台灣共同基金清算決定因素以及合併基金股東財富移轉效果

The Exit Determinants and Wealth Effects in the Taiwan Mutual Fund Industry

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摘要：本研究旨在探討台灣共同基金進行合併或清算的決定因素，以及合併後基金股東的財富影響效果。實證結果發現，清算基金的績效表現是最差的，同家族內的合併基金表現次之，而存活的基金表現是最好的。從基金流量的角度觀察，前期績效較差且長期資金淨流出的基金會增加被清算的機率；另一方面，前期績效較差但短期資金淨流出的基金則較容易進行同機構內基金的合併動作。透過相互合併的基金樣本發現，主併基金的績效在併購後呈現明顯的衰退，相反的，併購對於被併基金是最有利的。意味著合併過程可能造成主併基金股東的財富移轉至目標基金的投資人。合併後存續下來的基金，併購之後的資金仍然呈現淨流出的現象。由於併購改善經濟規模效果，存續基金的費用率可望在合併後的第二年出現下降的情況。

關鍵詞：共同基金；績效；清算；合併

Abstract：This study examines the determinants of mutual fund mergers and liquidations, and discusses the subsequent wealth impacts of mergers on investors in the Taiwan Mutual Fund Industry. Liquidated funds showed the worst performance, funds merged within the same family ranked second, and surviving

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funds were the best. Poor prior performance and long-term fund outflows increase the possibility of being liquidated. Similarly, poor prior performance and short-term fund outflows lead to higher odds of a within-family merger. Investors in an acquiring fund experienced a significant deterioration in performance subsequent to the merger activity. In contrast, the investors of target funds benefited from these combinations. The net asset flows continued to remain negative for the combined fund in the year following the merger. The expense ratio of combined funds declined in the second post-merger year due to improved economies of scale after the merger.

Keywords: Mutual fund; Performance; Flow; Liquidationk; Merger

1. Introduction

Given the rapid growth in the Taiwan mutual fund industry during the 1990s, the investment trust companies have designed and initiated many new financial products. Meanwhile, a large number of funds have also exited the market over the past few years. Mutual fund closures are not extraordinary events; actually, they happen all the time as part of the fund industry's natural business cycle. In particular, due to the decline of the global stock market in late 2008, the numbers of defunct funds reached a record level in 2008.

Mutual fund liquidation and fund mergers are normal market exit mechanisms and are considered to be one means of reducing what may be perceived as an excessive supply (Zhao 2005). Fund families are in business to make a profit, with the hope that funds can operate with economies of scale in which bigger is better from a cost-savings perspective. As costs increase and the fund families start to feel that it is becoming unprofitable to operate, the fund will be faced with the choice of being terminated or merged with other funds. In addition to the consideration of costs and profitability, fund families may merge funds because the merger gets rid of bad performers, so that dreary track records disappear from fund literature and databases, making the fund families look better than they really are. After thoroughly considering various factors like prior

performance and flows, fund families make decisions about whether a mutual fund should be liquidated, merged, or kept in the fund market.

The relevant factors guiding fund families' exit choices have attracted some attention, but only a few papers are dedicated exclusively to this topic (Jayaraman, Khorana and Nelling, 2002; Zhao, 2005). The survivorship bias literature also addresses issues regarding the fund exit process. For example, several studies have shown that poor performance increases the exit probability of a fund, and that funds are more likely to exit when overall market performance is poor (see Brown and Goetzmann, 1995; Elton, Gruber and Blake, 1996; Hendricks, Patel, and Zeckhauser, 1997; Lunde, Timmermann and Blake, 1999). In addition, due to the economies of scale, the likelihood of a fund exit may be inversely related to the fund size (see Brown and Goetzmann, 1995; Elton, Gruber and Blake, 1996; Jayaraman, Khorana and Nelling, 2002).

One purpose of this paper is to investigate the determinants of the decision to terminate funds by fund companies in the Taiwan mutual fund industry. This research is motivated by certain features of Taiwan fund companies. First, by the current Taiwan Stock Exchange Corporation (TSEC) rules, only the surviving fund's record should be reported. This rule motivates fund families to terminate funds with poor performances. By doing so, they improve the image of the entire family, because they no longer have to keep track of the poor records of funds liquidated or merged out of existence. Second, In the United States, a mutual fund is a separate entity, a trust or corporation, with its own board of directors, usually consisting of a majority of independent directors. By contrast, Taiwan investment trusts do not have a corporate form of organization. Mutual fund companies in Taiwan sell trust certificates, not shares, to investors and a mutual fund company can concurrently manage several mutual funds (Lin, 2004). As a result, it is the fund complex, rather than the fund itself, that decides whether a fund should exit. Therefore, this paper treats exit decisions as a function of the characteristics of both individual funds and fund families, rather than of solely individual funds. This differs from Jayaraman, Khorana, and Nelling (2002), who treated merge decisions as decisions made by individual funds.

In addition, though the mutual fund industry in Taiwan has grown rapidly and there are an increasing number of mutual funds leaving the market, to the best of our knowledge no attention has been paid to the topic of fund closures. For a relatively small scale industry with few professional mutual fund managers, the Taiwan mutual fund industry has funds that are fairly easy to operate without economics of scales and therefore easy to exit from the market. By studying the determinants that have led to the decision to terminate funds in the Taiwan mutual fund industry, we intend to fill in the research gap in this area.

Our results show that decisions related to both liquidation and mergers were negatively related to fund size, past fund flows and past fund performance. In addition, as expected, the fewer the family flows, the greater the probability that a fund would be liquidated. Finally, a fund family in our studies liquidated both a poorly-performing and a long-term outflow fund, but merged a poorly-performing fund with another one within a family if it had only experienced short-term fund outflows. This phenomenon may be attributed to the fact that the fund family attempted to retain valuable client sources and distribution channels within the family, if a fund with poor performance had only experienced short-term asset outflows.

In the context of wealth effects, investors of target funds benefited from the merger activity at the expense of investors in acquiring funds. Specifically, target fund investors experienced significant improvements in performance and a reduction in expense ratios after the merger. In contrast, acquiring fund investors experienced a significant deterioration in postmerger performance. Finally, because a fund family could retain fund assets if it merged other funds, the combinded fund had an increase in assets under management, even though the net asset flows remained negative for the combined fund in the year following the merger.

The remainder of this paper is divided into six sections, beginning with this Introduction. Section 2 describes the related literature regarding determinants of fund exits. Section 3 outlines the data and statistic methodology. Section 4 contains the empirical determinants for liquidations and merges, and Section 5

addresses the wealth and other effects surrounding the merger. Section 6 concludes the study.

2. Potential Determinants of Fund Exits

When deciding to terminate a fund, a fund family has, in addition to mergers, alternative exit forms (such as liquidation) based on different considerations (Zhao, 2005). Specifically, exits may take the form of liquidation or a merger with another portfolio either within the same fund family ("within-family merger") or in other families ("across-family merger") (Zhao, 2005). Among these possibilities, we found that fund companies in Taiwan seldom merged their defunct funds with a fund in other families.[2] As a result, our sample only consisted of two main categories: liquidation and within-family mergers.

The exit forms of liquidation and a within-family merger share some common features, indicating that they may share common determinants. However, liquidation may not serve the purpose of a merger. Specifically, liquidations involve the sale of all of a fund's assets and the distribution of the proceeds to the fund investors. In comparison, mutual fund mergers lead to consolidation in the fund industry. Also, assets of portfolios liquidated are eliminated from the fund companies, while assets of within-family mergers are still under management of the fund complexes. Therefore, there must be reasons why the defunct funds take different exit forms; motives for fund exits for liquidations and within-family mergers are examined in detail in the remainder of this paper. Because exit forms depend on different considerations by fund families and objective-related issues, the study discusses the determinants for liquidations and within-family mergers at the mutual fund level, at the family level and finally at the objective level. To help illustrate the hypotheses, Table 1 summarizes the hypothesized signs of the potential determinants for each exit form.

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[2] According to the definition of an across-family merger, only two samples were classified as such: the merger between the UBS Strong Fund and the Cathay Dragon Fund, and the merger between the UBS Genghis Khan Fund and the Cathay Dragon Fund. Hence, we did not consider across-family mergers in our study.

Table 1

Summary of the Hypothesized Effects of Potential Determinants on Various Exit Forms

This table summarizes the hypothesized signs of the potential determinants for each exit form. A positive sign (+) indicates that a higher value of the corresponding variable is expected to increase the likelihood of the exit form, while a negative sign indicates that a higher value of the corresponding variables is expected to decrease the likelihood of the exit form. A question mark (?) indicates that the corresponding variable is not expected to significantly affect the likelihood of the exit form.

Variables	Liquidation	Within-family merger
Family Level		
Fund number	+	+
Net asset flow	-	-
Performance	+	?
Objective Level		
Fund number	?	-
Net asset flow	-	-
Performance	-	-
Fund Level		
Size	-	-
Net asset flow	-	-
Age	-	+
Performance	-	-
Expense ratio	+	+
Uniqueness	?	?

2.1. Common Determinants for Liquidations and Mergers

2.1.1. Fund level: Performance, Size, Asset Flow, and Expense Ratio

Funds exit the market for a variety of reasons, with poor performance ranked as one of the primary causes. Poor performance reduces asset flows, as investors choose not to buy into a fund that isn't doing well. It also lowers the mutual fund management firm's track record. If the firm has five funds and four of them are doing well, closing the poor performer gives the firm a track record based on four successful funds. In order to preserve records of superior family performance, which is critical in light of the positive relationship between performance and subsequent asset flows, it is rational for the family to eliminate funds with poor performance via a merger or liquidation. Poor performance also results in bad publicity, which

can lead to large redemptions. Thus, mergers and liquidations are motivated, to a large degree, by the need to hide the performance of failing funds (Jayaraman, Khorana and Nelling, 2002; Zhao 2005; Khorana, Tufano and Wedge, 2007), and funds that disappear tend to do so due to their very poor performance over a period of time, or to the fact that their total market value does not provide sufficient management fees to maintain the fund (see Brown and Goetzmann, 1995; Elton, Gruber and Blake, 1996; Hendricks, Patel and Zeckhauser, 1997; Lunde, Timmermann and Blake, 1999). Along the same line of reasoning, a fund that has a poor economy of scale, which might be discernible in higher expense ratios, is more likely to be liquidated or merged within a family.

In addition, fund size and fund flows also play an important role as determinants of survival or exit (Brown and Goetzmann, 1995; Elton, Gruber and Blake, 1996; Jayaraman, Khorana and Nelling, 2002; Zhao, 2005). If a fund is too small to achieve the economies of scale, the fund family is more likely to terminate the portfolio to avoid net losses through liquidation or a merger with similar investment objectives (see Indro et al., 1999; Perold and Salomon, 1991). Hence, if a fund is small in size or generates low flows that might lead to small size, the fund family is more likely to terminate the fund to circumvent net losses.

2.1.2. Family Level: Numbers of Funds and Asset Flows

As mentioned by Audretsch (1994), institutions belonging to a multi-plant firm may have a higher likelihood of exit than independent institutions. Along this line of reasoning, in order to preserve or improve their reputation, a large family of funds may choose to liquidate or merge a poorly-performing fund, because they are in a better position to consolidate their product offerings without adversely affecting the investment choices available to their investors (Jayaraman, Khorana and Nelling, 2002). Also, in contrast to smaller fund families, which may have fewer corresponding funds available to combine with a poorly performing fund, large fund families are more likely to find an acquiring fund for within-family

mergers. Therefore, the large families may show a stronger likelihood to participate in a within-family mutual fund merger to clear up funds with poor performance. Finally, fund families experiencing low net asset flows are more likely to get rid of those funds with poor performance, low net flows or small size, either by liquidation or a merger, in order to stay focused (Zhao, 2005).

2.1.3. Objective Level: Performance and Asset Flow

The investment objective of a fund is often regarded as an industry. The industrial organization literature suggests that a lack of industry growth tends to result in firm exits (see Ilmakunnas and Topi, 1999; Doi, 1999). As a result, mutual fund exits are more apt to occur in regard to investment objectives with poor performance or poor net flows (Zhao, 2005).

2.2. Determinants with Different Effects on the Two Exit Forms

2.2.1. Fund Level: Age and Uniqueness

In the industrial organization literature, Audretsch (1995) has indicated that a firm's age could have different effects on the exit forms. In addition, the existing literature based on the US data posits that portfolio age has a significant effect on the decision whether to liquidate or merge (Jayaraman, Khorana and Nelling, 2002; Zhao, 2005), because mutual fund ratings are generally available for funds with a minimum history of three years. As a consequence, a family might liquidate a portfolio that does not meet expectations in its early stage, in order to avoid poor Morningstar ratings. However, since it takes time to develop clients and distribution channels, a fund family may merge the fund with longer histories within the family (Zhao, 2005).

In addition, fund families may spread their funds across a variety of investment objectives in an attempt to extend their offerings in a strategic move (Mamaysky and Spiegel, 2002). Zhao (2005) posits that funds with different investment objectives may invest in different assets, and fund families may set up new funds with objectives different from existing ones, to attract more investors and expand their market share. If the fund is the only one with a certain

investment objective in the family, the fund will be considered truly unique in the family. Although a unique fund can satisfy the requirement of some particular investors by offering special assets management and trading strategies, a unique fund also entails special research costs and marketing efforts. To achieve economies of scale and to remain focused, a family can eliminate the associated research and marketing costs by liquidating a relatively unique portfolio or selling it to other families. However, to attract more investors and expand their market share, they may also choose to keep a relatively unique portfolio. Hence, the uniqueness of a fund relative to other funds in the family may increase or decrease the likelihood of termination, depending on the trade-off between costs and market shares (Zhao, 2005).

2.2.2. Family Level: Performance

With respect to family performance, a family with superior performance should be less hesitant to liquidate a fund with poor performance and small size, because the benefits from a clean record for the family outweigh the negligible loss of management fees from the liquidated fund. On the other hand, families with poor performance have a higher propensity to sell relatively unique portfolios to other families in order to stay focused by eliminating the special research and marketing costs associated with these relatively unique funds. However, if the family decides to terminate a fund in the exit form of a within-family merger, assets of the target funds may still be preserved in the family after merging, regardless of whether the family has poor or superior performance. Hence, the relationship between family performance and the probability of a within-family merger can be either positive or negative.

2.2.3. Objective Level: Number of Funds

If the number of portfolios with a specific objective is small, the investment objective may be minor or there may be few clients who are fond of this objective. Although these rare funds with a particular objective might cater to the requirement of some particular investors by offering special assets management and trading strategies, they also entail special research costs and

marketing efforts. To achieve economies of scale and reduce cost, a family may eliminate a relatively rare portfolio by liquidation. In line with this reasoning, mergers may be more likely to occur in investment objectives with fewer funds, because consolidation can more easily lead to a larger market share and achieve economies of scale in smaller investment objectives. However, to attract more investors and expand their market shares, a fund family may keep rare portfolios with a specific objective. Therefore, the relationship between fund numbers in the objective and the probability of liquidation and/or a merger depends on the trade-off between costs and market shares.

3. Data and Empirical Methodology

3.1. Data

This sample of mutual funds was obtained from the Securities Investment Trust and Consulting Association of the R.O.C. (SITCA) and Taiwan Economic Journal (TEJ). The TEJ database contains data on: fund name, fund family, inception date, daily net asset value, expense ratio, fund loads, fund category, daily return, net asset value (NAV), turnover ratio, total assets, and other characteristics of the fund. For funds that exited, the dataset has information on when they exited, their history until then, whether they were liquidated or merged with other funds, and the identity of the acquiring funds in the latter case. This sample covers 624 open-end equity funds for the period 1997 to 2008. Over the sample period, 211 funds exited the market, with 115 mutual funds via liquidation and 96 mutual funds via merger. If a fund's age was less than two years when exiting the market, it was excluded from the sample because complete information could not be received. Based on this criterion, we excluded five liquidated funds and four merged funds from the raw sample. Therefore, the total sample considered consists of 110 mutual fund liquidations and 92 mutual fund mergers.

Table 2 shows the number of open-end equity funds increasing steadily from 156 at the end of 1997 to 523 at the end of 2007. There was a steady increase in the number of fund companies before 2005, and they decreased afterwards. The

total net assets (TNA) of open-end equity funds increased from NT$556,958 million in 1997 to the maximum value of NT$2,666,848 million in 2003, and then dropped to NT$1,571,381 million in 2008. Given the decrease in the total assets managed by the fund industry since 2003 and the rapid increase in the number of mutual funds, the liquidations and mergers among mutual funds from 2003 to 2008 can be seen as one means of reducing what may have been perceived as an excessive supply. The ongoing consolidation of the financial services industry provided an incentive for fund families to combine funds, and reduce the number of fund offerings with similar objectives.

Table 2
Summary Statistics for Open-end Equity Funds in the Taiwan Mutual Fund Market

This table reports summary statistics of open-end equity funds from 1997 to 2008. The number of funds, number of fund companies, and total net assets managed in the mutual fund industry are presented. During the sample period, there was a steady increase in the numbers of open-end equity funds before 2007 and the number of fund companies before 2005, and they decrease afterwards. The total net assets (TNA) reached the highest level during 2003 and then subsequently decreased.

Yearly	Numbers of Mutual Funds	Number of fund companies	Total Net Assets of Mutual Fund (Unit : million NT dollars)
1997	156	25	556,958
1998	200	30	745,962
1999	236	35	1,059,045
2000	301	38	1,096,717
2001	326	41	1,777,610
2002	362	44	2,181,164
2003	418	43	2,666,848
2004	466	45	2,481,256
2005	502	45	1,963,118
2006	508	41	1,966,524
2007	523	39	2,040,908
2008	497	39	1,571,381

Table 3 shows the numbers and percentage of mutual fund liquidations, fund mergers and surviving funds over the sample period. It can be seen that there is a steady increase in the liquidations and mergers of mutual funds along with growth in the mutual fund industry. A total of 147 funds exited the fund market in

2005, 2006, 2007, and 2008, representing 72.8 percent of all exits. In particular, because of the financial tsunami in September 2008, total net assets and the numbers of mutual funds plunged from the end of 2007 to the end of 2008. Both the numbers of liquidations and mergers reached the highest levels of 40 and 24, respectively, in 2008. On average, 4.30% of equity funds exited the market during the sample period.

3.2. Statistic Methodology

3.2.1. Measures of Performance

According to performance measurement literature, past performance is predictive of future risk-adjusted returns in both the short run and longer run (see Brown and Goetzmann, 1995; Elton, Gruber and Blake, 1996). Besides raw returns, we also employed both Sharpe's (1964) single-factor model (CAPM) and Carhart's (1997) four-factor model, which is based on the Fama and French (1993) three-factor model, to evaluate the equity fund's performance. The specifications of the model are as follows:

$$R_{it} - R_{ft} = \alpha_i + \beta_{i1} * (R_{Mt} - R_{ft}) + \varepsilon_{it}, \tag{1}$$

$$R_{it} - R_{ft} = \alpha_i + \beta_{i1} * (R_{Mt} - R_{ft}) + \beta_{i2} * SMB_t + \beta_{i3} * HML_t + \beta_{i4} * UMD_t + \varepsilon_{it}, \tag{2}$$

where R_{it} is the monthly return of fund i at time t; R_{ft} (risk-free rate) is the monthly time deposit rate from the Fist Commercial Bank at time t; α_i from (1) and (2) represents the single-factor return and four-factor return, respectively; β_{ij} is the sensitivity of excess return on fund i to excess return on factor j; $R_{Mt}-R_{ft}$ is the value-weighted market return on all TSEC stocks in excess of the risk-free rate at time t; SMB_t is the difference in returns across small and big stocks at time t; HML_t is the difference in returns between high and low book-to-market stocks at time t; UMD_t is the momentum factor at time t, which is the difference in returns between stocks with high and low prior returns; and ε_{it} is the random error in month t. The SMB and HML factors were calculated following the procedure of Fama and French (1993), and the UMD factor was

computed following Carhart (1997).[3]

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Table 3
Numbers of Mutual Fund Liquidations and Mergers over the Sample Period

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This table shows the numbers of mutual fund liquidations and mergers during the sample period. The numbers of liquidations are larger than those of mergers. On average, 4.30% of equity funds exited the market during the sample period.

Year	Exits Funds						Numbers of Survivors
	Liquidations		Mergers		Total		
	Numbers	%	Numbers	%	Numbers	%	
1997	1	0.64	0	0.00	1	0.64	156
1998	0	0.00	0	0.00	0	0.00	200
1999	1	0.42	0	0.00	1	0.42	236
2000	9	2.90	0	0.00	9	2.90	301
2001	9	2.66	3	0.89	12	3.55	326
2002	2	0.53	13	3.45	15	3.98	362
2003	4	0.93	6	1.40	10	2.34	418
2004	3	0.63	4	0.85	7	1.48	466
2005	6	1.15	12	2.31	18	3.46	502
2006	21	3.85	16	2.94	37	6.79	508
2007	14	2.54	14	2.54	28	5.08	523
2008	40	7.13	24	4.28	64	11.41	497
Total	110	2.34	92	1.96	202	4.30	4495

In addition, the objective-adjusted annual holding period returns (OARs), as proposed by Khorana (1996, 2001), were also used to measure fund performance. OARs are defined as the annual return of a fund in excess of the corresponding annual return of other funds within the same investment objective. For each fund, OAR is computed as follows:

$$OAR_{it} = [\prod_{t=1}^{12}(1+R_{i,t})-1]-[\prod_{t=1}^{12}(1+R_{o,t})-1], \tag{3}$$

where $R_{i,t}$ is the return of fund i in month t and $R_{o,t}$ is the average return of all funds in the same investment objective in month t. This OAR measures the performance of funds before and after the merger relative to other funds in their peer group. The same performance measure is also applied in the liquidation situation except for the years after liquidation, since liquidated funds are not survival entities.

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[3] Please see http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html for details.

3.2.2. Flows

Because the subscription and redemption amounts are available in the Taiwan mutual fund market, this paper measures the magnitude of asset flows directly using data on subscription amounts, redemption amounts, and fund assets. We compute flows ($Flow_{i,t}$) by subtracting the redemption amounts from the subscription amounts, and then normalizing the result by the asset values:

$$Flow_{it} = [\,Subscription_{i,t} - \mathrm{Re}\,demption_{i,t}\,]/\,Asset_{i,t-1} \qquad (4)$$

where $Asset_{i,t}$ is the total assets of fund i at the end of month t, and $Subscription_{i,t}$ and $\mathrm{Re}\,demption_{i,t}$ are the redemption and subscription amounts of fund *i* during month t. The net asset flow is a measure of the difference between additional contributions into the fund and redemptions out of the fund. Furthermore, we also calculated the objective-adjusted net asset flow (objective net asset flow), which is defined as the net asset flow of fund *i* less the average flow into all funds in the homologous investment objective.

3.2.3. Multinomial Logit Model

To examine the possibility that the underlying motives may differ between mutual fund mergers and liquidation, this paper estimated a three-outcome multinomial logit model to investigate the distinction among different exit forms. The fund family can dispose of funds in three ways: (0) keep the fund in the family; (1) liquidate the fund; and (2) merge the fund into another fund within the same family. Of these three choices, we used the choice of keeping the fund as the comparison group to obtain insight into fund exit decisions by means of empirical dichotomies. Based on the values of family, objectives, and fund attributes, the probability of each condition was made as follows:

$$\mathrm{Prob}\ (Y_i = j) \ = \ \frac{\exp(\beta_j^{'} X_i)}{\displaystyle\sum_{k=0}^{2} \exp(\beta_k^{'} X_i)} \quad , \quad j = 0, 1, 2 \qquad (5)$$

where j and i stand for each choice and fund, respectively; and k, which also stands for each choice, takes a value from 0 to 2. Prob $(Y_i = j)$ represents the probability, conditional on one of three choices, that the fund family may handle fund i. In order to correctly describe the explanatory variables and the importance of each factor, this paper classified these variables into three-level factors: Family Level, Objective Level, and Fund Level.

1. Family Level:
   a. *Fund number in the family* is the total number of all other surviving funds in the family.
   b. *Family net asset flow* is the difference between the sum of purchase amounts across funds in the family and the sum of redemption amounts across funds in the family, normalized by the sum of net asset values in the fund family over the past period.
   c. *Family performance* is the asset-weighted average of the objective-adjusted returns of all other funds in the family.

2. Objective Level:
   a. *Fund number in the objective* is the total number of all other surviving funds with the same investment objective.
   b. *Objective net asset flow* is the difference between the sum of purchase amounts across funds in the objective and the sum of redemption amounts across funds in the objective, normalized by the sum of net asset values in the objective over the past period.
   c. *Objective performance* is the asset-weighted average of the holding period returns of all other funds with the same investment objective.

3. Fund Level:
   a. *Fund size* is the natural log of total assets under management.
   b. *Fund net asset flow* is the flow of money into and out of the fund, normalized by the net asset values over the past period.
   c. *Fund age* is the time period of the fund from its start to its termination.
   d. *Fund performance* is the holding period return in excess of the asset-weighted average return of all funds with the same investment objective (i.e., objective-adjusted performance).

e.*Expense ratio* is defined as the value of operating expenses and management
fees given as a percentage of fund assets.

f.*Uniqueness* is defined as the only fund with a certain investment objective in
the family (if the fund is unique, we regard it as 1; if the fund is not unique,
we give it 0).

Since performance and net asset flows may play a major role in important
and long-term motives of fund exit decisions, this paper included both one-lagged
and two-lagged values of these two factors to reach a more precise understanding
of their influence. The regression model is described as follows:

$$Y_i = \alpha_0 + \beta_1(\textit{fund number in family})_{i,t-1} + \beta_2(\textit{family net asset flow})_{i,t-1} + \beta_3(\textit{family net asset flow})_{i,t-2} + \beta_4(\textit{family performance})_{i,t-1} + \beta_5(\textit{family performance})_{i,t-2} + \beta_6(\textit{fund number in objective})_{i,t-1} + \beta_7(\textit{objective net asset flow})_{i,t-1} + \beta_8(\textit{objective net asset flow})_{i,t-2} + \beta_9(\textit{objective performance})_{i,t-1} + \beta_{10}(\textit{objective performance})_{i,t-2} + \beta_{11}(\textit{fund size})_{i,t} + \beta_{12}(\textit{fund net asset flows})_{i,t-1} + \beta_{13}(\textit{fund net asset flow})_{i,t-2} + \beta_{14}(\textit{fund age})_{i,t} + \beta_{15}(\textit{fund performance})_{i,t-1} + \beta_{16}(\textit{fund performance})_{i,t-2} + \beta_{17}(\text{expense ratio})_{i,t-1} + \beta_{18}(\textit{uniqueness})_{i,t} + \varepsilon_{i,t},$$
$$\text{(6)}$$

where *i, j* and *t* stand for each fund, choice, and year, respectively; α_0 is the
intercept; β_q ($q = 1,2...18$) is the regression coefficient; and $\varepsilon_{i,t}$ is the
residual.

To depict the linear relations between variables, Table 4 provides the simple
correlation coefficients. As shown, irrespective of family level, objective level,
and fund level, performance and net fund flows were highly correlated with their
lagged values, with the corresponding simple correlation coefficients ranging
from 0.236 to 0.714. To further diagnose whether there is collinearity between
variables, Table 5 reports the variance inflation factor (VIF) and conditional index.
If VIF > 10 or the conditional index > 15, multicollinearity exists. Table 5 shows
that there is no evidence of multicollinearity. In the following section, we present
the empirical results.

Table 4
The Correlation Coefficient Matrix of Independent Variables in Multinomial Logit Model

Among them, X1 is the number of funds in family; X2 is family net asset flow in year t-1; X3 is family net asset flow in year t-2; X4 is family performance in year t-1; X5 is family performance in year t-2; X6 is the number of funds in objective; X7 is objective net asset flow in year t-1; X8 is objective net asset flow in year t-2; X9 is objective performance in year t-1; X10 is objective performance in year t-2; X11 is fund size; X12 is fund net asset flow in year t-1; X13 is fund net asset flow in year t-2; X14 is fund age; X15 is fund performance in year t-1; X16 is fund performance in year t-2; and X17 is expense ratio in year t-1, X18 is characteristic of uniqueness. ** and * indicate significant at the 1 and 5 percent confidence level, respectively.

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	X17	x18
X1	1																	
X2	0.086**	1																
X3	0.092**	0.686**	1															
X4	0.100**	0.084**	0.103**	1														
X5	0.167**	0.061**	0.057**	0.601**	1													
X6	0.004	0.068**	0.053**	-0.019**	-0.052**	1												
X7	0.135**	0.399**	0.367**	0.011	0.003	0.072**	1											
X8	0.070**	0.209**	0.256**	-0.007	-0.028**	0.130**	0.659**	1										
X9	-0.028**	-0.035**	-0.014*	-0.007	0.009	0.014*	-0.073**	-0.036**	1									
X10	-0.014*	-0.034**	-0.018**	-0.003	-0.013*	0.044**	-0.060**	0.005	0.714**	1								
X11	0.249**	-0.035**	0.002	0.105**	0.190**	-0.034**	-0.027**	-0.008	-0.056**	-0.013	1							
X12	0.043**	0.340**	0.299**	0.032**	0.038**	0.037**	0.266**	0.170**	0.006	0.005	-0.149**	1						
X13	0.038**	0.368**	0.333**	0.038**	0.050**	0.034**	0.295**	0.178**	0.000	0.000	-0.102**	0.707**	1					
X14	0.298**	0.087**	0.079**	0.010	0.030**	0.297**	0.162**	0.083**	0.028**	0.055**	-0.045**	0.115**	0.087**	1				
X15	0.017*	0.005	0.029**	0.013	0.026**	-0.001	0.004	0.005	0.065**	0.061**	0.051**	0.102**	0.193**	0.020**	1			
X16	0.009	0.063**	0.057**	0.243**	0.190**	-0.029**	-0.041**	-0.031**	-0.010	-0.008	-0.004	0.118**	0.151**	-0.048**	0.236**	1		
X17	0.015	0.109**	0..097**	0.109**	0.065**	0.049	0.106	0.007	0.091	0.003	0.309**	0.201**	0.197*	0.094*	0.102**	0.872*	1	
X18	-0.191**	0.023**	0.017*	-0.026**	-0.025**	-0.422**	0.056**	0.041**	-0.010	-0.005	-0.035**	0.014*	0.018*	-0.117**	-0.012	0.004	-0.191**	1

Table 5
Collinearity Diagnostics

This table reports the variance inflation factor (VIF) and conditional index to diagnose whether there are collinear between variables. If VIF > 10 or conditional index > 15, the multicollinearity exists.

Variables	VIF	Conditional index
Family level		
Fund number(t-1)	1.382	1.258
Net asset flow(t-1)	5.516	1.649
Net asset flow(t-2)	5.321	1.710
Performance(t-1)	1.916	1.863
Performance(t-2)	1.970	2.131
Objective level		
Fund number(t-1)	1.506	2.198
Net asset flow(t-1)	2.226	2.551
Net asset flow(t-2)	1.927	2.670
Performance(t-1)	2.285	3.783
Performance(t-2)	2.280	4.017
Fund level		
Size(t)	1.209	4.435
Net asset flow(t-1)	6.362	4.596
Net asset flow(t-2)	6.701	5.813
Age(t)	1.231	7.156
Performance(t-1)	1.146	7.844
Performance(t-2)	1.162	8.352
Expense ratio(t-1)	1.201	3.882
Uniqueness(t)	1.436	4.827

4.Empirical Results

4.1. Fund Characteristics for Surviving, Liquidated Funds, and Merged Funds

This section first summarizes the fund characteristics for all surviving funds, liquidated funds, and funds merged within a family. Table 6 presents the fund performance, net asset flows and other fund characteristics, such as size, age, expense ratios, turnover ratios, and beneficiary. Panel A reports three fund performance measures: single-factor alpha, Carhart (1997) four-factor alpha and objective-adjusted performance. Panel B describes the medians of other fund characteristics. Fund size is the total assets under management; fund net asset

flow is the net flow (fund inflow minus fund outflow) divided by total net assets; expense ratio is the value of operating expense and management fees as a percentage of fund assets; fund age is the period of time of a fund from its start to its termination; fund turnover is the turnover ratio of funds, which are estimated by adding the accumulative buy-in turnover and accumulative sell-out turnover together; and fund beneficiary is the number of investors who buy the funds without redeeming them.

In panel A, all performance measures show the same qualitative results. Liquidated funds and funds merged within the same family displayed poorer performance than did the surviving funds. For instance, the objective-adjusted performance of surviving funds was 0.155 percent, which was higher than the performance of liquidated funds (-0.221 percent) and within-family merger funds (-0.137 percent). The risk-adjusted return of single-factor alpha and multifactor alpha also presented similar results, namely that poor performance was an important determinant that correlated with the exits of mutual funds.

Table 6
Summary Statistics on the Exit Forms

This table presents the medians of fund performance, net asset flows and other fund characteristics for the surviving funds, liquidated funds and funds merged within a family in one year before the liquidation or merger date. Panel A reports three fund performance measures: the objective-adjusted performance, the single-factor alpha, and multifactor alpha. Panel B presents the medians of other fund characteristics. Among them, fund size is the total assets under management; fund net asset flow is the net flow (fund inflow minus fund outflow) divided by total net assets; fund age is the period from the inception of a fund to its termination; expense ratio is the value of operating expense and management fees as a percentage of fund assets; fund turnover is the turnover ratio of funds; and fund beneficiaries are the number of investors who buy the funds without redeeming them.

	Surviving funds	Liquidated funds	Funds merge within a family
Panel A: Fund performance (%)			
Single-factor α	-0.033	-0.427	-0.250
Multi-factor α	-0.034	-0.435	-0.393
Objective-adjusted Performance	0.155	-0.221	-0.137
Panel B: Other fund characteristics			
Size (Million, NT dollars)	1211.0	340.5	403.1
Net asset flows (%)	-0.075	-5.912	-2.326
Age (Months)	66	44	51
Expense ratio (%)	0.136	0.217	0.149
Turnover (%)	158.922	139.377	146.598
Beneficiary (Numbers)	6302	156	939

Panel B of table 6 shows that the size of all defunct funds, especially liquidated funds, was much smaller than surviving funds. Because a fund family could retain fund assets if it merged other funds within the family, the size of fund mergers within a family was a little higher than liquidated funds, and only the smallest funds left the mutual fund market in the exit form of liquidation. Besides, both liquidated funds and funds merged within a family suffered from net redemptions. Although the surviving funds also experienced net outflows, their net outflows were smaller than those of the defunct funds. Compared to surviving funds, younger funds had a higher propensity to cause liquidation than a merger with a fund within the family. Also, liquidated funds had the highest expense ratios, within-family merged funds ranked second, and survival funds had the lowest expense ratios. This implies that funds without economics of scales are more likely to become candidates for exit funds. Furthermore, the liquidated funds had the lowest turnover ratio, and the surviving funds had the highest. This indicates a greater tendency of aggressive trading for surviving funds than for exit funds. Finally, the units of beneficiary were significantly lower for liquidated funds than for either funds merged within a family or surviving funds. The above results imply that the reasons for a fund being liquidated or merged within a family may differ.

4.2. IIA Test

A key property of the multinomial logit framework is the assumption of the independence of irrelevant alternatives (IIA), which states that the relative probabilities of two options being chosen are unaffected by the introduction or removal of the other alternative. That is, the exit decisions represent three mutually exclusive (independent) alternatives: keep, liquidate, and merge. If the IIA property is violated, then the multinomial logit model will be biased. To test for the validity of the IIA assumption with respect to the fund exit decision-making process, we apply Hausman's specification test (Hausman and McFadden, 1984). The strategy is to estimate the model with (the unconstrained model) and without (the constrained model) the other variables. If the IIA assumption is true, the constrained and unconstrained estimated coefficients on

the remaining categories should not be statistically different. The test statistic is:

$$(b_c - b_u)'[Cov(b_c) - Cov(b_u)]^{-1}(b_c - b_u), \tag{7}$$

where b_c and b_u are the constrained and unconstrained coefficient estimates, and Cov(b_c) and Cov(b_u) are their estimated covariance matrices. This statistic has an approximate chi-square distribution with the number of degrees of freedom equal to the number of coefficients estimated in the constrained model.

As the test fails to reject the assumption of the independence of irrelevant alternatives (IIA), we consider a multinomial logit model to be an appropriate specification for the exit choice. The estimation results are shown in table 7. As shown, IIA property cannot be rejected at the 1% significant level when one of the three alternatives is dropped. Therefore, the multinomial logit model is an appropriate model for the estimation of this data.

Table 7
Test of independence of irrelevant alternatives (IIA)

This table reports the results for Hausman and McFadden test with three of the alternative dropped. The result indicates that IIA property cannot be rejected at 1 % significant level. Therefore, multinomial Logit model is an appropriate model for estimation of this data.

Alternative dropped	Chi-Square	Probability
Keep the fund	0.0000	1.0000
Liquidation	0.0000	1.0000
Within-family merge	0.4903	0.9988

4.3. Multinomial Logit Results

Table 8 reports the results from the multinomial logit model. We considered two models with different specifications. In Model (I), we compiled all level variables and considered all of them concurrently. To get a solid result, we performed a stepwise regression in Model (II) to obtain proper explanatory variables, and then took these variables into account.

The results in Model (I) provide evidence of significant and negative relationships between liquidation probability and prior net asset flows into a fund

family. For example, one additional 1% of net asset flow into a fund's family in year t-1 reduced the 61.9% odds of being in liquidation at year t. These findings were consistent with the prediction that families with lower fund flows are more likely to liquidate a fund for the sake of keeping the economies of scale. However, the decisions on fund exits were not associated with numbers of funds and the performance of a family. Interestingly, when the evaluation was based on results at the objective level, the characteristics of the fund objective did not affect whether a fund exited or remained in the industry.

At the fund level, the likelihood of both liquidations and mergers was inversely related to fund size. The odds ratio on fund size was 0.051, which indicated the odds of liquidation were 94.9 percent lower when a fund size increased one billion. Furthermore, poor past two year performances increased the probability of a fund exiting the market, either in the form of liquidation or a merger. Specifically, liquidation was followed by past one-year and two-year fund outflows; however, mergers were followed by past one-year fund outflows. An additional 1% net inflow in year t-1 (t-2) decreased the liquidation probability by 29.6% (9.0%), and the odds of being within-family merged decreased by 37.4% for a marginal 1% net inflow in year t-1. This indicates that a fund family tended to get rid of a poor performing fund with consequent two-year cash outflows, but merged a poor performing fund into other funds if it had experienced only one year cash outflows. Because the fund families desired to terminate poor performing funds but preserve their original investors and distribution channels, they chose the exit form of merger to sweep away funds with poor records provided that the poor performing funds had experienced short-term fund outflows.

Surprisingly, when taking other determinants into consideration, the decisions on fund exits were not associated with fund age. One possible reason is that, in Taiwan, though funds are rated when they have at least a three-year history, their performance is reported and ranked based on the investment interval of three-month, six-month, one-year, three-year, and five-year (see SITCA website). As a result, fund age failed to affect the decision to exit. Finally, a fund exit decision did not depend on the expense ratio, or on whether or not the fund

was unique in a fund family. Although keeping a unique fund can maintain its market share, it also entails research and marketing costs. Thus, the trade-off between market share and the cost of keeping a unique fund makes uniqueness have no influence on the exit decision.

With respect to the effect of the interaction term of Net asset flow(t-2)× Performance(t-2) on both liquidation and a within-family merger, a larger than one odds ratio implies the following: the worse the performance in year t-2, the greater was the effect of fund outflows in year t-2 on the possibilities of both liquidation and a within-family merger. Similarly, the more the fund outflows, the greater was the effect of poor performance on the possibilities of both liquidation and a within-family merger. Similar results were also found in the interaction term of Net asset flow(t-1)×Performance(t-1) for the merge case, with one additional increase in this interaction term being accompanied by an additional 1.2% odds of being merged.

To avoid the potential effects from the financial crisis, Table 9 reports the results that exclude data with a liquidation date or merge date occurring between September 2008 and December 2008.[4] The results remained qualitatively similar when excluding the financial crisis period. Specifically, the larger the fund outflows for a family in the previous year, the greater the likelihood of liquidation. Poor fund performance and smaller fund size increased the exit probability. A fund with both poor performing and poor long-term flows was more likely to be liquidated, but a poorly performing fund having short-term fund outflows was merged with other funds within a family. The more the fund outflows, the greater was the effect of poor performance on the possibilities of both liquidation and a within-family merger.

Overall, in comparison with the hypothesized signs of the potential determinants in Table 1, fund size, fund flows, and fund performance had the expected signs for exits in both liquidations and mergers. Family flows also, as expected, had negative effects on decisions to liquidate. Though family size and performance, objective flows and performance, and fund age were expected to

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[4] There were 9 fund liquidations and 6 within-family fund mergers from September 2008 to December 2008.

negatively affect the decision to liquidate or employ within-family mergers, the empirical results did not provide significant evidence for this. Similar inconclusive results were found on the effects of fund numbers at the family level and at the objective level for both liquidations and within-family mergers, and on family flows for the within-family merger.[5]

5. Wealth and Characteristic Effects Surrounding the Merger

Mergers can entail substantial consequences for fund investors. They can accompany a change in objectives and thereby affect future returns. They can accompany changes in fund fees, which in turn affect investor performance since fund fees have been identified as an important determinant of fund performance (for example, see Elton, Gruber and Busse, 2004). By affecting either portfolio returns or fees, mergers can affect investors' wealth. The following sections study the wealth effects for fund investors, and examine whether fund characteristics changed after the merger.

5.1. Fund Performance Surrounding the Merger

This section examines the performance effects upon the investors of target and acquiring funds between the pre-merger and post-merger period. Table 10 presents the alpha of a single-factor model and the alpha of a four-factor model for both target and acquiring funds. Moreover, we also report the objective-adjusted returns computed as the difference between the funds' annual return and the average return of all funds in the same investment objective.

As shown in Table 10, acquiring funds performed better than target funds regardless of whether they were measured on the basis of one-year or two-year returns before the merger date. These results held regardless of performance measures. For example, the single-factor alphas of the acquiring funds were

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[5] Interestingly, Zhao (2005) has also presented some inconclusive results pertaining to family performance and objective performance, and has posited a significantly negative relationship between the probability of liquidation and fund numbers in the investment objective even when the relationship is expected to be inconclusive.

-0.101% in year -1 and -0.020% in year -2, both of whichwere significantly larger than the target funds of -0.455% in year -1 and -0.317% in year -2.

If the target funds were merged into the acquiring funds, the fund family shifted to the combined funds (acquiring funds) the rights of clients who had initially invested in the target funds. Thus, investors in the target funds had the chance to share the benefits of the acquiring fund investors. Note that because only the surviving funds could be recorded after mergers, only the post-merge performance of acquiring funds is reported in Table 10. As shown, the performance of the combined funds in the postmerger period indicates that target fund investors benefited from the merger activity, which is consistent with the findings of Jayaraman, Khorana and Nelling (2002). Specifically, the single-factor alpha of the target funds increased 0.312 percent and 0.427 percent from the year preceding the merger to years +1 and +2, respectively. The multifactor alpha and the objective-adjusted returns also showed a similar performance improvement of target funds from year -1 to year +1 and year +2. The improvement of the target shareholders' performance might potentially be attributed to the superior assets of acquiring funds and administrative skills of the surviving fund manager.[6]

On the other hand, because of the deterioration in their fund performance, the acquiring fund investors were not as lucky as the target fund investors, a result confirmed by Jayaraman, Khorana and Nelling (2002). In comparison, the one-factor alpha of acquiring funds declined about –0.110% from year -1 to year +1 and -0.023% from year -1 to year +2. Similar results were found when the analysis was based on the objective-adjusted return and Carhart's four-factor returns. The deterioration in performance subsequent to the merger activity may be due to the inability of the manager to dispose of poorly performing assets that were held by the target funds prior to the merger, and to the inability to find better investment objects after the merger (Jayaraman, Khorana and Nelling, 2002). The outcome in this study was consistent with the literature on corporate mergers, which indicates that investors of acquiring firms suffer a definite wealth loss

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[6] Additionally, since we estimated the performance and other fund characteristics for the four years surrounding the fund merge, only the sample before 2007 was analyzed.

Table 8
Multinomial Logit Model Estimates for Liquidation and Within-Family Merger

A three-outcome multinomial logit model was used to investigate the distinction among different exit forms. The fund family can dispose funds by three choices: (0) keep the fund in the family; (1) liquidate the fund; (2) a within-family mutual fund merge. The variables included fund numbers, net asset flows, and performance at the family, objective, and fund level. We also included fund size, age, and uniqueness in the analysis. ***, **, and * indicate significant at the one, five, and ten percent, respectively. The numbers of observations are 26,337.

Variables	Model I						Model II					
	Liquidation			Within-Merger			Liquidation			Within-Merger		
	Estimates	Chi-square	Odds ratio	Estimates	Chi-square	Odds ratio	Estimates	Chi-square	Odds ratio	Estimates	Chi-square	Odds ratio
Intercept	-2.717	0.974		-3.303	1.047		1.904	0.863			-0.657	0.078
					Family Level							
Fund number(t-1)	-0.006	0.003	0.994	-0.094	1.962	0.910						
Net asset flow(t-1)	-1.767*	3.146	0.171	-0.556	0.481	0.573	-0.964***	15.955	0.381	-0.189	0.352	0.828
Net asset flow(t-2)	1.020	0.498	2.773	1.833	1.049	6.253						
Performance(t-1)	-0.176	0.373	0.839	-0.266	1.473	0.767						
Performance(t-2)	-5.144	1.048	0.006	8.609	1.519	2.385						
					Objective Level							
Fund number(t-1)	-0.028	2.219	0.972	-0.005	0.131	0.995						
Net asset flow(t-1)	-1.608	0.642	0.200	-0.594	0.151	0.552						
Net asset flow(t-2)	-4.572	0.337	0.010	-7.174	0.834	0.001						
Performance(t-1)	-0.044	0.437	0.957	-0.057	0.301	0.941						
Performance(t-2)	-4.606	0.695	0.010	-5.575	0.433	0.004						
					Fund Level							
Size(t)	-4.253***	19.187	0.014	-0.943	1.209	0.389	-2.918***	13.920	0.051	-1.412	2.072	0.244
Net asset flow(t-1)	-0.406***	16.381	0.666	-0.547***	13.622	0.579	-0.350***	20.310	0.704	-0.469***	17.620	0.626
Net asset flow(t-2)	-0.111***	62.729	0.895	-0.006*	3.038	0.994	-0.094***	81.242	0.910	-0.004	1.752	0.996
Age(t)	-0.035**	5.841	0.966	-0.006	0.576	0.994						
Performance(t-1)	-0.048***	6.965	0.951	-0.011	0.496	0.989						
Performance(t-2)	-0.131***	51.574	0.860	-0.042**	5.441	0.959	-0.117***	77.515	0.890	-0.043***	8.862	0.958
Expense ratio(t-1)	0.108	2.094	1.114	0.095	1.998	1.100						
Uniqueness(t)	0.681	0.546	1.975	1.664**	5.629	5.280						
Net asset flow(t-1)×Performance(t-1)	0.021	2.363	1.022	0.012***	8.142	1.012	0.004	0.195	1.004	0.012***	17.431	1.012
Net asset flow(t-2)×Performance(t-2)	0.001***	36.747	1.001	0.000**	4.791	1.000	0.001***	52.754	1.001	0.002**	6.291	1.002
Likelihood ratio test statistics	1603.97***						1562.55***					

Table 9
Multinomial Logit Model Estimates for Liquidation and Within-Family Merger: Excluding Financial Crisis

A three-outcome multinomial logit model was used to investigate the distinction among different exit forms. The fund family can dispose funds by three choices: (0) keep the fund in the family; (1) liquidate the fund; (2) a within-family mutual fund merge. The variables included fund numbers, net asset flows, and performance at the family, objective, and fund level. We also included fund size, age, and uniqueness in the analysis. ***, **, and * indicate significant at the one, five, and ten percent, respectively. The numbers of observations excluding financial crisis are 24,234, respectively.

Variables	Model I						Model II					
	Liquidation			Within-Merger			Liquidation			Within-Merger		
	Estimates	Chi-square	Odds ratio	Estimates	Chi-square	Odds ratio	Estimates	Chi-square	Odds ratio	Estimates	Chi-square	Odds ratio
Intercept	-3.300	1.451		-9.616	5.580		1.580	0.616		-2.822	1.179	
					Family level							
Fund number(t-1)	-0.024	0.044	0.976	-0.125	2.404	0.882						
Net asset flow(t-1)	-1.840*	3.414	0.159	-0.124	0.011	0.884	-0.939	14.188***	0.391	0.500	0.912	1.649
Net asset flow(t-2)	3.331	0.648	27.965	2.164	0.395	8.704						
Performance(t-1)	-0.111	0.315	0.895	-0.116	0.809	0.891						
Performance(t-2)	-7.720	1.468	0.000	2.222	1.142	9.226						
					Objective level							
Fund number(t-1)	-0.028	2.131	0.972	-0.018	1.490	0.982						
Net asset flow(t-1)	-2.170	1.117	0.114	-3.737**	3.920	0.024						
Net asset flow(t-2)	-8.263	0.974	0.000	-8.463**	4.473	0.000						
Performance(t-1)	-0.033	0.249	0.968	-0.104	0.906	0.901						
Performance(t-2)	3.775	0.487	43.589	-9.486	1.163	0.000						
					Fund level							
Size(t)	-4.482***	21.528	0.011	-1.093	0.604	0.335	-3.030	15.307***	0.048	-0.922	0.750	0.398
Net asset flow(t-1)	-0.404***	16.299	0.668	-0.653***	16.114	0.521	-0.346	18.275***	0.708	-0.487***	16.824	0.615
Net asset flow(t-2)	-0.111***	60.769	0.894	-0.007*	3.600	0.993	-0.094	79.496***	0.902	-0.006	3.437	0.994
Age(t)	-0.036**	6.616	0.965	-0.007	0.888	0.993						
Performance(t-1)	-0.049***	7.651	0.952	-0.013	0.566	0.987						
Performance(t-2)	-0.132***	52.252	0.876	-0.039*	3.693	0.962	-0.118	77.611***	0.875	-0.051***	9.387	0.950
Expense ratio(t-1)	0.119	2.076	1.126	0.099	2.044	1.104						
Uniqueness(t)	0.764	0.691	2.146	2.123**	6.265	8.355						
Net asset flow(t-1)×Performance(t-1)	0.024*	2.962	1.024	0.014**	8.473	1.014	0.004	0.220	1.004	0.012***	16.531	1.012
Net asset flow(t-2)×Performance(t-2)	0.001***	38.339	1.001	0.000*	2.752	1.000	0.001	52.382***	1.001	0.002**	6.154	1.002
Likelihood ratio test statistics		1603.97***						1431.85***				

Table 10
Performance Changes Following Mutual Fund Mergers

This table presents the median values of single-factor alpha, multifactor alpha and objective-adjusted returns for target and acquiring funds. Objective-adjusted returns are computed as the difference between the funds' annual return and the average return on all funds in the same investment objective. We estimated performance for the four years following the fund merger. Year -1 is one-year prior to the merger month, and year -2 is two-year prior to the merger, etc. The changes of year relative to merger represent the difference of performance between post-merger and pre-merger periods for all acquiring funds. The first two *p*-values represent the significance of the difference across the target and acquiring funds in the years preceding the merger, and the last two *p*-values represent the significance of the characteristic variations for acquiring funds following the merger.

	Annualized Performance (%)							
	Year Relative to Merger				Changes of Year			
	-2	-1	+1	+2	-1 to +1	*p*-values	-1 to +2	*p*-values
Panel A: Single-factor Alpha								
Target funds	-0.317	-0.455			0.312	0.041	0.427	0.015
Acquiring funds	-0.020	-0.101	-0.111	-0.040	-0.110	0.036	-0.023	0.078
p-values	0.011	0.018						
Panel B: Multi-factor Alpha								
Target funds	-0.463	-0.652			0.219	0.039	0.578	0.004
Acquiring funds	-0.249	-0.332	-0.429	-0.003	-0.047	0.022	-0.004	0.023
p-values	0.011	0.019						
Panel C: Objective-adjusted return								
Target funds	-0.100	-0.137			0.045	0.089	0.114	0.054
Acquiring funds	0.002	0.468	-0.100	-0.016	-0.192	0.003	-0.122	0.031
p-values	0.001	0.004						

following a merger in a five-year empirical period (e.g., Agrawal, Jaffe and Mandelker, 1992).

Table 11 reports the results excluding the period of the 2008 global financial crisis, and confirms the results in Table 10. The target funds performed worse than the acquiring funds during the pre-merge period. The investors of the target funds benefited from the merge activity since their returns increased from year -1 to year +1 and to year +2, regardless of the return measure; however, the investors of acquiring funds suffered from deterioration in performance subsequent to the merger.

Table 11
Performance Changes Following Mutual Fund Mergers: Excluding the
Period of Global Financial Crisis

This table presents the median values of single-factor alpha, multifactor alpha and objective-adjusted returns for target and acquiring funds. Objective-adjusted returns are computed as the difference between the funds' annual return and the average return on all funds in the same investment objective. We estimated performance for the four years following the fund merger. Year -1 is one-year prior to the merger month, and year -2 is two-year prior to the merger, etc. The changes of year relative to merger represent the difference of performance between post-merger and pre-merger periods for all acquiring funds. The first two *p*-values represent the significance of the difference in median across the target and acquiring funds in the years preceding the merger, and the last two *p*-values represent the significance of the characteristic variations for acquiring funds following the merger.

	Annualized Performance (%)							
	Year Relative to Merger					Changes of Year		
	-2	-1	+1	+2	-1 to +1	*p*-values	-1 to +2	*p*-values
Panel A: Single-factor Alpha								
Target funds	-0.072	-0.185			0.167	0.029	0.138	0.033
Acquiring funds	-0.025	-0.006	-0.009	-0.042	-0.049	0.074	-0.040	0.045
p-values	0.051	0.019						
Panel B: Multi-factor Alpha								
Target funds	-0.264	-0.358			0.201	0.035	0.298	0.027
Acquiring funds	-0.197	-0.315	-0.147	-0.034	-0.096	0.017	-0.009	0.038
p-values	0.048	0.062						
Panel C: Objective-adjusted return								
Target funds	-0.063	-0.032			0.006	0.191	0.033	0.087
Acquiring funds	-0.061	0.166	-0.031	0.002	-0.293	0.008	-0.012	0.041
p-values	0.204	0.009						

5.2. Net Asset Flows Surrounding the Merger

Table 12 presents the values of net asset flows and objective-adjusted net asset flows for target and acquiring funds before and after the merger. It is found that in the pre-merger period both acquiring and target funds experienced negative net asset flows, with the acquiring funds experiencing higher net asset flows than the target funds. In particular, the net asset flows of the acquiring funds in year -1

and year -2 were -0.799 percent and -1.153 percent, respectively. However, the net asset flows of the target funds in year -1 and year -2 were -2.326 percent and -2.297 percent, respectively. In addition, in terms of objective-adjusted net asset flows, both the target funds and the acquiring funds also encountered negative objective-adjusted net asset flows. The significant *p*-values indicate that the target funds suffered more acute net redemptions than the acquiring funds did before the merger. This phenomenon suggests that the merger may have been motivated by the fund family's managerial strategies. On one hand, the fund family eliminated poor-performing funds by merging; on the other hand, the acquiring funds attracted additional assets by merging. Hence, the fund family gained two advantages by a single move.

In the post-merger period, both the net asset flows and the objective-adjusted flows continued to post negative returns of -1.993 percent and -1.362 percent in year +1, respectively. The negative flows arose from the fact that the investors of acquiring funds redeemed assets from combined funds due to their deterioration in performance. Moreover, though the target fund investors could enjoy benefits together with the acquiring fund investors after the merger, the possibility remained that they might change their investment tactics and chose different funds in which to invest subsequent to the merger. This could lead to a pattern of net redemption after the merger. However, the right panel shows that the difference in the net asset flows of acquiring funds between one year before and one year (a two year period) after the merger was an insignificant -1.381 (-0.422) percent. Similar results were found in terms of the objective-adjusted net asset flows. This indicates that, even though cash kept flowing out the fund after the merge activity, it was insignificant compared to the magnitude of outflows that occurred during the pre-merge period.

To avoid the confounding effects of the 2008 global financial crisis, we excluded the data from this sample period. As shown in Table 13, both target and acquiring funds suffered from cash outflows within the one-year and two-year period before the merge activity; acquiring funds also experienced insignificant

fund outflows after the merge activity. These results are similar to those including the financial crisis period.

In summary, even though the combined funds suffer a decrease in performance in the post-merger period, the subsequent net outflow of the combined funds is insignificant. This was consistent with many studies, based on both US and Taiwan data, namely that document an asymmetric relationship between fund performance and asset flows, with a positive relationship between good performance and subsequent inflows but an insignificant relationship between poor performance and net outflows (Ippolito, 1992; Chevalier and Ellison, 1997; Sirri and Tufano, 1998; Lin, 2004).

Table 12
Changes in Net Asset Flows around Fund Mergers

This table presents the median values of net asset flows and objective-adjusted net asset flows (as a percentage) for target and acquiring funds. Objective-adjusted net asset flows are computed as the difference between the funds' annual net asset flow and the average net asset flows of all funds in the same investment objective. Year -1 is one-year prior to the merger month, and year -2 is the second year prior to the merger, etc. The changes of year relative to the merger represent the difference of net asset flows between post-merger and the pre-merger periods for all acquiring funds. The first two *p*-values represent the significance of the difference in median across the target and acquiring funds in the years preceding the merger, and the last two *p*-values represent the significance of characteristics variation for acquiring funds following the merger.

	Year Relative to Merger				Changes of Year	
	-2	-1	+1	+2	-1 to +1	-1 to +2
Panel A: Net asset flows						
Target funds	-2.297	-2.326				
Acquiring funds	-1.153	-0.799	-1.933	-0.972	-1.381	-0.422
p-values	0.000	0.000			0.146	0.747
Panel B: Objective-adjusted net asset flows						
Target funds	-2.372	-2.378				
Acquiring funds	-1.191	-0.862	-1.362	-0.462	-1.449	-0.421
p-values	0.000	0.000			0.156	0.418

Table 13

Changes in Net Asset Flows around Mutual Fund Mergers: Excluding the Period of Global Financial Crisis

This table presents the median values of net asset flows and objective-adjusted net asset flows (as a percentage) for target and acquiring funds. Objective-adjusted net asset flows are computed as the difference between the funds' annual net asset flow and the average net asset flows of all funds in the same investment objective. Year -1 is one-year prior to the merger month, and year -2 is the second year prior to the merger, etc. The changes of year relative to the merger represent the difference of net asset flows between post-merger and the pre-merger periods for all acquiring funds. The first two *p*-values represent the significance of the difference in median across the target and acquiring funds in the years preceding the merger, and the last two *p*-values represent the significance of characteristics variation for acquiring funds following the merger.

	Year Relative to Merger				Changes of Year	
	-2	-1	+1	+2	-1 to +1	-1 to +2
Panel A: Net asset flows						
Target funds	-0.020	-0.025				
Acquiring funds	-0.007	-0.006	-0.018	-0.017	-0.015	-0.008
p-values	0.039	0.033			0.491	0.574
Panel B: Objective-adjusted net asset flows						
Target funds	-2.027	-2.500				
Acquiring funds	-0.680	-0.686	-1.489	-1.731	-1.450	-0.918
p-values	0.000	0.000			0.102	0.199

5.3. Other Characteristics Effects Following a Merger

Table 14 presents the values of asset size, expense ratio, fund turnover, and units of benefit for target and acquiring funds surrounding the merger. First of all, in the years preceding the merger, the size of the acquiring funds was larger than that of the target funds. Specifically, the size of the acquiring funds for one year and two years prior to the merger was 478.9 million NT dollars and 709.0 million NT dollars, respectively. However, the corresponding size of target funds was only 313.5 million NT dollars (514.6 million NT dollars) in year -1 (-2). Furthermore, in comparison of size, the target and acquiring funds in each of the pre-merger years were statistically and significantly different (*p*-value = 0.000).

In the post-merger period, the size of acquiring funds increased slightly from 478.9 to 493.2 (524.3) million NT dollars in year +1 (+2). The difference in the size of acquired funds increased significantly. This increase in size can partly be attributed to the merger of the assets of target funds. But the redemptions after the merge activity made the post-merger assets less than the combined assets of target

and acquiring funds (493.2 < 313.5+478.9). Based on the above results, we infer that an important motivation for a fund merger is to achieve economies of scale.[7] Hence, in the material below, we detect the variation in expense ratio in the pre- and post-merger period to determine whether a merger can reduce the expense ratio by achieving economies of scale.

Table 14
Changes in Other Characteristics Concerning Mutual Fund Mergers

This table presents the median values of assets (NT dollars, million), fund turnover (percent), and beneficiary(numbers) for target and acquiring funds. We estimate characteristics for the four years following the fundmerger. Year -1 is one-year prior to the merge month, and year -2 is the second year prior to the merger, etc.The changes of year relative to the merger represent the differences of fund characteristics between thepost-merger and pre-merger periods for all acquiring funds. The first two *p*-values represent the significance ofthe difference in median across the target and acquiring funds in the years preceding the merger, and the lasttwo *p*-values represent the significance of the variable characteristics for acquiring funds following the merger.

| | Year Relative to Merger | | | | Changes of Year | |
	-2	-1	+1	+2	-1 to +1	-1 to +2
Panel A: Assets, million (NT dollars)						
Target funds	514.6	313.5				
Acquiring funds	709.0	478.9	493.2	524.3	5.970	10.740
p-values	0.000	0.000			0.056	0.046
Panel B: Expense ratio (%)						
Target funds	0.148	0.149				
Acquiring funds	0.133	0.138	0.144	0.128	0.002	-0.001
p-values	0.062	0.033			0.308	0.038
Panel C: Turnover (%)						
Target funds	170.1	146.6				
Acquiring funds	175.5	148.8	151.5	182.4	13.008	27.688
p-values	0.134	0.635			0.731	0.926
Panel D: Beneficiary (numbers)						
Target funds	1341	1073				
Acquiring funds	1940	1657	2632	2448	339	221
p-values	0.017	0.001			0.000	0.063

In the first year (year -1) and the second year (year -2) before the merger, the median expense ratios of the acquired funds were 0.149 percent and 0.148 percent, respectively, which were significantly higher than the 0.138 percent and 0.133

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[7] Due to the lack of confidence in the merger activity, some investors withdrew their money from the combined funds. This consequently led to the increase in fund size being moderate after the merger.

percent expense ratios of the acquiring funds. To investigate if the merger could reduce the expense ratio, we calculated the difference in expense ratios between the pre-merger and post-merger periods. The results show that even though there was no significant change in the expense ratio of the acquiring fund one year after the merger (year +1) (p-value = 0.308), the expense ratio decreased significantly in the second year after the merger (year +2) (p-value = 0.038). The reduction in the expense ratio of acquiring funds in the second post-merger year suggests that the combined funds gained efficiency and improved significantly after the merger. The evidence of decline in expense ratios indicates that fund investors would benefit from reducing expenses if a fund family were to achieve the economies of scale via mergers.

With respect to fund turnover, target and acquiring funds did not have any significant difference in fund turnover in the one year and two year pre-merger periods. The acquiring funds also did not show any significant changes in turnover ratio between pre- and post-merger periods (p-value = 0.731 and 0.926). This suggests that the mutual managers' trading strategies did not change following the merger activity.

Finally, we compared fund beneficiaries between target and acquiring funds before and after the merger. In Table 14, the numbers of beneficiaries of target funds are smaller than those of acquiring funds in the years prior to merging, and the difference across the target and acquiring funds in the pre-merger period is significant, especially in the year before merging (year -1) (p-value < 0.01). The phenomenon of the target funds having fewer beneficiaries could reflect the poor performance of target funds. Fund beneficiaries, in order to protect their own property, will choose to redeem assets when they are conscious of the funds' poor performance or become aware of poor fund management.

In the post-merger period, the numbers of beneficiaries of the combined funds increased from 1657 to 2632. The right panel shows that the increase in fund beneficiaries in the years following the merger is significant (p-value = 0.000 and 0.063 at years +1 and +2, respectively). The increase resulted from the fact that the beneficiaries, originally belonging to the acquired funds, were shifted to the acquiring funds, and they shared benefits with the beneficiaries of the

acquiring funds after the merger. However, because of the redemptions after the merge activity, the post-merger number of beneficiaries is less than the combination of target and acquiring funds (2632 < 1073+1657). The increase in fund beneficiaries was less in the second post-merger year than it was in the first year, indicating that some additional investors withdrew their money from the combined funds afterwards because these funds did not perform well subsequent to the merger.

Table 15
Changes in Other Characteristics Concerning Mutual Fund Mergers:
Excluding the Period of Global Financial Crisis

This table presents the median values of assets (NT dollars, million), fund turnover (percent), and beneficiary (numbers) for target and acquiring funds. We estimate characteristics for the four years following the fund merger. Year -1 is one-year prior to the merge month, and year -2 is the second year prior to the merger, etc. The changes of year relative to the merger represent the differences of fund characteristics between the post-merger and pre-merger periods for all acquiring funds. The first two *p*-values represent the significance of the difference in median across the target and acquiring funds in the years preceding the merger, and the last two *p*-values represent the significance of the variable characteristics for acquiring funds following the merger.

| | Year Relative to Merger | | | | Changes of Year | |
	-2	-1	+1	+2	-1 to +1	-1 to +2
Panel A: Assets, million (NT dollars)						
Target funds	459.8	309.0				
Acquiring funds	742.4	489.0	492.2	524.3	5.970	19.532
p-values	0.000	0.000			0.058	0.029
Panel B: Expense ratio (%)						
Target funds	0.148	0.148				
Acquiring funds	0.146	0.145	0.146	0.145	-0.000	-0.001
p-values	0.194	0.215			0.387	0.041
Panel C: Turnover (%)						
Target funds	221.5	144.0				
Acquiring funds	194.3	157.2	159.8	182.4	3.568	9.042
p-values	0.048	0.241			0.729	0.816
Panel D: Beneficiary (numbers)						
Target funds	1456	1241				
Acquiring funds	2337	2373	3329	3291	540	313
p-values	0.000	0.000			0.000	0.014

Table 15 reports the values of asset size, expense ratio, fund turnover, and units of beneficiary for target and acquiring funds while excluding the period of the global financial crisis. Similar to the results found in Table 14, target funds had a smaller size and a smaller number of beneficiaries than acquiring funds

during the pre-merge period. Through merging other funds' assets, acquiring funds had more fund assets under management and the number of beneficiaries increased from year -1 to year +1 and to year +2. Acquiring funds also had a decline in expense ratios in year +2, which indicates that the target and acquiring fund investors would benefit from reducing expenses if a fund family were to achieve the economies of scale via mergers.

6. Conclusion

When mutual-fund investors are confronted with poor performance, they often head for the exits. Increasingly, fund companies are doing the same. They exit by merging weak funds into better performers, or by liquidating a fund's holdings and returning the proceeds to investors. This paper examined the determinants of the mutual fund exit forms, liquidation and a within-family merger, as well as the subsequent impacts on fund investors after a merger. It was found that the likelihood of a fund exit was inversely related to fund size, fund performance and fund flows, regardless of liquidations and mergers. Specifically, we found that a fund family may liquidate a poor-performing and long-term outflow fund, but it will merge a poor-performing fund with another one within a family if the fund has experienced only short-term fund outflows. This phenomenon may be attributed to the fact that, following a merger, a fund family can retain valuable client sources and distribution channels within the family, if a fund with poor performance has short-term asset outflows. However, fund outflows at the family level only affect the liquidation decisions.

Acquiring fund investors in our study experienced a significant deterioration in performance subsequent to the merger activity. In contrast, the target fund investors appeared to benefit from these combinations, as their fund's performance improved in the year after the merger. The difference in performance between acquired and acquiring funds suggests some wealth transfer effects from investors of acquiring funds to the target funds. In addition, the net asset flows continued to remain negative for the combined fund in the year following the

merger. This indicates that a merger may not be a remedy to improve the net redemption of acquiring funds unless the performance of combined funds improves after the merger. However, the greater assets under management after a merger prove that the action of merging really adds to the economies of scale.

After a fund family achieves economies of scale in operations, the expense ratio of combined funds following the merger decreases.

7. References

Agrawal, A., Jaffe, J. F., and Mandelker, G. N. (1992), "The Post-Merger Performance of Acquiring Firms: A Re-Examination of an Anomaly," *Journal of Finance,* 47(4), 1605-1621.

Audretsch, D. B. (1994), "Business Survival and the Decision to Exit," *Journal of the Economics of Business*, 1(1), 125-137.

Audretsch, D. B. (1995), "The Propensity to Exit and Innovation, " *Review of Industrial Organization*, 10(5), 589-605.

Brown, S. J. and Goetzmann, W. N. (1995), "Performance Persistence," *Journal of Finance*, 50(2), 679-698.

Carhart, M. M. (1997), "On Persistence in Mutual Fund Performance," *Journal of Finance*, 52(1), 57-82.

Chevalier, J. A. and Ellison, G. D. (1997), "Risk Taking by Mutual Funds as a Response to Incentives, " *Journal of Political Economy*, 105(6), 1167-1200.

Doi, N. (1999), "The Determinants of Firm Exit in Japanese Manufacturing Industries," *Small Business Economics*, 13(4), 331-337.

Elton, E. J., Gruber, M. J., and Blake, C. R. (1996), "Survivorship Bias and Mutual Fund Performance," *Review of Financial Studies*, 9(4), 1097-1120.

Elton, E. J., Gruber, M. J., and Busse, J. A. (2004), "Are Investors Rational? Choices among Index Funds," *Journal of Finance*, 59(1), 261-288.

Fama, E. F. and French, K. R. (1993), "Common Risk Factors in the Returns on Stocks and Bonds," *Journal of Financial Economics*, 33(1), 3-56.

Hausman, J. and McFadden, D. (1984), "Specification tests for the multinomial logit model," *Econometrica*, 52(5), 1219-1240.

Hendricks, D., Patel, J., and Zeckhauser, R. (1997), "The J-shape of Performance Persistence Given Survivorship Bias, " *The Review of Economics and Statistics*, 79(2), 161-166.

Ilmakunnas, P. and Topi, J. (1999), "Microeconomic and Macroeconomic Influences on Entry and Exit of Firms," *Review of Industrial Organization*, 15(3), 283-301.

Indro, D. C., Jiang, C. X., Hu, M. Y., and Lee, W. Y. (1999), "Mutual Fund Performance: Does Fund Size Matter?," *Financial Analysts Journal*, 55(3), 74-87.

Ippolito, R. A. (1992), "Consumer Reaction to Measures of Poor Quality: Evidence from the Mutual Fund Industry," *Journal of Law and Economics*, 35(1), 45-70.

Jayaraman, N., Khorana, A., and Nelling E. (2002), "An Analysis of the Determinants and Shareholder Wealth Effects of Mutual Fund Mergers," *Journal of Finance*, 57(3), 1521-1551.

Khorana, A. (1996), "Top Management Turnover: An Empirical Investigation of Mutual Fund Managers," *Journal of Financial Economics*, 40(3), 403-427.

Khorana, A. (2001), "Performance Changes Following Top Management Turnover: Evidence from Open-End Mutual Funds," *Journal of Financial and Quantitative Analysis*, 36(3), 371-393.

Khorana, A., Tufano, P., and Wedge, L. (2007), "Board Structure, Mergers and Shareholder Wealth: A Study of the Mutual Fund Industry," *Journal of Financial Economics*, 85(2), 571-598.

Lin, M. C. (2004), "Mutual Fund Tournament in the Taiwan Market: Risk-Taking, Turnover, and Investors Rewards," *Journal of Financial Studies*, 12(2), 45-100.

Lunde, A., Timmermann, A., and Blake, D. (1999), "The Hazards of Mutual Fund Underperformance: a Cox Regression Analysis," *Journal of Empirical Finance*, 6(2), 121-152.

Mamaysky, H. and Spiegel, M. (2001), "A Theory of Mutual Funds: Optimal Fund Objectives and Industry Organization, " working paper, Yale School of Management.

Perold, A. and Salomon, R. (1991), "The Right Amount of Assets under Management," *Financial Analysts Journal*, 47(3), 31-39.

Sharpe, W. F. (1964), "Capital Asset Prices: A Theory of Market Equilibrium under Condition of Risk," *Journal of Finance*, 19(3), 425-442.

Sirri, E. R. and Tufano, P. (1998), "Costly Search and Mutual Fund Flows," *Journal of Finance*, 53(5), 1589-1622.

Zhao, X. (2005), "Exit Decisions in Mutual Fund Industry: Determinants and Effects of Mutual Fund Mergers," *Journal of Business*, 78(4), 1365-1401.