
| Fund risk | 0.30 | 0.01*** | 16.46 | 0.00 | 0.00 | 0.95 | 0.34 | 0.00*** | 10.08 | 0.00 |
| | 0.60 | –0.46** | –2.06 | 0.03 | 0.02*** | 20.91 | 0.00 | 0.01*** | 23.20 | 0.00 |
| | 0.90 | 0.03*** | 24.97 | 0.00 | 0.02*** | 14.42 | 0.00 | 0.01*** | 13.83 | 0.00 |
| Dlog (fund size) | 0.30 | 0.08*** | 27.10 | 0.00 | 0.27*** | 38.64 | 0.00 | 0.22*** | 54.66 | 0.00 |
| | 0.60 | 0.02*** | 29.01 | 0.00 | 0.10*** | 42.92 | 0.00 | 0.20*** | 72.20 | 0.00 |
| | 0.90 | 0.03*** | 26.02 | 0.00 | 0.16*** | 39.47 | 0.00 | 0.29*** | 64.18 | 0.00 |
| Turnover | 0.30 | –0.01 | –1.07 | 0.28 | –0.04** | –2.30 | 0.02 | –0.10*** | –6.31 | 0.00 |
| | 0.60 | 0.05*** | 36.36 | 0.00 | 0.01 | 1.05 | 0.29 | –0.04*** | –3.49 | 0.00 |
| | 0.90 | –0.03** | –2.36 | 0.01 | –0.09*** | –4.54 | 0.00 | 0.04*** | 3.38 | 0.00 |
| Adjusted R-square | – | 0.24 | – | – | 0.39 | – | – | 0.39 | – | – |

*Note:* The research samples came from the monthly data of the Taiwan Economic Journal (TEJ) from January 1, 2001 to December 31, 2016, with a total of 192 monthly data samples. Those samples divided the fund into three categories according to the source of investment: Group A represented a bank institutional investor, Group B was an insurance company investor, and Group C was a mutual fund investor.

$$Mode\ LOG\ \mathrm{I} = \beta_1 + \beta_2^* (Jensen\ index) + \beta_3^* (\ Expense\ ratio) + \beta_4^* (Fund\ risk) + \beta_5^* Dlog\ (Fund\ size) + \beta_6^* (Turnover) + \varepsilon.$$

The variables include Jensen index, Expense ratio, Fund risk, Fund size, and Turnover. The significance levels of 10%, 5%, and 1% are represented by *, **, and ***.

## 4.4. The relationship between fund outflow and performance

As shown in Table 12, Groups A, B, C showed a partially negative correlation between the fund outflow and the expense rate, and the partial quantile had statistical significance.

## 4.5. The relationship between fund outflow and expense rate

This analysis shows that when the investors redeem funds, they are more concerned about the expense rate. The fund outflow and expense rate of Group B funds at 0.1 to 0.6 quantile have the sta-

**Table 12.** Fund outflow, performance and fund characteristics

| Characteristics | Component | Group A | | | Group B | | | Group C | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Coefficient | T | P | Coefficient | T | P | Coefficient | T | P |
| Jensen index | 0.30 | 0.17*** | 32.63 | 0.00 | 0.18*** | 28.17 | 0.00 | 0.16*** | 33.44 | 0.00 |
| | 0.60 | 0.19*** | 27.13 | 0.00 | 0.17*** | 18.89 | 0.00 | 0.10*** | 15.54 | 0.00 |
| | 0.90 | 0.17*** | 22.71 | 0.00 | 0.15*** | 17.20 | 0.00 | 0.15*** | 24.63 | 0.00 |
| Expense ratio | 0.30 | 0.70*** | 4.60 | 0.00 | 2.12*** | 7.02 | 0.00 | 1.27*** | 9.58 | 0.00 |
| | 0.60 | 2.29*** | 11.38 | 0.00 | 2.20*** | 9.74 | 0.00 | 1.76*** | 12.80 | 0.00 |
| | 0.90 | –0.58*** | –3.88 | 0.00 | 1.20*** | 9.51 | 0.00 | 0.75*** | 6.74 | 0.00 |
| Fund risk | 0.30 | –0.00 | –1.13 | 0.25 | –0.00*** | –11.60 | 0.00 | –0.00*** | –8.06 | 0.00 |
| | 0.60 | 0.01*** | 19.45 | 0.00 | 0.00*** | 8.74 | 0.00 | 0.00*** | 8.48 | 0.00 |
| | 0.90 | 0.01*** | 8.49 | 0.00 | 0.00 | 0.33 | 0.73 | 0.02*** | 2.06 | 0.00 |
| Dlog (fund size) | 0.30 | 0.07*** | 29.79 | 0.00 | 0.24*** | 41.01 | 0.00 | 0.17*** | 58.17 | 0.00 |
| | 0.60 | 0.04*** | 35.62 | 0.00 | 0.08*** | 40.34 | 0.00 | 0.18*** | 72.41 | 0.00 |
| | 0.90 | 0.03*** | 28.50 | 0.00 | 0.14*** | 42.94 | 0.00 | 0.26*** | 70.08 | 0.00 |
| Turnover | 0.30 | –0.05*** | –3.38 | 0.00 | 0.01 | 1.06 | 0.28 | –0.08*** | –6.91 | 0.00 |
| | 0.60 | –0.04*** | –3.95 | 0.00 | 0.03** | 2.51 | 0.01 | –0.00 | –0.01 | 0.98 |
| | 0.90 | –0.06*** | –5.31 | 0.00 | –0.07*** | –4.30 | 0.00 | 0.03*** | 3.39 | 0.00 |
| Adjusted R-square | – | 0.26 | – | – | 0.37 | – | – | 0.39 | – | – |

*Note:* The research sample came from the monthly data of the Taiwan Economic Journal (TEJ) from the period of January 1, 2001 to December 31, 2016, with a total of 192 data samples. Those samples divided the fund into three categories according to the source of investment: Group A represented a bank institutional investor, Group B was an insurance company investor, and Group C was a mutual fund investor.

$$Mode\ LOG\ \mathrm{I} = \beta_1 + \beta_2^* (Jensen) + \beta_3^* (\ Expense\ ratio) + \beta_4^* (Fund\ risk) + \beta_5^* Dlog\ (Fund\ size) + \beta_6^* (Turnover) + \varepsilon.$$

The variables include Jensen index, Expense ratio, Fund risk, Fund size, and Turnover. The significance levels of 10%, 5%, and 1% are represented by *, **, and ***.

tistical significance, indicating that when the insurance investors redeem funds, they prefer those with high expense rates. The fund outflow and expense rates of Group C at 0.3 to 0.5 are statistically significant, showing that when investors redeem funds, they tend to redeem those with high expense rates. This result is the same with Group B, meaning that whether or not the investors are insurance-related, when they redeem funds, it always affects the fund expense rate.

## 4.6. The relationship between fund outflow and risk

The fund outflow of Group B is positively correlated with most of the fund risk and has statistical significance. The fund outflow and fund risk of Group C are mostly not significant under the various conditions, a result different from the study of Fu Ying-fen et al. (2010) who argued that when investors faced purchase or redemption of advertised funds, they did not consider risk factors too much, because the funds' ads changed the investors' attitude toward risk. Although we did not analyze the advertisement of the funds, investment-linked products are mostly sold to consumers through direct marketing or channel marketing methods, an argument consistent to the results of Groups B or C.

The regression result of Group B is significant and positively correlated at 0.1 to 0.3 quantile. This shows that when the insurance investors redeem funds, they not only redeem the poorly performing funds, but also make a profit on the better performance fund. The redemption of Group C is significant in each condition at 0.2-0.3 quantile. This indicates that the fund investors all tend to redeem good performing funds actively.

This study has a different argument from Fu Ying-fen et al. (2010), thinking that when the investors purchase or redeem advertised funds, they should also take into account the risk factors, because fund advertisements change investors' attitude to risk. Although this study does not analyze the advertisement of funds, the sales of investment-linked products are mostly communicated to consumers through direct marketing or channel marketing techniques, an arguments different from those of previous studies.

## 4.7. The relationship between fund outflow and size

The redemption volume and the fund size of Groups A, B, C at 0.1-0.3 quantiles have statistical significance. Although they show a positive correlation, they also indicate that investors' preference for redeeming high fund value will weaken as the fund outflow grows. These results are similar to the study by Jank and Wedow(2013), indicating that the size of a fund affects the relationship between flow and performance; that is, the larger the scale of fund families, the higher the redemption rates and purchase rates. On the other hand, if variables are insignificant, indicating that when the investors face redemption decisions, there is no preference for the size of the fund assets. However, an insurance investor, compared to institutional and mutual fund investors, is more concerned about the fund size when redeeming funds.

## 4.8. The relationship between fund outflow and turnover

Our study only found partially positive correlation in the quantile regression analysis of Groups A, B, and C, indicating statistical significance in the outflow of the general fund and the outflow of the strong fund families. The results of group B showed that the fund outflow was mostly negatively and significantly correlated with the fund turnover at the 0.1-0.9 quantiles, meaning that the fund turnover would change as the fund outflow increased. We also found that fund outflow and turnover of Group C was partially and positively correlated with statistical significance under various conditions, showing that the fund turnover were still affected by the fund outflow indirectly.

The increase of turnover was accompanied by an increase in the fund outflow, a phenomenon that could be explained by the motivation of insurance-linked investors to actively convert the investment target of the portfolio to seek other portoflio with better returns. On the other hand, the fund outflow and turnover rate were statistically significant only in the outflow of the weak fund as exhibited in the 0.1-0.3 quantiles, showing the result that the increase in fund outflows had no effect on the sensitivity of fund flows and turnover rates.


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## CONCLUSION AND RECOMMENDATION

Recent promotion of financial technology and online banking becomes popular for the banking industry, enabling investors to easily adjust the deduction date and amount of to purchase different investment funds, as well as to manage their own investment portfolios with great convenience. The combination of big data analysis and digital development helps to transform large and complex data into information for easy analysis. The use of Robotic Process Automation (RPA) to simplify the process of banking and life insurance makes direct finance more attractive and indirect finance to contract.

However, the advantage of traditional banking and insurance industry includes many branches, plenty of products selection with different local and foreign prices, but with the disadvantage of higher expensive transaction fees. The advantage of institutional fund lies in proficient financial information and specialization in trading trends, research reports, and investment opinions, a focus of market attention to attract investors to follow up.

This study investigated the mutual fund industry in Taiwan with three categories of bank, insurance company and fund institution as research design. More specifically, the study tested the fund performance under three categories in samples of mutual funds over the period 2001–2016 using QR analysis and five mutual fund variables of concern: Jensen index, expense rates, risk, size, and turnover rates. The Taiwan mutual fund industry offered an excellent sample to test product links to different industry categories in the financial market. Our main conclusions are three-fold.

First, the relationship between a bank fund expense ratio and its flow from the bank is better than that of insurance-linked and institutional investors. The fund inflow meets the argument proposed by Huang et al. (2007) that a high expense rate led to a decrease in a fund's flow and a lower expense rate would attract new investors because of the improved performance, indirectly making the relationship between fund flow and performance more sensitive in times of good performance.

Second, investment performance via bank channels are still better than those of institutional mutual fund and insurance-linked investors, an similar arguments proposed by Huang et al. (2007), Jank and Wedow (2013), which said that the size of a fund affected the relationship between fund flows and the fund performance. The fund linkings to large fund families attracts more net flows, an similar argument posited by some international scholars, but our research results using Taiwan fund samples are different from the study by Fu Ying-fen et al. (2010), indicating that investors may not be too concerned about risk because the investment-linked products are mostly sold through massive access marketing channels having more opportunity to host direct face-to-face briefings, and, thus, insurance investors are more likely to change their minds about risks due to advertisement promotional effects.

Third, regardless of institutional investors, the relationship between bank fund inflows and performance is better than those of the insurance-linked and institutional fund investors. The purchase and redemption of insurance investors are affected by the deferred rate of return, i.e., the higher the amount of purchase, the stronger the relationship between fund inflows and fund performance. This conclusion is different from the past research due to the changing investment environment over time, since insurance investors are no longer more favored than non-insurance-based ones because of the ease of use and the spread of technology in transactions. Since non-insurance investor's performance preference are positively correlated with fund risk, showing the return pattern of risk-adjusted profile. A risk averter such as the insurance-linked investor will try to redeem a fund when the fund risk increases over time whereas a risk lover will continue to hold on to it.

We conclude our comprehensive evaluation that overall performance of the banking investors is better than those of insurance-linked investors and institutional fund investors, because investors are more comfortable with banks, still preferring to invest under the advice from the traditional banking channels even when banks charge high handling fees.

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