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基金經理人任期，市場競爭與從眾行為:共同基金研究

Manager Tenure, Market Competition and Herding:

A study of Mutual Fund

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## 摘 要

關於基金的從眾行為研究已有眾多參考依據，根據過去文獻，許多研究探討著重在事業誘因與薪酬誘因對基金從眾行為的影響。本研究的被解釋變數，從眾行為，主要參照Lakonishok et al. (1992)、Grinblatt, Titman and Wermers (1995)與 Massa (2005)做設計。解釋變數則是基金經理人任期以及基金的市場競爭強度。

本研究衍伸過去研究的脈絡，引用 Alexander, Stefan, Tanja (2009) 設計事業誘因的方式來進一步探討當年經的基金經理人在面對事業誘因時是否會更加強烈地想要選擇從眾。此外，本研究也另外將基金經理人任期細分為產業面以及基金面，來探討是否本研究與過去文獻的成果有相同的結論。另一方面，本研究引用自策略管理期刊當中，Roberts (1999) 對於創新以及市場競爭的概念，設計基金市場競爭變數，端視其如何影響基金從眾行為。

本研究的研究重要結果摘錄如下：(1) 基金經理人在面臨產業任期較短時，其面臨強烈的事業誘因導致其進行從眾行為 (2) 基金經理人在面臨基金任期較短時，即使面臨強烈的事業誘因，也不會傾向進行從眾行為 (3) 當基金面對市場競爭變強，該基金選擇成為追隨者，進而進行從眾行為。

**關鍵字：**從眾行為、事業誘因、基金經理人任期、市場競爭

## Abstract

There are a lot of past researches about mutual fund and herding behavior in the last decades. According to past literatures of herding behavior, most of them are focus on the effect of career incentives and compensation incentives on herding behavior separately. The dependent variable the research adopt, herding behavior, is referred from Lakonishok et al. (1992) 、Grinblatt, Titman and Wermers (1995) and Massa (2005). While main independent variables are fund manager's tenure and fund's market competition.

The research extends the idea from Alexander, Stefan, Tanja (2009) to set the similar career concern proxy and multiple regression. The main purpose is to examine whether young managers with career concerns strongly tend to herd. Besides, the research divides manager's tenure into industry tenure and fund tenure to discuss if this separation has the same outcome as past literature. On the other hand, the research also extend the idea of market competition from Roberts (1999).

The major conclusions are following: (1) Fund managers with shorter industry tenures and face career concerns would tend to herd. (2) Fund managers with shorter fund tenures and face career concerns would not to herd. (3) When fund's market competition becomes fiercer, it chooses to be a follower and tend to herd.

**Keywords:** herding, career concerns, manager's tenure, market competition

## 誌 謝

研究所兩年半的生活飛快，時光荏苒但閉上眼卻仍歷歷在目。從一開始踏入研究所生活，懵懂學習並選擇跨領財金域至今，不知不覺也從各師長身上學習到許多財金領域的知識。這兩年半的學習歷程與論文撰寫過程，尤其要感謝我的指導教授，賴慧文老師。沒有她的細心指導與關心，不會有今天這篇論文的產生。

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# Chapter 1.Introduction

The purpose of this research is to investigate how herding behaviors of fund managers are affected by fund managers' tenures after considering career concerns dominate on the market. We also examine how changes of fund's market competition affect fund managers' herding behaviors as time passes.

According to past literatures, Fama (1980), Lazear and Rosen (1981), Scharfstein and Stein (1990), Holmstrom (1999), Chevalier and Ellison (1999) find that fund managers change their portfolio to herd with peers is because of career concerns mainly dominate fund managers decision. Furthermore, Chevalier and Ellison (1999) reveal that younger managers who are new to fund companies care their job performance much more than older managers. They show that "younger managers are easily to be punished for deviating from their objective group." Goldman and Sleazak (2003) further explain the reasons that fund managers tend to discard the private information which can outperform in the group is because of the tenure of fund managers.

We predict that when career concerns dominate on the market, the younger fund managers are, the stronger propensities for them to herd. On the contrary, when compensation concerns dominate on the market, fund managers are younger, then herding is lesser attractive for them. Furthermore, we examine that when fund's market competition becomes fierce as time elapses, fund managers tend to take anti-herding. These will be examined in our research.

Our contributions are presented as follows:

First, we use the different tenure measures from Chevalier and Ellison (1999) to examine that when career concerns dominate on the market, younger fund managers tend to herd. On the other hand, when compensation concerns dominate on the market, younger

managers tend to be different.

Second, we use idea of market competition from Roberts (1999) to examine that when fund's market competition becomes fierce as time elapses, fund managers tend to take anti-herding with others.

## **Chapter 2.Literature Review & Hypothesis**

### **2-1 Literature Review**

#### **A. Career Concerns and Manager Tenures**

Since there is an agency problem between fund managers and investors in mutual fund industry, Fama (1980) reveals that such agency problem can be resolved by career concerns of fund managers. Such career concerns arise from both external labor market, which provides fund managers have better wage opportunities and internal monitoring system, which determines the productivities and promotions of fund managers from lower statuses to higher ones can obtain more wages. Therefore, fund managers are concerned about their performance judged under firm's reward system. If fund managers perform poorly, they suffer the demand of poorly performing managers from declining. This makes fund managers alleviate agency problem because poorly performing managers are in danger of being laid-off. Later, Lazear and Rosen (1981) provide an alternative approach which is less costly to compensate and evaluate workers who are risk aversions on the market to solve the agency problem.

Later, there are plenty of empirical researches to investigate the relationship between career concerns and herding behaviors. Holmstrom (1999) further examines that career concerns act in a dynamic process that induce fund managers' desires to learn about other managers' abilities through the observation of performance. This desire is what Holmstrom (1999) calls "implicit incentive" to seek future wage. Furthermore, Chevalier and Ellison (1999) provide an observable and empirical research in mutual fund industry. They reveal that fund managers who are younger have more career concerns than those who are older. Since Chevalier and Ellison (1999) show that "younger managers are easily to be punished for deviating from the mean industry



sector weighting beta or unsystematic risk level in their objective group.” Hence, younger managers have inclination to herd rather than taking anti-herding to deter their holding portfolios from being terminated. Scharfstein and Stein (1990) show some other forces lead fund managers to herd and ignore their private information: while smart managers tend to receive relevant information, dumb ones not. Dumb managers want to avoid being blamed on picking wrong investment or lagged response to information. Therefore, “sharing-the-blame” effect arises to lead dumb managers to herd and abandon the information which may bring expected positive future return. Goldman and Sleazak (2003) further explain the reasons that fund managers tend to discard the private information is because of the tenure of fund managers. For high mobility and turnover, the private information which fund managers have may not go to public and realize during their short tenure. The same situation also happens in inherited positions from previous fund managers. Goldman and Sleazak (2003) find out it will induce mispricing on the market.

Since past researches reveal empirical research that career concerns affect herding behaviors strongly, this research is going to examine how career concerns influence fund managers’ herding behavior when fund managers with different tenure.

## **B. Herding Behavior**

### **a. Herding theoretical researches**

There are three main herding theories explaining why fund managers herd in the financial market. We put all related researches in order as follows.

First, reputation-related herding: Scharfstein and Stein (1990) and Zwiebel (1995) also propose that since fund managers undertake the reputation concerns, they tend to discard their private information and decide to follow the benchmark to easily get evaluated. However, Zwiebel (1995) present different model to examine how a leader manager leads other managers to herd, while Scharfstein and Stein (1990) examine the effect of “sharing the blame” effect which point out how fund managers act like followers. Furthermore, Graham (1999) reveals that herding behaviors can happens among non-private investment information. Graham (1999) extends the model and produces relevant evidence that with high reputation or low ability concerns, fund managers herd with “Value Line.”

Second, information cascade herding: Banerjee (1992), Bikchandani, Hirshleifer, and Welch (1992) and Welch (1992) all reveals that latter fund managers tend to discard their private information and learn investment decision-making strategies from previous fund managers who are thought to be well-informed. This will incur subsequent mimic investment behaviors called “informational cascade.” Banerjee (1992) provides models of herding behavior as cascades. Bikchandani, Hirshleifer, and Welch (1992) further provide the fragility of cascades with all types of shocks. Welch (1992) provides the similar concepts in stock market for initial public stock offerings.

Third, similar information cluster herding: Froot, Scharfstein and Stein (1992), Hirshleifer, Subrahmanyam, and Titman (1994), and Barberis and Shleifer (2003) reveal that under inefficient market, part of fund managers receive common private information together before others do, they tend to herd. Because they follow the same

sources of private information. Barberis and Shleifer (2003) further propose a new category investment to examine whether the same sources of private information bring profits. Overall, Devenow and Welch (1996) provide theoretical herding researches in review.

**b. Herding empirical researches**

Despite there are strong theoretical researches of herding behaviors, empirical evidences of herding behaviors also take into deep examination. Lakonishok, Shleifer, and Vishny (we call LSV hereafter) (1992) use holdings of 769 US tax-exempt funds (mostly are pension funds) to evaluate the effects on stock prices. The data is quarterly ownership of shares, and the examined period is positioned from 1985 to 1989. They find that small stocks have more apparent herding and positive-feedback trading than largest stocks. Wermers (1999) further modifies LSV herding measuring model to examine the strength of “buy herding” and “sell herding.” In this research, Wermers (1999) examine all categories of mutual funds to analyze herding behaviors, with data period from 1975 to 1994. The evidence shows that small stocks and growth-oriented funds find out have higher level of herding behaviors. Besides, Wermers (1999) also find that evidences of herding behaviors in growth-oriented funds respect to “positive-feedback strategy,” that is ,buy herding is strongly related with high past-return stocks; sell herding is strongly related with low past-return stocks. On the other hand, Grinblatt, Titman, and Wermers (1995) modify LSV model and provide “Momentum measure” to investigate how “positive-feedback strategy” work in mutual funds. They find that 77percent of mutual funds act as momentum investors who buy high past returns more than sell low past returns. Besides, they also find that performances of funds positively correlated with momentum. There are considerable empirical researches in herding behavior later developed. Bikhchandani and Sharma (2001) and provide a

comprehensive empirical survey of related herding behaviors researches in financial markets. Massa (2005) empirically demonstrates that how compensation incentives offset herding behavior, performance persistence in mutual funds and how a gap between compensation and reputation incentive can be bridged by family affiliations. Boyson (2005 & 2010) demonstrates evidence that even for hedge fund managers, they would act the same ways as mutual fund managers since they also have to concern about the fear of fund failure and desire to attract new customers.

### **c. Taiwan herding related literatures**

There are plenty of researches of herding behaviors in Taiwan mutual fund market. Si-In Li (2006) and Chieh-Yuan Wu (2013) further extends binomial distribution (LSV model) to trinomial distribution for measuring herding behaviors. This model consider buy side, sell side and holding strategy. Si-In Li (2006) finds LSV model might overrate herding behaviors of fund managers. On the other hand, Chieh-Yuan Wu (2013) further investigates factors that influence herding behaviors of fund managers, including emotions of managers, corporate size and PDR.

Chun-Han Chao (2010) further takes risk aversion of investors into consideration, investigating in what kind of market condition investors emphasize relative benchmark and then affect herding behaviors of fund managers.

Ching-mann Huang (2005) provides that scale effect will enlarge compensations of fund managers after first-term well-performed performance. Besides, the research also reveals the how differences of abilities affect herding behaviors of fund managers; to what extent, mental accounts will lead fund managers discard private information.

Chia-Hsuan Chiu (2008) investigates how relative performance affects investment decision of mutual fund investors. Moreover, Chia-Hsuan Chiu (2008) also provides new perspectives on herding behavior of mutual fund managers in terms of investors

and contractual incentives. The research reveals that in long evaluation term, investors who emphasize relative performance more induce the tendency to herd for fund managers. However, high-incentive contracts are not significantly related low herding behaviors of fund managers in this research.

Chih-Chieh Chen (2013) investigates the relationship between fund characteristics, fund managers' attributes and herding behaviors. He samples 105 opened-equity mutual funds and the period contains from 2008 to 2012. Chih-Chieh Chen (2013) finds only degree and certificate of college significantly related to herding behaviors. On the other hand, fund scale, fund age, redemption rate and commissions for fund managers are significantly related to herding behaviors except purchase rate.

Fu and Lin (2009) reveals that fund size, fund age and performance affect herding behaviors. Amid of them, small-sized funds tend to herd more than large-sized funds; low performance funds tend to herd more than high performance funds; younger funds tend to herd more than older funds. On the other hand, Fu and Lin (2009) also find that up market condition induce funds take herding more than in low market condition.

## 2-2 Hypothesis development

We know that the management structure of mutual fund companies is delegated portfolio management relationship, that is, some investors who neither have much information nor are knowledgeable enough to make a profitable investment decision need professional investment recommendations to help those investors earn the profit. Therefore, fund managers are expected to be professional and have high ability to choose profitable portfolio which help investors earn the profit. However, there are agency problems resulted from this sort of delegated portfolio management relationship. Under the 1940 Investment Company Act regulations, investors are allowed to monitor mutual fund companies, and fund managers are allowed to only possess the performance fee charged to fund companies.<sup>1</sup> Besides, fund companies cannot design compensation incentive contracts that motivate fund managers to make undesirable investing behavior to hurt the benefits of investors (Modigliani and Pogue, 1975 ; Chevalier and Ellison, 1999). Modigliani and Pogue (1975) reveal that under explicit compensation schemes of fund companies, there are alternative investment performance fee arrangements to affect fund managers investment decision-making behavior. It leads fund managers to act and derive from average and attract new inflows. However, it will induce capital market inefficiency and arise severe agency problem between investors and mutual fund companies. Subsequently, Fama (1980), Lazear and Rosen (1981), Holmstrom (1999) note that fund managers may have career concerns to alleviate agency problem.

Chevalier and Ellison (1999) show the career concerns have different effect when they take the tenures of fund managers into consideration. Chevalier and Ellison (1999) explore the implicit incentive induced from career concerns which make fund managers, especially

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<sup>1</sup> Investment Advisers Act of 1940 and General Rules and Regulations Thereunder. Securities and Exchange Commission, Washington, D.C., April 1, 1971.

younger ones, take herding behavior to avoid fund termination. That is, younger fund managers are concerned about their job-loss in the future and therefore they will take more conventional decision-making to save their job. The following literatures similarly focus on whether career concerns lead to herding behavior among fund managers (Scharfstein and Stein 1990; Zwiebel 1995; Prendergast and Stole 1996; Morris 1997; Avery and Chevalier 1999 ; Graham 1999).

On the other hand, Scharfstein and Stein (1990) demonstrate that "...managers will be more favorably evaluated if they follow the decisions of others than if they behave in a contrarian fashion. Thus an unprofitable decision is not as bad for reputation when others make the same mistake. They can share the blame if there are systematically unpredictable shocks." This is what Scharfstein and Stein (1990) call "sharing-the-blame" effect. In other word, we can see fund managers are inclined to make the same decisions (herding) as other fund managers to deter from laid-off even they hold private information in hand. We here expect this "sharing-the-blame" effect will induce herding in the bear market, where systematically unpredictable shocks are much more, since in bear market fund managers have stronger career concerns.

From above literature, we find that career incentive lead fund managers to discard their private information to herd for the decrease in possibility of laid-off, even these private information may realize high expected returns in the future (Scharfstein and Stein, 1990). The reasons that mutual fund tends to discard these private information and herd are related to typical delegated portfolio management relationship. Goldman and Sleazak (2003) show that under circumstances of high mobility and turnover rate of fund managers, they will discard long term information since these investment period investor can be terminated at a very short notice. Chevalier and Ellison (1999) show that "fund termination" mostly happen more to younger fund managers who have career concerns to preserve jobs than to

older ones. Hence, these younger fund managers have inclinations to deter from possessing fund portfolio of idiosyncratic risk level or weight of specific fund sectors deviates considerably from average funds' peer group because they cannot bear the loss of reputation. Therefore, Froot, Scharfstein, and Stein (1992) reveal that fund managers, especially those younger ones face short-term trading, have less incentive to wait until their long-term information is revealed and incorporated in expected stocks prices maximization.

We know that the fund managers tenures take an effect on decision-making behaviors because these fund managers possess career concerns of being laid off. Therefore, we here use negative market returns as proxy of career concerns incentives to examine the relationship between fund managers' tenures and herding behaviors. The reason why we use negative market returns as proxy of career concerns are presented in Since Khorana (1996) and Hu, Hall, and Harvey (2000). They reveal that there is an inverse relationship between fund managers replacement and past performance, i.e., fund managers with poor past performance face highly-risk turnover rate. Chevalier and Ellison (1999) also show in the research, fund managers have poor past performance lead to fund outflows and therefore being replaced. This situation is more likely to happen in bear market, which negative returns usually happen. Chevalier and Ellison (1999) show that job loss indeed more likely happens after bear markets than after bull markets. Karceski (2002) also reveals that in bear markets, fund managers only care about their job, not their outperformance comparative to other fund managers, i.e., career concerns are strong in bear market, but in contrast, compensation concerns are weak in bear market. Zhao (2005) points out low probability of fund termination brings low unemployment for fund managers. Therefore, they are not worried to be laid off in bull market.

Hence, we here predict that, when career concerns dominates on the market, fund managers with shorter tenures tend to herd to prevent from replacement.



**Hypothesis 1:** When career concerns dominate on the market, fund managers with shorter tenures would rather to herd than not to herd.

On the other hand, a strategic literature review from Roberts (1999) examines the product innovation ensures sustained high profitability and therefore, companies can maintain high performance position. However, as time elapses, there are more imitators want to follow the strategy provided by first mover, as a result, the market competition of new product increase and decrease the profitability of new products.

Therefore, we find out if a particular fund is a first mover, it will take the lead and induce market competition gradually. The first mover will maintain its position and keep high profitability but some other follower will show and imitate the first mover. According to past literature of informational cascade herding, we find out fund herding is mainly because of informational prevalence and thus induce herding if this information reveals well-performed outcome. Friend et al. (1970) found, during a quarter in 1968, a tendency for mutual funds follow the investment decisions made in the previous quarter by successful and better performance funds. Grinblatt et al. (1995) find that most stock mutual funds purchased past winners during 1974–84. They find a tendency for funds to buy and sell stocks at the same time in stocks in which a large number of funds are active.

Sushil Bikhchandani, David Hirshleifer and Ivo WelchSource (1998) reveal that the theory of informational cascades theory suggests that firms should imitate each other in their product decisions. From the research of Kennedy (1997), among ABC CBS and NBC, "the networks tend to make introductions in the same categories as their rivals (e.g., situation comedies, medical dramas, adventure series)."

We here want to combine market competition and informational cascade evidence in mutual fund industry. We predict that as time elapses, when specific fund's market competition becomes fierce, it means this fund becomes a follower. It will trace

informational cascade which is induced from first mover and take herding to obtain the profit.

**Hypothesis 2:** When specific fund's market competition becomes fiercer as time elapse, it becomes a follower to herd because of informational cascade.

## Chapter 3 Methodology

### 3-1 Data and Construction of variables measures

In light of further investigation, we take the multiple regression model to investigate how fund manager's herding behavior is affected by manager tenure when fund manager faces career concerns and compensation concern. Further, we also want to examine whether the change of market competition as time passes will affect fund manager's herding behavior.

Our research is fundamentally based on the following two databases: the CRSP Survivor-Bias Free US Mutual Fund database<sup>2</sup> and the Thomson Financial Mutual Fund Holdings database (i.e., CDA/Spectrum). The Thomson Financial Mutual Fund Holdings database contains comprehensive information on mutual funds from 1975 on. The database of information on the reporting date of the holdings is stated in CDA/Spectrum starting from 1980. Portfolio holdings for each fund are stated quarterly, 8 quarterly or historical feed. Our research choose historical quarterly data according to previous herding literature. The CRSP Survivor-Bias Free US Mutual Fund database includes historical information of US open-ended mutual funds starting from 1962 on. It comprises a historical information of each name of the fund, fee structure, monthly total returns, monthly total net assets, monthly/daily net asset values under management, and other further fund specific information. Since we will to examine herding behaviors with quarterly mutual funds data, we need to convert monthly data from CRSP database into quarterly data. The information on accessible reporting date from CRSP Survivor-Bias Free US Mutual Fund database we can use is from January in 1962 to March in 2014.

Although CRSP Mutual Fund database is publicly provided starting in 1962, the

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<sup>2</sup> Source: CRSP™, Center for Research in Security Prices. Graduate School of Business, the University of Chicago. Used with permission. All rights reserved crsp. uchicago. edu. For a more detailed description of the CRSP database, see Carhart (1997) and Elton, Gruber, and Blake (2001).

information of holding on reporting date can only be traced starting in 1980. Besides, the available historical portfolio holdings are stated from the first quarter in 1997 to the second quarter in 2013. Therefore, we will merge these two data resource and examine measures starting from the first quarter in 1997 to the second quarter in 2013.

## **A. Measure tenure of fund manager**

Manager tenure measure we adopt here is different from Chevalier and Ellison (1999) in which manager tenure is calculated in ages since this fund manager starts to work in management industry to stand for the career stage in market; while we calculated manager tenure under management time in each fund. Because the birthday of each fund manager is no accessible, we decide to designate the manager tenure by counting management period of each fund when each manager is mainly in charge.

Manager tenure can be calculated as industry tenure and fund tenure. The following steps are how we sort the tenure names out first:

First, we use the CRSP Survivor-Bias Free US Mutual Fund database to separate each fund manager's name for each fund and export to Excel file. If there is co-managers who co-managed the same fund, we also need to separate co-managers' names for each fund. Then we sort out each manager's name manually and separately in Excel and search some manager's name by Google if there is different typing but they are actually the same manager. After clear each manager's name for each fund, then we merger this file back with Original CRSP database. Next, we need to find out each manger's earliest management time to stand for his first date in management industry or in particular fund.

Industry tenures are the difference between the first management date of manager in the management industry and each reporting date of holding portfolio. While fund tenures

for each manager is under each fund management in each month. The amount of management time for each fund is calculated from each fund's starting date to last date under management for each current manager. Both method will show manager tenure is accumulated over time.

Because of considering the direction of manager tenure measure needs to be accorded with hypothesis one, therefore, we adopt dummy variable to separate young managers and old managers. The dummy variable for defining young manager and old managers is taken his tenure in each month relative to total fund managers' tenures each month (either in fund or in industry). This proportion is the rank for each manager in each month. Younger manager who manages funds with short months (with ascending rank of 10th percentile) is dummied equal to one,  $D_{t-1}^{young} = 1$ ; while other percentiles other than the first 10,  $D_{t-1}^{young} = 0$ . Old manager who manages funds with long months (with ascending rank of 90th percentile) is dummied equal to zero,  $D_{t-1}^{old}=1$ ; while other percentiles other than the last 10,  $D_{t-1}^{old} = 0$ . Although tenure measure is calculated with monthly data, but we still take the end of quarterly data as its quarterly data.

## B. Measure of market competition

The idea of market competition measure is referenced from Roberts (1999). We here construct each fund's market competition in industry by quarterly which is stated as follows:

$$MK_{i,t} = \left( \frac{MS_{i,t}}{\text{Max } MS_{i,k}} \right) \times 100 \quad (1)$$

$$D_{i,t}^{MK} \begin{cases} = 0 & \text{if } MK_{i,t} - MK_{i,t-1} \geq 0 \\ = 1 & \text{if } MK_{i,t} - MK_{i,t-1} < 0 \end{cases} \quad (2)$$

Where formula (2) shows market competition is the proportion of particular fund i market share in quarter t, relative to its own maximum market share during holding

period  $k$  (which is defined as from quarter  $t$  to first reporting quarter.) According to Roberts (1999) production innovation causes profit at first move on the market. However, this profit will decrease as time lapses because of other following competitors. Hence, we adopt this concept to create a market competition measure to examine whether when fund's market competition becomes fiercer over time and then induce herding. We define  $D_{i,t}^{MK}=1$  when the market competition of particular fund  $i$  in quarter  $t$  minus previous market competition in quarter  $t-1$  is less than zero. While  $D_{i,t}^{MK}=0$  when the deduction equals to zero and above. We predict fund's market competition is a sign that fund manager has tendency of herding on the market.

### C. Measure of Herding

Herding behavior in management industry defines as a disproportionate number of mutual fund managers are buying (selling) specific stock in a given quarter. Our main empirical herding measure is from the Lakonishok et al. (1992; henceforth LSV). The LSV measure of herding in stock  $j$  during quarter  $t$ , which is "Unsigned Herding Measure" ( $UHM_{(j,t)}$ ). It is set as follows:

$$\begin{aligned}
 UHM_{(j,t)} &= \left| \left[ \frac{B_{(j,t)}}{B_{(j,t)}+S_{(j,t)}} \right] - E[p_{(j,t)}] \right| - E\left[ \left| p_{(j,t)} - E[p_{(j,t)}] \right| \right] \\
 &= |p_{(j,t)} - p(t)| - AF_{(j,t)}, \tag{3}
 \end{aligned}$$

Where  $B_{(j,t)}$  is the number of mutual funds which increase stock  $j$  in quarter  $t$ , and  $S_{(j,t)}$  is the number of mutual funds which decrease stock  $j$  in quarter  $t$ .  $\left[ \frac{B_{(j,t)}}{B_{(j,t)}+S_{(j,t)}} \right] = p_{(j,t)}$  is the proportion of the number of mutual funds buying stock  $j$  during quarter  $t$ , relative to the total number of mutual funds buying and selling in the same period.

$E[p_{(j,t)}] = p(t)$ , is the expected proportion of mutual funds actively buying all stocks during quarter t relative to the number of mutual funds trading all stocks in the same quarter.

$E[|p_{(j,t)} - E[p_{(j,t)}]|] = AF_{j,t}$ , is an adjustment factor and expected value that under the null hypothesis of no herding and for the fact that  $|p_{(j,t)} - p(t)|$  is greater than zero for all  $p(t) > 0$ . Since  $B_{(j,t)}$  follows a binomial distribution with probability  $p(t)$  of success, therefore we have  $AF_{(j,t)}$  follow the expected value of binomial distribution:

$$E[|p_{(j,t)} - E[p_{(j,t)}]|] = AF_{(j,t)} = \sum_{B_{j,t}=0}^N |p_{(j,t)} - p(t)| \times C_{B_{j,t}}^N \times p(t)^{B_{j,t}} \times (1 - p(t))^{N-B_{j,t}} \quad (4)$$

For any stock,  $AF_{(j,t)}$  is decided by the probability of randomly chosen specific stock j in a given quarter t which is based on difference between individual portfolio and active market portfolio.  $AF_{(j,t)}$  declines to zero as the number of mutual funds are active in that stock increases.

To further construct a herding measure at the individual fund level, we follow a methodology from Grinblatt, Titman and Wermers (1995), hereafter called (GTW). It defined the ‘‘Signed Herding Measure’’ ( $SHM_{(i,j,t)}$ ) that provides an indication of whether a mutual fund is herding or anti-herding. For fund i, the ( $SHM_{(i,j,t)}$ ) measure is given as following:

$$SHM_{(i,j,t)} = I_{(i,j,t)} \times UHM_{(j,t)} - E[I_{(i,j,t)} \times UHM_{(j,t)}] \quad (5)$$

Where  $I_{(i,j,t)} = 0$  if  $|p_{(j,t)} - p(t)| < E|p_{(j,t)} - p(t)|$  ;

$I_{(i,j,t)} = 1$  if  $p_{(j,t)} - p(t) > E|p_{(j,t)} - p(t)|$  and the mutual fund is a buyer of the stock j in quarter t, or  $-(p_{(j,t)} - p(t)) > E|p_{(j,t)} - p(t)|$  and the mutual fund is a seller ;

$I_{(i,j,t)} = -1$  if  $p_{(j,t)} - p(t) > E|p_{(j,t)} - p(t)|$  and the mutual fund is a seller of the stock  $j$  in quarter  $t$ , or  $-(p_{(j,t)} - p(t)) > E|p_{(j,t)} - p(t)|$  and the mutual fund is a buyer.

Additionally, we put the restriction that herding measure is only considered equity-focused fund. The indicator variable  $I_{(i,j,t)}$  captures the fact that whether a mutual fund is buying (selling) stock  $j$  when there are more buyers (sellers) in the industry, i.e. if the mutual fund is herding with the crowd (against herding.) The expectation term which is calculated under null hypothesis of no herding by the funds in the stock-quarter, as presented in Grinblatt, Titman and Wermers (1995).<sup>3</sup>

Under the null hypothesis of independent trading decisions among funds, the number of funds which are buyers is binomially distributed. We calculate the value of  $E[I \times UHM]$  for stock  $j$  in quarter  $t$  by using with parameters of the binomial distribution:  $N_{(j,t)}$ , is the number of funds trading stock  $j$  in quarter  $t$ ;  $p(t)$ , is the proportion of trading funds in the population that are buyers for stock  $j$  in quarter  $t$ ,  $Np$  is the number of funds which are buyers. Then we have expected value:

$$E[I_{(i,j,t)} \times UHM_{(j,t)}] = \sum_{p: [p-p(t)] > E|p-p(t)|} (2p-1) \times UHM(p) \times \Pr(p) - \sum_{p: -[p-p(t)] > E|p-p(t)|} (2p-1) \times UHM(p) \times \Pr(p) \quad (6)$$

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<sup>3</sup> Foot note (20), Grinblatt, Mark, Titman, Sheridan and Wermers, Russ (1995), p1101-1102



Where for  $N_{(j,t)}$  discrete values that  $Pr(p)$  can assume,

$$Pr(p) = \binom{N}{Np} p(t)^{Np} \{1 - p(t)\}^{N-Np} \quad (7)$$

In order to decide the direction of  $E[I \times UHM]$  is herding or not herding depends on indicator I. When p comes to  $[p - p(t)] > E|p - p(t)|$ , it means  $I_{(i,j,t)} = 1$  and the fund i is stock j buyer while funds on the market are much more buyers; while p comes to  $-[p - p(t)] > E|p - p(t)|$ , it means  $I_{(i,j,t)} = -1$  and the fund i is stock j buyer while funds on the market are much more sellers. When these we deduct these two conditions, which shows independent decision of trading stock j, and excludes the effect of herding and anti-herding happens randomly.

$$H_{(s,it)} = \sum_j [W_{(j,t)} - W_{(j,t-1)}] \times SHM_{(i,j,t)} \quad (8)$$

The stock herding measure for fund i,  $H_{(s,it)}$ , in quarter t shows as (8).  $H_{(s,it)}$  which is calculated with the portfolio weight of each kind of stock states herding measure for fund level. This method is referred from Massa (2005), in which revised particular fund's herding measure.

## D. Measure of other control variables

### a. Fund flow

Net fund inflows (New Money Inflow) is defined as total net asset growth in fund.

It is referenced from Sirri and Tufano (1998) and stated as following:

$$New\ Money\ Inflow_{i,l} = \frac{TNA_{i,l} - TNA_{i,l-1} * (1 + R_{i,l})}{TNA_{i,l-1}} \quad (9)$$

Where  $TNA_{i,t}$  is total net assets of fund  $i$  during monthly  $l$ , and  $R_{i,l}$  is monthly return.  $TNA_{i,l} - TNA_{i,l-1} * (1 + R_{i,l})$  needs to be calculated monthly first and then average them quarterly by  $TNA_{i,l-1}$  which is total net asset in the end of quarter. New Money Inflow reflects the percentage growth of a fund in excess of the growth that would have occurred had no new flow in and had all the dividends been invested.

**b. Fund size**

The average fund size is presented as the total net assets that are invested in equities. It is referenced from Wermer (1999). The data is accumulated monthly. It equals to total assets minus liabilities as of month-end, and reported in millions of dollars. We take each fund's monthly total net assets in the end of each quarter as fund size.

**c. Return**

Here we obtain total monthly returns associated with given date from CRSP Survivor-Bias Free US Mutual Fund database. Monthly returns values are calculated as a change in NAV including reinvested dividends from one month to the next. All management expenses, front and rear load fees and 12b-1 fees are excluded in monthly NAVs. We examine it by averaging the amount of monthly returns in each quarter.

**d. Turnover ratio**

Fund turnover is defined as the minimum of aggregated sales or aggregated purchases of securities divided by the total net assets of the fund. Since the data is monthly data without change in one year, we take it in the end of each quarter as quarterly data.

**e. Fund age**

The age of fund is calculated under the number of months in which fund had been traded. We take data in the end of each quarter as quarterly fund age.

**f. Volatility**

The volatility of fund's return is constructed by calculating a period time of standard deviation of monthly returns in the past. It is calculated by moving average idea. For example, if we are going to calculate the standard deviation for first quarter in 2003, we need to trace the monthly return from first end of quarter in 2002 to last end of quarter in 2002. The whole observation moving period is taken one year. This is how we work: first, we sort out each calendar time and find out calculate each fund's total monthly return. Secondly, we trace each fund's return back to previous year in the same quarter as its starting return. Then we calculate standard deviation by moving 12 month returns back from starting return.

**g. 12b-1 fee**

12b-1 fee is reported as the ratio of the total assets attributed to marketing and distribution costs. It is the actual fee represented in the most recently completed fiscal year. We take data in the end of each quarter as quarterly 12b-1 fee.

### **3-2. Multiple regression approach:**

The methodology here we examine for manager's herding behavior is through multiple regression approach. The multiple regression approach allows us to examine manager's herding behavior when interact with managers' tenure, and especially as career concerns dominate. We also want to examine how market competition changes as time elapses affects manager's herding behavior.

Thus, we expect to see that when young managers face career concerns, they herd severely. Furthermore, we predict that when particular fund's market competition becomes fierce over time, it tends to take herding decisions.

The two main incentives here we would like to take referenced from Alexander, Stefan, Tanja (2009). It takes market return as proxy for two dominant incentives, i.e., compensation concerns dominate in bull market and career concerns dominate in bear market. Although simple, but it is ideal method to directly compare with the comparative intensity of two main incentives that fund managers have. Alexander, Stefan, Tanja (2009) use the mid-year stock market return which is calculated as value-weighted index of all securities traded at the NYSE, Amex and Nasdaq as proxy of two incentives. They think mid-year market returns can represent managers might change their decision in the middle of year. However, our herding measure is mainly referenced from LSV(2002) and the observation period for herding measure is based on quarter. We cannot take this situation into consideration in our research. The data of market returns we take is from Kenneth R. French CRSP research data which is available on the internet and mainly provided by Chicago University.<sup>4</sup> The market returns are also calculated as value-weighted index all

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<sup>4</sup> Current Research Returns: We have revised the market return used to measure  $R_m - R_f$  in the US. It is now the value-weight return of all CRSP firms incorporated in the US and listed on the NYSE, AMEX, or NASDAQ that have a CRSP share code of 10 or 11 at the beginning of month  $t$ , good shares and price data at the beginning of  $t$ , and good return data for  $t$ . Previously we used the CRSP NYSE/AMEX/NASDAQ Value-Weighted Market Index as the proxy for the market return. The set of firms in the new series is more consistent with the universe used to compute the other US returns.

CRSP firms securities traded in NYSE, Amex, and Nasdaq.

For the main purpose, we need to differentiate that career concerns dominate in bear market, while compensation concerns dominate in bull market by quarterly average market return. Next, we dummied this market return to stand for relative intensity of two main incentives every quarter to see whether manager's tenure affects herding behaviors severely under career dominant incentive. Other control variables are also included. We then demonstrate our first regression model as following:

$$\begin{aligned}
H_{(s,it)} = & \beta_0 + \beta_1^{RI} D_{t-1}^{RI} + \beta_2 D_{t-1}^{young} + \beta_3^{RI} D_{t-1}^{young} D_{t-1}^{RI} + \beta_4 D_{(i,t-1)}^{MK} + \\
& \beta_5 Fund\ Age_{(i,t-1)} + \beta_6 Fund\ Size_{(i,t-1)} + \beta_7 NewInflow_{(i,t-1)} + \\
& \beta_8 Fund\ Turnover_{(i,t-1)} + \beta_9 Return_{(i,t-1)} + \beta_{10} Volatility_{(i,t-1)} + \\
& \beta_{11} 12b1Fee_{(i,t-1)} + \\
& \epsilon_{(i,t-1)}
\end{aligned} \tag{10}$$

The dependent variable term,  $H_{(s,it)}$  which is presented in equation (8), is what Masa (2005) defined for fund level herding which is the same concept as FHM in GTW (1995). All the independent variables are set in previous quarter because of herding behavior is taken while considering the measure condition in previous quarter. We let dummy variable of career concerns  $D_{t-1}^{RI}$  equals to one when quarterly market return is below and equal to zero if career concerns dominate in a given quarter  $t$ ; while zero otherwise. We put dummy variables  $D_t^{RI}$  independently in the first terms to examine and compare estimate when  $D_t^{RI}$  interacts with fund level herding. According to literature reviews, we here expect to see  $\beta_1^{RI} > 0$ : when career concerns dominate, herding behaviors are more likely to occur. This should be in accordance with what we want to examine in the hypothesis.

The second and third explanatory variable term in equation (10) are the young manager's

tenure. We expect to see  $\beta_2 > 0$ , young managers are usually inclined to herd. While  $\beta_3^{RI} > \beta_2 > 0$ , we add career concerns factors  $D_t^{RI}$  to interact with manager's tenure to examine whether the degree of herding behaviors apparently becomes severe. And we do expect so. According to Alexander, Stefan, Tanja (2009) and Gibbons and Murphy, (1992), older managers are hard to be incentivized because they already have enough reputation or close to retire in the industry.

The fourth explanatory variable term in equation (10) is dummy variable of market competition, which is defined as following:

$$MK_{i,t} = \left( \frac{MS_{i,t}}{\text{Max } MS_{i,k}} \right) \times 100 \quad (1)$$

$$D_{i,t}^{MK} \begin{cases} = 0 & \text{if } MK_{i,t} - MK_{i,t-1} \geq 0 \\ = 1 & \text{if } MK_{i,t} - MK_{i,t-1} < 0 \end{cases} \quad (2)$$

As  $D_{(i,t)}^{MK} = 0$ , it means the market competition for particular fund  $i$  in quarter  $t$  relative to previous quarter do not become fierce. In other word, the growth of fund's market share means more investors are willing to invest it. Therefore, this fund's market competition is not so fierce that it doesn't need to take herd to attract investors. We predict market competition is negatively related to herding behaviors. As  $D_{(i,t)}^{MK} = 1$ , it means the market competition for particular fund  $i$  in quarter  $t$  relative to previous quarter becomes fierce, therefore, market competition influence managers to take herd. That is market competition is positively related to herding behaviors, that is,  $\beta_4 > 0$ .

In order to control for some other specific fund's characteristics which are found have influences in herding in past researches, we include additional control variables as follows: fund age since the fund began trading (Fund Age), fund inflows in dollars (New Money Inflow), turnover rate of the fund (Fund Turnover), return (Fund Return) and volatility (Fund Return Volatility), the level of its advertising and marketing fees (12b-1 Expense).

## Chapter 4 Main Finding and Analysis

Before we examine our hypothesis with multiple regression, we need to present numbers, means, minimum, maximum and standard deviation for each variable (Table 1). Besides, we also examine Industry tenure, Dummy of Market competition, fund size, and fund age by Pearson Correlation Coefficients to see if these variables have highly correlation with each other and influence the outcome of the regression (Table 2). Thus we can trace each variable and to see if all can work well in our multiple model.

In Table1,  $H_{(s,it)}$  here is fund level herding, it is influenced by indicator I which designates out that if the fund is close to crowd or against the crowd. All the variables is set quarterly and we use independent variables in quarter (t-1) to examine herding fund level measure in quarter t. Especially manager tenure here is the original value by counting the difference between manager's fist date when he is under management in the industry and each fund's first record date. We set young manager and old manager variable are dummy, when manager falls in the tenure rank of the first 10%, he/she is taken as young manger; while the manager falls in the tenure rank of the last 10%, he/ she is taken as old manager. We further examine how managers interacts with herding measure if they possess career concerns.

However, data of manager's industry tenure is apparently less than herding measure sample. The reason is that original data of manager management reporting date is not available on each fund from CRSP database. Further, while processing manager's industry tenure, there is a selection bias: we intentionally select industry tenure from fund industry, so we neglect other possibilities in other industries. Therefore we can only took these data are missing value. This might influenced our testing outcome, since there is less than over 80,000 missing value in manager's industry tenure. Other control variables are proven to be

significant variables which influence herding measure in some past literature review. Here we control these variables in the model in case of influencing our main independent variables.

In Table 2, the correlation coefficients between each variable is not highly correlated. The correlation coefficient for fund size and fund age falls between 0.25769, which is positively weakly correlated. Therefore, we can further examine variables

#### **4-1 Multiple regression: Industry tenure and fund tenure without career concern**

In this section, we examine Industry tenure and Fund tenure separately for each fund into multiple regression while not considering career concern. We expect to see even without career concern, young managers still tend to herd. In next section, we compare industry tenure and fund tenure without career concern to those with career concern to see if career concern works strongly for young managers.

Table 3-a model 1 is industry tenure and market competition predicting herding behavior; while model 2 is fund tenure and market competition predicting herding behavior. Both model don't consider career concern intersection. Meanwhile, both model put the same market competition variable and other control variables as stated on formula (10). Industry tenure counts each fund manager's tenure under his first starting date in the management industry. We trace this date on which manager starts to manage his first fund in the industry. If there are co-workers in the same fund, we will separate and count each fund manager's industry tenure and depends on one whose tenure is longest. If the fund is managed by a team, we count the fund's entire reporting survival period as its independent manager's tenure.

On the other hand, fund tenure is calculated under each fund and each manager. If fund changes new manager, it means next manager is young to this fund. Still, if the fund is co-



managed by more than one manager, we calculate each manager's total tenure in the same fund and pick the longest one as this fund's manager tenure. When we set up these two model, we expect to see young manager without career concern still tend to take herd and when market competition becomes fiercer, funds under management would rather herd as well.

In model 1, we find out career concern-dominated market has negative relationship with fund level herding. It shows career concern-dominated market would rather not to herd, which is against to our hypothesis. However, young industry tenure manager dummy variable has significantly positive relationship with fund level herding. It shows young industry tenure managers without career concern intersected have 0.000557 effect on fund level herding. It means young industry tenure managers would more likely to take herd. However the estimate is not significant. On the other hand, when we compare it to young fund tenure managers, it shows young fund tenure managers without career concern intersected have -0.00026992 effect on fund level herding. It's negatively correlated. We preliminarily think it's because of managers with fund tenure are too short to determine the herding effect. Besides, managers with shorter fund tenure maybe possess longer industry tenure. We need to further examine: does shorter industry tenure managers affects herding behavior much more than shorter fund tenure managers. Therefore, what it show in model 2 is not what we expect to see.

When it comes to fund's market competition, the estimate is 0.00436 and at 1% significant level. It means when fund's market competition rise 1, it would rather take herd on 0.00436, which is support our hypothesis. The idea of fund's market completion is resulted from Roberts (1999), who provided the concept that product innovation can ensure sustained high profitability. That's why we cited this idea and examine the same idea in mutual fund industry. Roberts (1999) mentioned that when time passes, the profitability

from product innovation will decrease eventually because other competitors will take the same strategy as the first mover and take first mover's market share away. The measure in our research is market share in current period, comparing to its maximum market share in the past.

However, this research doesn't tell if this fund's maximum market share presents the fund is the first mover. According to informational cascade research, herding behavior easily happens when there is an apparent successful example to imitate. Everyone wants to obtain information quickly and immediately before the profitability of this information runs away. If research later on can deal with market competition with detail to determine which fund is actually the first mover, the outcome here would be more convincing.

Other control variables such as fund size, fund flow fund return, fund volatility, fund turnover rate and 12b-1 fee are significantly negative related with herding measure respectively, while other variable is controlled.

#### **4-2 Multiple regression: Industry tenure and fund tenure with career concern**

This section, we will show industry tenure with career concern and fund tenure with career concern to see if career concern works strongly for young managers.

Table 3-b also presents two multiple regression models. Model 1 is industry tenure and market competition predicting herding behavior; while model 2 is fund tenure and market competition predicting herding behavior. Both model consider career concern intersection.

These two model represents that when young industry tenure managers with career concerns, they tend to herd; while young fund tenure managers with career concerns are negatively with fund level herding. It shows young industry tenure managers with career concern intersected have 0.00237 effect on fund level herding. On the other hand, when we compare it to young fund tenure managers, it shows young fund tenure managers without career concern intersected have -0.00271 effect on fund level herding. Both of beta are important in 5% significant level. To young industry tenure managers, when they face bear market, their career concern arise. To avoid being laid off, they would tend to herd. It is accorded with our hypothesis 1. However, to young fund tenure managers, it's against our hypothesis 1. The reason we try to put together and figure out is that young fund tenure managers might possess long industry tenure already. This should be considered while in later research. Furthermore, because of missing value in tenure is too much to be ignored, it might be a selection bias. The multiple regression model we use here should be revised by Heckman selection model. It's a two stage model. We have to find out the selection bias and set first stage to revise the probability of missing value. On the second stage, a new model comes out with this probability and run a regression.


When it comes to fund's market competition, the estimate in both model is 0.00436 and at 1% significant level. It means when fund's market competition rise 1, it would rather take herd on 0.00436, which is still support our hypothesis 2. Therefore, we can tell, the

market competition is a good and new idea to examine the fund's herding effect. However, this variable still has a flaw: it doesn't determine which fund is a first mover. We suggest research later on should revise this problem and make the outcome more convincing.

## Chapter 5 Conclusion

Mutual fund managers face various incentives while they manage holding portfolios. We decided to take the incentive proxy idea from Alexander, Stefan, Tanja (2009) while we think it is a simple but concrete empirical outcome to follow. According to our research, young industry tenure managers with career concerns significantly support the hypothesis one; while young fund tenure managers don't support it. The reason is because of young fund tenure managers might possess long industry tenure already. It could influence the original short tenure definition. Therefore, we suggest research later on try to find out if young fund tenure managers still possess career concerns.

On the other hand, our market competition measure is significant positively with herding. It means when a fund's market competition become fiercer, this fund is more likely to take herd. The testing outcome is accorded with hypothesis two, which is considered market competition is assumed to increase the possibility of herding. However, there is a presumption before we set market competition: particular fund with biggest market share during holding period is considered as a first mover. Therefore, when each fund's market competition become fiercer, it is taken as follower. This presumption is not conscientious enough to determine a particular fund is a first mover or follower. We suggest research later on should revise this measure and set the presumption properly.



# Appendix

*Table 1- Description of variables*

Variables	N	Mean	Minimum	Maximum	Std. Dev.
Herding ( $H_{(s,it)}$ )	284225	0.016	-0.525	0.508	0.045
Career concern- ( $D^{RI}$ )	284225	0.364	0	1	0.481
Young Manager ( $D^{iyoung}$ )	194209	0.589	0	1	0.492
Young manager and Career concern	194209	0.218	0	1	0.413
Market competition variation ( $D^{MK}$ )	278917	0.091	0	1	0.377
Fund age	284225	96.955	0	1064.	100.949
Fund flow	278940	-0.499	0	48340.211	102.687
Fund size	281018	514.754	0	129835.300	2622.756
Return	280354	0.006	0	1.783	0.036
Turnover ratio	278205	0.936	0	1.532	0.026
Volatility	266752	0.050	0	150.910	2.136
12b-1 fee	268871	0.003	0	0.035	0.004

<sup>a</sup>Young manager: 1 = industry tenure rank  $\leq 10\%$ , 0 = industry tenure rank  $> 10\%$ .

<sup>b</sup>Old manager: 0 = industry tenure rank  $< 90\%$ , 1 = industry tenure rank  $\geq 90\%$ .

<sup>c</sup>Career Concern: 0 = quarterly market return  $\leq 0$ , 1 = quarterly market return  $> 0$ .

<sup>d</sup>Market Competition Variation: 0 = Market Competition in t- Market Competition in (t-1)  $\geq 0$ , 1 = Market Competition in t- Market Competition in (t-1)  $< 0$ .

*Table2- Pearson Correlation Coefficients*

Pearson Correlation Coefficients				
Prob >  r  under H0: Rho=0				
Number of Observations				
	Industry tenure(t-1)	Dummy of MK(t-1)	Fund size(t-1)	Fund age (t-1)
Industry tenure(t-1)	1.00000	-0.01121	0.01481	0.10039
		<.0001	<.0001	<.0001
	201466	199344	200517	201466
Dummy of MK(t-1)	-0.01121	1.00000	-0.00015	0.03881
	<.0001		0.9331	<.0001
	199344	304612	304612	304612
Fund size(t-1)	0.01481	-0.00015	1.00000	0.25769
	<.0001	0.9331		<.0001
	200517	304612	306879	306879
Fund age (t-1)	0.10039	0.03881	0.25769	1.00000
	<.0001	<.0001	<.0001	
	201466	304612	306879	310386

Table 3-a. Summary of Multiple Regression Analysis for Variables Predicting Herding (N = 178023)

$$H_{(s,it)} = \beta_0 + \beta_1^{RI} D_{t-1}^{RI} + \beta_2 D_{t-1}^{young} + \beta_3 D_{(i,t-1)}^{MK} + \beta_4 Fund\ Age_{(i,t-1)} + \beta_5 Fund\ Size_{(i,t-1)} + \beta_6 NewInflow_{(i,t-1)} + \beta_7 Fund\ Turnover_{(i,t-1)} + \beta_8 Return_{(i,t-1)} + \beta_9 Volatility_{(i,t-1)} + \beta_{10} 12b1Fee_{(i,t-1)} + \epsilon_{(i,t-1)} \quad (10)$$

Variable	Model 1: Industry Tenure and Market competition predicting Herding			Model 2: Fund Tenure and Market competition predicting Herding		
	$\beta$	Se	t-value	$\beta$	Se	t-value
Herding ( $H_{(s,it)}$ )	0.02000***	0.00055	(36.08)	0.02006***	0.00055462	(36.17)
Career concern- ( $D^{RI}$ )	-0.00679***	0.00039	(-17.26)	-0.00678***	0.00039318	(-17.26)
Young Manager ( $D^{young}$ )	0.000557	0.00046	(1.21)	-0.00026992	0.00051275	(-0.53)
Young manager and Career concern						
Market competition variation ( $D^{MK}$ )	0.00436***	0.00030842	(14.12)	0.00436***	0.00030840	(14.14)
Fund age	0.00000188	0.000001	(1.57)	0.00000185	0.00000120	(1.54)
Fund flow	-0.00000340	0.00000340	(-1.00)	-0.00000344	0.00000340	(-1.01)
Fund size	6.375265E-7***	4.689809E-8	(13.59)	6.369984E-7***	4.689915E-8	(13.58)
Return	-0.04388***	0.00479	(-9.16)	-0.04391***	0.00479	(-9.17)
Turnover ratio	-0.00052082***	0.00005	(-9.52)	-0.00051975***	0.000055	(-9.51)
Volatility	-0.08989***	0.0054	(-16.61)	-0.08970***	0.00541	(-16.57)
12b-1 fee	-0.11382***	0.0311	(-3.66)	-0.11386***	0.03113	(-3.66)
<i>Adj R</i> <sup>2</sup>		0.0174			0.0155	
<i>F</i> for change in <i>R</i> <sup>2</sup>		101.54***			107.72***	

Note: <sup>a</sup>Young manager: 1 = tenure rank  $\leq 10\%$ , 0 = tenure rank  $> 10\%$ . <sup>b</sup>Old manager: 0 = tenure rank  $< 90\%$ , 1 = tenure rank  $\geq 90\%$ . <sup>c</sup>Career Concern: 0 = quarterly market return  $\leq 0$ , 1 = quarterly market return  $> 0$ . <sup>d</sup>Market Competition Variation: 0 = Market Competition in t- Market Competition in (t-1)  $\geq 0$ , 1 = Market Competition in t- Market Competition in (t-1)  $< 0$ .

\*T-statistics value is in the parentheses, \*\*\*, \*\* and \* denote significance at 1%, 5% and 10% level respectively.



Table 3-b. Summary of Multiple Regression Analysis for Variables Predicting Herding (N = 178023)

$$H_{(s,it)} = \beta_0 + \beta_1 D_{t-1}^{RI} + \beta_2 D_{t-1}^{young} + \beta_3 D_{(i,t-1)}^{MK} + \beta_4 Fund\ Age_{(i,t-1)} + \beta_5 Fund\ Size_{(i,t-1)} + \beta_6 NewInflow_{(i,t-1)} + \beta_7 Fund\ Turnover_{(i,t-1)} + \beta_8 Return_{(i,t-1)} + \beta_9 Volatility_{(i,t-1)} + \beta_{10} 12b1Fee_{(i,t-1)} + \epsilon_{(i,t-1)} \quad (10)$$

Variable	Model 1: Industry Tenure and Market competition predicting Herding			Model 2: Fund Tenure and Market competition predicting Herding		
	$\beta$	Se	t-value	$\beta$	Se	t-value
Herding ( $H_{(s,it)}$ )	0.02007***	0.00056	(36.16)	0.01999***	0.00056	(36.00)
Career concern- ( $D^{RI}$ )	-0.00696***	0.0004	(-17.43)	-0.00663***	0.000398	(-16.64)
Young Manager ( $D^{young}$ )	-0.00027286	0.00057	(-0.48)	0.00069211	0.000638	(1.08)
Young manager and Career concern	0.00237**	0.00096	(2.46)	-0.00271**	0.00107	(-2.52)
Market competition variation ( $D^{MK}$ )	0.00436***	0.00031	(14.14)	0.00436***	0.000308	(14.13)
Fund age	0.00000190	0.0000012	(1.59)	0.00000184	0.000001	(1.54)
Fund flow	-0.00000335	0.0000034	(-0.98)	-0.00000341	0.000003	(-1.00)
Fund size	6.374405E-7***	4.689744E-8	(13.59)	6.365785E-7***	4.689873E-8	(13.57)
Return	-0.04368***	0.00479	(-9.12)	-0.04391***	0.00479	(-9.17)
Turnover ratio	-0.00052574***	0.000055	(-9.61)	-0.00051841***	0.000054	(-9.48)
Volatility	-0.08996***	0.00541	(-16.62)	-0.08972***	0.00541	(-16.58)
12b-1 fee	-0.11361***	0.00031	(-3.65)	-0.11369***	0.03113	(-3.65)
<i>Adj R</i> <sup>2</sup>		0.0154			0.0155	
<i>F</i> for change in <i>R</i> <sup>2</sup>		104.00***			103.97***	

Note: <sup>a</sup>Young manager: 1 = tenure rank  $\leq 10\%$ , 0 = tenure rank  $> 10\%$ . <sup>b</sup>Old manager: 0 = tenure rank  $< 90\%$ , 1 = tenure rank  $\geq 90\%$ . <sup>c</sup>Career Concern: 0 = quarterly market return  $\leq 0$ , 1 = quarterly market return  $> 0$ . <sup>d</sup>Market Competition Variation: 0 = Market Competition in t- Market Competition in (t-1)  $\geq 0$ , 1 = Market Competition in t- Market Competition in (t-1)  $< 0$ .

\*T-statistics value is in the parentheses, \*\*\*, \*\* and \* denote significance at 1%, 5% and 10% level respectively.

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論文題目

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