Mutual Funds, Superstition, and Price Inefficiency

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Abstract

We examine how Chinese mutual funds react to superstitious beliefs about bad luck during one's zodiac year, which occurs on a 12-year cycle around a person's birth year. Funds decrease their holdings of zodiac stocks, non-state-owned enterprises in the zodiac years of their chairperson, and profit more from trading zodiac stocks than from trading other stocks. This pattern is more pronounced in firms with lower investor awareness and higher liquidity, and for fund managers with higher past ability, indicating funds' ability to exploit predictable underperformance of zodiac stocks.

Keywords: Mutual Funds, Superstition, Market Efficiency, Return Predictability, Arbitrage

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1 Introduction

Asset pricing models have discovered many predictors of returns (Bryzgalova, Huang, and Julliard, 2023). How arbitrageurs should react to these patterns is usually not clear as a particular form of return predictability may represent risk compensation or mispricing (Farmer, Schmidt, and Timmermann, 2023). We examine how institutional investors react to the price impact of superstition, a form of return predictability that is less likely to represent risk premium. Superstitions, beliefs that are not based on reason, persist across diverse cultures. For example, the number 13 is considered unlucky in Western cultures, while the number 8 is considered lucky, and the number 4 is considered unlucky in Chinese culture. Since superstition is a private choice with mostly private consequences, if any, addressing superstition does not appear to be a priority for public policy or institutions. In some cases, actions motivated by superstitious beliefs can have systematic consequences that impose externalities on others. For example, there is evidence that Chinese superstition about numbers leads to higher prices or rents for houses with numbers ending in eight and lower prices or rents for houses with numbers ending in four (Fortin, Hill, and Huang, 2014, He, Liu, Sing, Song, and Wong, 2020). The preference of Japanese patients to be discharged from hospital on lucky days imposes a high cost on the Japanese medical system (Hira, Fukui, Endoh, Rahman, and Maekawa, 1998).

While the impact of superstitions on individuals has been studied, we know less about how institutions are impacted by superstition. Superstitious behavior is likely to attract institutions in financial markets with low trading costs. We shed light on this issue by examining the behavior of mutual funds in China in response to a widely held belief that a person's zodiac years, repeating every twelve years starting from the person's birth year, are unlucky for the person. It is believed that actions taken in these years can lead to adverse outcomes. Fisman, Huang, Ning, Pan, Qiu, and Wang (2023) report that respondents in the Chinese Household Finance Survey are more likely to choose the least risky investments in their zodiac years. They further show that Chinese firms reduce risk-taking in the zodiac

years of their chairperson's zodiac year. Li, Guo, Hu, and Tang (2021) and Zeng, Zhang, Zhou, Zhang, and Zhou (2022) also provide evidence of firms adopting cautious policies in their chairperson's zodiac years.

Investors' trading decisions are likely to be influenced by their superstition about the chairperson's zodiac years and potentially by the real effects of firms' policy responses in these years.[1] The case for superstition is less compelling for institutional investors than for individual investors. Our goal is not to examine whether institutional investors are superstitious. Rather, we examine how institutional investors act. Even if some managers in institutions believe in the zodiac year superstition, performance incentives and regular feedback from investments may mitigate the impact of their beliefs (Larrick and Feiler, 2015).

We address three research questions. First, do mutual funds treat firms in the zodiac years of their chairpersons differently from other firms? We expect this to be the case if stock returns differ around zodiac year, which is plausible if the occurrence of the zodiac year is a fundamental shock that impacts a firm's current or future operating performance or if investor superstition leads to a demand shock in the zodiac year. In particular, we examine whether funds are more or less likely to invest in firms in the zodiac years of their chairpersons. Second, are funds' trades more profitable or less profitable for stocks impacted by zodiac superstition? They may be more profitable if funds trade zodiac stocks to exploit systematic price impact of superstition. They may be less profitable if funds trade irrationally or if the price impact of superstition increases volatility and weakens funds' ability to exploit their informational advantage. Third, which funds' trades are more sensitive to zodiac superstition? In particular, is trading of zodiac stocks correlated with fund managers' demographic characteristics or with their ability? We use the answers to these questions to distinguish between funds' motives for trading in zodiac stocks.

Our research questions also contribute to the literature on mutual fund ability. There is empirical evidence that some mutual fund managers exhibit ability to earn superior returns

[1]See Appendix B for some examples of financial media discussion of firms' chairpersons' zodiac years. An example of a corporate executive expressing the zodiac superstition is Alibaba group's chairman Jack Ma, who mentioned in a speech at the 8th Internet Business Conference in 2011 that he had a hunch that there would be lot of troubles in his zodiac year, but he didn't expect there would be so many troubles.

(Chevalier and Ellison, 1999, Bollen and Busse, 2001, Busse and Tong, 2012, Berk and van Binsbergen, 2015). However, it is difficult to determine how fund managers' ability translates to portfolio decisions and how superior performance can be disentangled from risk or style differences (Daniel, Grinblatt, Titman, and Wermers, 1997, Elton, Gruber, and Blake, 2011). By examining trading related to zodiac superstition, we identify a narrow but precise measure of fund managers' ability and examine persistence and cross-sectional differences across this dimension of ability.

The literature on behavioral biases has long focused on the question of the survival of behavioral biases and on the role of institutional investors as arbitrageurs in mitigating the impact of these biases. The zodiac year phenomenon is an ideal setting for examining these interactions. Since the timing of the zodiac year is predetermined, investor beliefs about firms in the zodiac years of their chairpersons can be considered exogenous. The widespread prevalence of the zodiac year superstition can potentially lead to systematic patterns in portfolios and prices, offering an opportunity for institutional investors to exploit these patterns. However, given the predictability of the zodiac year it is not clear at what time during or before a chairperson's zodiac year does investor superstition impact prices. We now discuss possible temporal patterns of individual investors' and institutional investors' portfolios and prices assuming individual investors are one homogeneous and competitive set of investors and institutional investors are another such set.

If there are no frictions and individual investors and institutional investors share the same preferences, beliefs, and information, their common beliefs about zodiac year will impact prices, but there will be no predictable pattern in trading or the composition of portfolios. If investors anticipate the zodiac year well in advance, prices will incorporate in advance a discount for any decline in performance during the zodiac year and zodiac stocks (stocks of firms in zodiac years of their chairpersons) will not exhibit an abnormal return. If investors are short-sighted and expect zodiac stocks to perform poorly, zodiac stocks would earn negative abnormal returns when investors first notice that a stock is in the zodiac year of its chairperson. The subsequent abnormal return for zodiac stocks will be zero if investors' beliefs are correct and positive if investors' pessimism is unjustified.

If individual investors and institutional investors share the same information but only individual investors are superstitious, the disagreement between individual and institutional

investors will lead to trading. Since the contribution of the cash flows from the zodiac year to the stock price is greatest at the start of the zodiac year, the disagreement in valuations of the two sets of investors will peak at the start of the zodiac year and be least at the end of the zodiac year. This suggests that individual investors will sell zodiac stocks to institutional investors in the period leading up to the zodiac year, and individual investors will buy zodiac stocks from institutional investors during and after the zodiac year. However, the price pattern will depend on who is the marginal investor. If institutional investors are competitive and large relative to individual investors, the prices will reflect their valuation, and returns will not be predictable across the zodiac year. If, however, institutional investors are less than fully competitive, institutional investors will trade to exploit the predictable price impact of superstitious trading.

Finally, suppose individual investors expect zodiac stocks to perform poorly, either because of their own superstition or because of corporate executives' superstition, but are slow to anticipate the zodiac year compared to institutional investors. Individual investors will sell zodiac stocks when they become aware that they are in the middle of the chairperson's zodiac year. If institutional investors are not perfectly competitive, zodiac shares will experience negative abnormal returns when individual investors sell them. Anticipating this, institutional investors will profit by selling stocks before individual investors act on their superstition. Note that abnormal returns will not be observed if institutional investors are perfectly competitive.

In summary, average abnormal returns for zodiac stocks should be zero if investors rationally anticipate zodiac years. Nonzero average abnormal returns suggest that at least some investors fail to fully anticipate the impact of zodiac years and any investors that rationally anticipate the full impact of zodiac years have market power so that they do not compete away their informational advantage by trading aggressively. We examine how funds' portfolio holdings change around stocks' zodiac years and correlate these changes with variation in stock returns around their zodiac years. The motive behind funds' trading of zodiac can be their own belief that firms' policies deteriorate in their chairperson's zodiac years, or their knowledge that other investors think so, as both impact stock returns. We offer analyses to try to distinguish between these two motives.

We follow Fisman et al. (2023) in focusing on non-state-owned enterprises (non-SOEs) in

the zodiac years of their chairpersons because of the ambiguity about corporate governance and decision-making authority in state-owned enterprises (SOEs). The chairperson has the most control over a non-SEO's strategy. Fisman et al. (2023) find that a firm takes fewer risks, engages in fewer mergers and acquisitions, spends less on R&D, and reduces idiosyncratic risks during its chairperson's zodiac year.

We utilize Chinese CSMAR database for data on funds, firms, and chairperson characteristics, including birth year, from 2008 to 2019. We construct two datasets: one with data about each mutual fund's investment in each non-SOE each year, and the other with data about aggregate investment of all mutual funds in each non-SOE in each year.[2] One of our major findings is that funds tend to reduce their holdings of zodiac stocks relative to their holdings of non-zodiac stocks. An average fund reduces its portfolio holdings of an average zodiac stock by 0.036% (t-statistic of -16.36) more than its ownership of an average non-zodiac stock. This equals about 15% of the weight of an average stock in the fund's portfolio. The incremental reduction in portfolio holding of zodiac stocks is 0.079% if stocks not held by funds are excluded, about 8% of the standard deviation of fund holdings. Using the aggregate dataset, we find that mutual funds in aggregate reduce their ownership of an average zodiac stock by 0.631% (t-statistic of -2.97) more than their ownership of an average non-zodiac stock. Figures 1 to 6 show a significant drop in funds' industry-adjusted share ownership in an average firm's chairperson's zodiac year.

The result that funds sell zodiac stocks disproportionately suggests that funds differ from other investors in their beliefs or information about zodiac stocks. We cannot directly observe whether the mutual funds' selling of zodiac stocks is based on their information or is a manifestation of their superstition. However, their behavior is consistent with rationality if it does not reduce their trading profits. We find that funds increase their profits by underweighting zodiac stocks. We measure value change, the profit from trading in a stock as the product of the change in the number of shares, and the change in share price divided by the market capitalization of the stock. The value change of aggregate mutual funds is 0.37% (t-statistic 2.05) more from an average zodiac stock than from an average non-zodiac stock. At the individual fund level, an average mutual fund realizes a modest yet distinctly positive

[2]Aggregate dataset consists of aggregate holdings of mutual funds at a firm-year level. Fund-level data, while more detailed, covers only 70% of funds' aggregate holdings.

additional value change from trading a zodiac stock than from trading a non-zodiac stock.

To investigate the source of the funds' profits from trading zodiac stocks, we examine the performance of zodiac stocks. We find that zodiac stocks exhibit lower valuations and lower returns than non-zodiac stocks. We cannot conclusively determine if the underperformance of zodiac stocks reflects stocks' fundamentals or investors' superstition. Nonetheless, the underperformance of zodiac stocks is consistent with funds earning higher profit from selling zodiac stocks if funds time their trades of zodiac stocks. To examine the timing of funds' trades, we perform two analyses. We examine holdings of funds and of retail investors at a semiannual frequency to find that funds tend to sell zodiac stocks both in the first half and the second half of the zodiac year. We do not find any clear pattern in aggregate holdings of retail investors. However, there appears to be significant trading during zodiac years, as evidenced by increased liquidity and turnover in the first half of zodiac years. Second, using the product of the change in shares and stock return over subsequent quarters as a measure of profitability of trading, we find that funds' trades of zodiac stocks are more profitable in subsequent quarters than their trades of other stocks.

Regardless of whether the underperformance of zodiac stocks reflects fundamentals such as suboptimal corporate decisions, investor superstition, or a combination of the two, if performance of zodiac stocks is predictable, sophisticated investors should arbitrage away the mispricing. While we cannot explain this puzzle, we examine if funds have an informational advantage in exploiting the underperformance of zodiac stocks. That is, even if all market participants are hesitant about holding onto zodiac stocks (rationally or irrationally), sophisticated fund managers may be able to access relevant firm information more readily than some other investors and earn additional profits by selling these stocks before other investors do. To compare funds' advantage in zodiac and non-zodiac stocks, we compare the excess returns of zodiac stocks held by funds, zodiac stocks not held by funds, non-zodiac stocks held by funds, and non-zodiac stocks not held by funds. We find that the underperformance of zodiac stocks relative to non-zodiac stocks is concentrated in stocks that are not held by mutual funds. Among stocks held by mutual funds, there is no statistically significant difference in returns of zodiac and non-zodiac stocks. These results suggest that funds enjoy a greater informational advantage in zodiac stocks than in other stocks.

To further test informational advantage as the source of mutual funds' superior perfor-

mance in zodiac stocks, we divide stocks on the basis of investor attention. We find that the incremental profitability of funds' trades of zodiac stocks is higher among stocks with lower investor attention. This suggests that fund managers anticipate the adverse stock return of a zodiac stock earlier than other investors and trade in advance of the expected superstition-induced selling. Regardless of whether fund managers believe in superstition or not, the profitability of their trades relies on exploiting their informational advantage relative to other investors. We also find that funds' selling around a chairperson's zodiac year and the resulting profits are greater in more liquid stocks. This is consistent with the role of liquidity in facilitating informational trading. We also find that funds are more likely to engage in zodiac-related trading and earn greater profits from doing so if they have demonstrated superior ability, based on historical net asset value growth and alpha relative to asset pricing models.

Our findings underscore the significant influence of biased beliefs of some investors, such as those arising from superstition, on aggregate market outcomes. While previous research has delved into the impact of superstition on individual decision-making, we go a step further by examining the role played by institutional investors such as mutual funds which command much more capital and are likely to have a greater impact on equilibrium prices. Our evidence suggests that institutional investors mitigate but do not eliminate the impact of contemporaneous biased beliefs on prices. Funds' trading in anticipation of other investors' biased beliefs may accelerate and smooth the impact of biased beliefs on prices. However, in doing so, they do not compete away their profits, indicating their ability to limit trading.

Superstitions abound in many cultures.[3] A few studies explore how superstitions can arise and persist. Foster and Kokko (2009) develop a model that shows that superstition that specifies spurious cause-effect relation may be evolutionarily advantageous if occasional correct relation has a high fitness benefit. Fudenberg and Levine (2006) show that some, but not all, superstitions can persist despite rational learning. Beck and Forstmeier (2007) and Abbott and Sherratt (2011) show that superstition can arise from imperfect learning.

Superstitions can impact personal spending or financial decisions. He et al. (2020) find that individuals in Singapore show a stronger preference for lucky addresses when buying

[3]See, e.g., Ng, Chong, and Du (2010), Shum, Sun, and Ye (2014), Hirshleifer, Jian, and Zhang (2018), Bhattacharya, Kuo, Lin, and Zhao (2018).

new apartments. Haggard (2015) shows that a trading strategy based on days featuring lucky numbers produces risk-adjusted returns surpassing market returns in the short run in markets dominated by Chinese investors. Hirshleifer et al. (2018) show that Chinese firms with lucky listing codes trade at a premium but experience inferior post-IPO abnormal returns. Chen and Zhao (2023) indicate that IPOs listed on unlucky days experience significantly lower initial returns. By using data from cognitive priming experiments, Jiang, Cho, and Adaval (2009) reveal that exposure to lucky numbers influences estimates of winning chances in lotteries, willingness to engage in risky games, and inclination towards risky investments among Asian retail investors. Bhattacharya et al. (2018) show that retail investors in the Taiwan Futures Exchange exhibit a disproportionate preference for submitting limit orders priced at eight rather than four, and this numerological superstition contributes to their losses. Trading mistakes by superstitious individuals documented by these studies shouldn't cost them if competitive institutional investors absorb the trading shocks of individual investors without a price impact.

There is an emerging literature about how institutions deal with superstition. Pham (2024) documents that Vietnamese companies significantly decrease their investment in fixed assets when their directors are ages 49-53, ages that are considered calamitous. Zeng et al. (2022) and Fisman et al. (2023) indicate that Chinese firms invest more conservatively and become less risk-taking when the chairperson approaches their zodiac year as people believe that zodiac year will bring bad luck. Building on their work, we show that mutual funds profit from superstition-related predictability in stock returns.

Our paper is also related to the literature on behavioral biases (see surveys by Barberis and Thaler (2003) and Hirshleifer (2015)). Behavioral biases investors should not impact prices if competition among arbitrageurs eliminates any bias-induced mispricing. The literature has identified various limits to such arbitrage (Ke and Ramalingegowda, 2005, Gromb and Vayanos, 2010, Edelen, Ince, and Kadlec, 2016, Ljungqvist and Qian, 2016). Gromb and Vayanos (2010) identify four main categories of limits to arbitrage: nonfundamental risk arising from demand shocks that impact prices, short-selling costs, leverage constraints and constraints on equity capital. Hombert and Thesmar (2014) also find support for limits to arbitrage arising from funding constraints to arbitrageurs. Brav, Heaton, and Li (2010) find empirical support for the limits of arbitrage argument to explain overvaluation anoma-

lies but not for undervaluation anomalies. Our results that mutual funds profit from the predictability in returns introduced by superstition indicates presence of limits to arbitrage.

Our paper is also related to the literature on mutual funds' trading behavior. Mutual funds may emerge due to their possession of superior information (Garcia and Vanden, 2009). Kacperczyk and Seru (2007) indicate that the higher the skill level of a fund manager, the greater their sensitivity to changes in public information, enabling them to adjust portfolio allocations promptly. Huang, Li, and Weng (2020) show that investors rationally react to funds' star ratings because star ratings reflect managers' informational advantage that decays unpredictably over time. Bai, Tang, Wan, and Yüksel (2022) find that fund managers with higher offshore concentration have an informational advantage, which leads to better performance.

Psychology can also play a role when fund managers trade stocks. Pool, Stoffman, and Yonker (2012) indicate that fund managers show home bias and overweight stocks from their home states because of familiarity. Social connections also influence institutional investor trading (Kuchler, Li, Peng, and Etal., 2022, Au, Dong, and Zhou, 2023). Adebambo and Yan (2017) show that overconfident fund managers are more likely to invest in overvalued firms. We show that mutual fund trading is also responsive to non-standard psychological biases such as superstition. Rather than sacrifice returns due to superstition, mutual funds appear to be profiting from others' superstition. Our results suggest that funds, and possibly other institutional investors, exploit others' behavioral biases and mitigate the return predictability introduced by these biases. That is, asset pricing anomalies may worsen when institutional investors' ability to arbitrage weakens. However, our results raise the question why competitive arbitrageurs do not eliminate the price impact of zodiac superstition.

2 Empirical Methodology and Data

2.1 Zodiac Year

The Chinese zodiac, or "Sheng Xiao", is a system in which twelve zodiac signs, based on twelve animals (rat, ox, tiger, rabbit, dragon, snake, horse, goat or sheep, monkey, rooster, dog, and pig) form a twelve-year cycle of the lunar zodiac years. In Chinese traditional

culture, a person's "Ben Ming Nian" or zodiac sign is the animal associated with their year of birth and the person experiences their "Ben Ming Nian" in each year corresponding to that zodiac sign. The zodiac year is based on the lunar calendar. For example, someone born on December 1, 1996, has the zodiac sign rat, and their zodiac year starts every twelve years at the beginning of a Chinese lunar year with zodiac sign rat rather than at their birthday on December 1. Since the Chinese lunar calendar typically starts in January or February, we consider the calendar year in which the zodiac lunar year starts as the zodiac year.

It is commonly believed that people face additional challenges or are unlucky in their zodiac year (Comstock, 2024). They may perform certain rituals and take certain precautions to try to curb any bad luck. It is believed that people should exercise extra caution during their zodiac years to avoid potential misfortune.

2.2 Empirical Methodology

We examine how mutual funds' trading and profits are impacted by a firm's chairperson's zodiac year. Our identification strategy relies on the assumption that the timing of a firm's chairperson's zodiac year is exogenous and unrelated to the firm's underlying fundamentals or funds' characteristics or portfolios. We now provide an overview of our empirical analyses using the fund-level data.

Our initial regressions assess whether funds' portfolio holdings of a firm's stock change around the firm's chairperson's zodiac year. We employ regressions to estimate models of the form

$$\text{Holding\_Measure}_{i,j,t} = \alpha + \beta \text{Zodiac}_{j,t} + \eta \text{FundControls}_{i,t} + \gamma \text{FirmControls}_{j,t-1} + \epsilon_{i,j,t} \quad (1)$$

where $\text{Holding\_Measure}_{i,j,t}$ is a measure of holdings or change in holdings of firm j's stock in fund i's portfolio in year t. The coefficient of interest is β, the coefficient of $\text{Zodiac}_{j,t}$, a dummy variable indicating whether year t is a zodiac year for the chairperson of firm j. We include time-varying fund- and firm-level controls and a rich set of fixed effects and cluster standard errors at the fund level.

To measure the difference in funds' profit from trades across zodiac stocks and other

stocks, we estimate models of the form:

$$\text{Trade\_Profit\_Measure}_{i,j,t} = \alpha + \beta \text{Zodiac}_{j,t} + \eta \text{FundControls}_{i,t} + \gamma \text{FirmControls}_{j,t-1} + \epsilon_{i,j,t} \tag{2}$$

where $\text{Trade\_Profit\_Measure}_{i,j,t}$ is a measure of a fund i's future profit from trades of stock j in year t, and the coefficient of interest is β. To determine the time period over which the incremental profits from a funds' zodiac trades are realized, we estimate a model similar to (2) with a dependent variable that captures trading profits for semiannual periods. Following Kuchler et al. (2022), we compare funds' advantage (return of stocks held by funds minus the return of stocks not held by funds) across zodiac stocks and other stocks.

With annual portfolio change data it is difficult to determine whether funds' trades react to return movements or anticipate such movements. We repeat portfolio regressions (1) with semiannual portfolio data to more precisely identify the timing of funds' trades around a firm's chairperson's zodiac year and compare it with the timing of retail investors' trades.

To understand the mechanism behind funds' trading behavior, we hypothesize that funds' trading of zodiac stocks reflects their informational advantage and is concentrated in more liquid stocks. We test these hypotheses by estimating (1) and (2) after interacting measures of investor attention and stock liquidity with Zodiac and interpreting the coefficients of the interaction terms. Similarly, we examine whether a fund manager's ability is correlated with the fund's trading of zodiac stocks by estimating (1) and (2) after interacting Zodiac with measures of fund manager's ability.

2.3 Data

Our sample consists of Chinese mutual fund-level holdings of all non-SOEs listed on the Shanghai and Shenzhen Stock Exchanges during the years 2008-2019, obtained from CSMAR (China Stock Market & Accounting Research), a provider of Chinese accounting and financial data with comprehensive coverage of Chinese publicly traded firms. The funds are not passive funds and the data for funds includes annual and semiannual portfolio composition, management size, and personal information about the fund managers.[4] We merge this data

[4]We exclude odd quarters' portfolio data as funds' are required to report only top ten holdings in these quarters.

with accounting and financial data on non-SOE stocks. For each non-SOE stock and each year in our sample, we identify whether the year is the chairperson's zodiac year. Our measure of time is calendar year as all Chinese firms adhere to the calendar year as the fiscal year. We validate our findings with an aggregate dataset obtained from the CSMAR database with stock holdings aggregated by institutional investor types, such as pension funds, mutual funds, and banks. We obtain the number of journal news articles for each firm from CNRDS (Chinese Research Data Services) database.

2.4 Key Variables

We use subscripts i, j, and t in variable names to indicate specific funds, firms, and years, respectively.

Fund Holdings. Building on the approach in Kuchler et al. (2022), we combine mutual funds' holdings with stock prices to determine each fund's holding of each firm. Specifically, we create a metric $\text{Weight}_{i,j,t}$ of mutual fund i's year-end portfolio holding of firm j in year t:

$$\text{Weight}_{i,j,t} = \frac{\text{Values of fund } i\text{'s holdings of firm } j \text{ in year } t}{\text{AUM}_{i,t}} \times 100 \tag{3}$$

where $\text{AUM}_{i,t}$ refers to the assets under management of fund i in year t, calculated as the sum of equity values held by the fund. We create the variable $\Delta\text{Weight}_{i,j,t}$, as the change in fund i's Weight of stock j from year $t-1$ to year t:

$$\Delta\text{Weight}_{i,j,t} = \text{Weight}_{i,j,t} - \text{Weight}_{i,j,t-1} \tag{4}$$

To identify change in the holding of a stock due to trading of the stock by the fund instead of a change in the stock price, we define a measure of the trading of stock j by fund i, $\text{Trade}_{i,j,t}$, as fund i's trading volume of stock j between from $t-1$ to year t, adjusted for changes in fund size:[5]:

$$\text{Trade}_{i,j,t} = \left(\frac{\text{Shares}_{i,j,t} \times \text{Price}_{j,t-1}}{\text{AUM}_{i,t}} - \frac{\text{Shares}_{i,j,t-1} \times \text{Price}_{j,t-1}}{\text{AUM}_{i,t-1}} \right) \times 100 \tag{5}$$

[5]We use different denominators because some funds' assets under management change dramatically from one year to next.

where $\text{Shares}_{i,j,t}$ denotes the number of shares of firm j held by fund i in year t and $\text{Price}_{j,t-1}$ represents the share price of firm j in year $t-1$.

The same change in the number of shares represents a bigger change in the ownership of a firm with fewer shares than in the ownership of a firm with more shares. Following the methodology used in Au et al. (2023), we calculate a measure of the change in ownership of firm j by fund i as the change in shares of firm j held by fund i from year $t-1$ to year t, multiplied by 100,000, and divided by the total outstanding shares of firm j in year t:

$$\Delta\text{Ownership}_{i,j,t} = \frac{\text{Shares}_{i,j,t} - \text{Shares}_{i,j,t-1}}{\text{Outstanding shares of firm } j \text{ in year } t} \times 100,000 \tag{6}$$

Aggregate Fund Holdings. Using data on aggregate fund holdings, we create a variable Ownership $\text{Agg}_{j,t}$ as funds' aggregate holdings of firm j as a percentage of the firm's outstanding shares in year t:

$$\text{Ownership Agg}_{j,t} = \frac{\text{Aggregate shares}_{j,t}}{\text{Outstanding shares of firm } j \text{ in year } t} \times 100 \tag{7}$$

where $\text{Aggregate shares}_{j,t}$ is the aggregate shares of firm j held by funds in year t. We measure the change in funds' aggregate holdings of firm j from year $t-1$ to year t as

$$\Delta\text{Ownership Agg}_{j,t} = \frac{\text{Aggregate shares}_{j,t} - \text{Aggregate shares}_{j,t-1}}{\text{Outstanding shares of firm } j \text{ in year } t} \times 100. \tag{8}$$

The variable $\text{Weight Agg}_{j,t}$ measures funds' aggregate holdings of firm j relative to their aggregate portfolio in year t and is calculated as

$$\text{Weight Agg}_{j,t} = \frac{\text{Aggregate value of firm } j \text{ held by funds in year } t}{\text{AUM of all funds in year } t} \times 100 \tag{9}$$

We calculate the corresponding annual change in aggregate funds' holdings as $\Delta\text{Weight Agg}_{j,t}$:

$$\Delta\text{Weight Agg}_{j,t} = \text{Weight Agg}_{j,t} - \text{Weight Agg}_{j,t-1} \tag{10}$$

Zodiac Year. The dummy variable Zodiac identifies a firm's chairperson's zodiac year, taking a value of one when the chairperson is in the zodiac year and zero otherwise.

Fund Managers' Characteristics. To examine variation across funds in trading of zodiac stocks, we consider managers' educational background, political affiliation, gender, and

professional experiences. Top University is a dummy variable indicating whether the fund manager attended a 985 university[6] and Degree signifies the educational degree level, with a value of 3 for a doctoral degree, 2 for a master's degree, and 1 for a bachelor's degree.

The variable Overseas Background takes the values 3, 2, and 1, if a fund manager was born abroad, studied abroad, or worked abroad, respectively. The variable Certificate equals the number of professional certifications (CFA, CPA, and FRM) held by a fund manager. The variable Work Years is the approximate number of years a fund manager has worked in the industry. The variable Political identifies whether a fund manager is a member of the Communist Party of China. Finally, Gender is 1 and 0 for male and female fund managers, respectively.

Firm Characteristics. We use several firm characteristics as control variables in our regressions. We obtain panel data on the chairperson's gender, age, and firm's financial variables from CSMAR's Corporate Governance Database. We assume that funds' investment in a firm is influenced by the firm's performance in the prior year. We consider ROA, ROE, and Tobin's Q as measures of firm performance. Tobin's Q is computed as the year-end total market value of equity plus the book value of debt divided by total assets. Log Size corresponds to the logarithm of the firm's assets. Leverage represents the ratio of total liabilities to total assets. B/M stands for the book-to-market ratio. R&D denotes the ratio of the research and development expenditure to sales. Log Firm Age is the logarithm of the firm's age. Stock Return signifies the stock return of the firm. Chairperson Gender is coded as 0 if the chairperson is female, and as 0 otherwise. Chairperson Age is the age of the chairperson. Duality is a dummy variable that equals one if the chairperson is also the CEO. The definitions of all variables are presented in Table 1.

2.5 Summary Statistics

Table 2 presents summary statistics. Our data consists of 4,326 funds. However, the number of funds changes over time and many funds are present only in a few years. There are

[6]985 is an initiative in China's higher education. The 985 Project targets elite institutions, offering significant funds to boost their global competitiveness. The 39 affiliated universities are regarded as top-tier in China.

3,489 firms, 2,477 of which are non-SOEs. Columns 1 to 4 present summary statistics for the entire sample. The average weight of a zodiac stock in a fund's portfolio is 0.24%. The average values of portfolio holding change measures ΔWeight and Trade are 0.01% and 0.02%, respectively. The mean and median are often zero for these measures because if a stock is ever held by a fund, its observation is included with a Weight of 0 in years in which it is not in the fund's portfolio.[7]

Most fund managers are male, and few are affiliated with the Communist Party. Most managers have education at a master's level, as evidenced by a mean of 1.7 and a median of 2 for Degree. About 13% of managers have extensive overseas experience. Managers' average work experience is 3 to 4 years. The data on aggregate holdings of funds shows that mutual funds hold 5.41% shares of a firm on average. The average annual increase in a firm's holdings is 0.78%. The majority of firm chairpersons are male, and their average age is around 53 years.

Columns 5, 6, and 7 present summary statistics for groups of observations in which Zodiac equals zero and for observations in which Zodiac equals one, and their differences. There is a significant difference in portfolio holdings change measures between zodiac and non-zodiac years ($p < 0.01$), suggesting that funds reduce their holding of a firm during its zodiac year. However, there are no significant differences in firm characteristics except for small differences in firm age and CEO age.

3 Results

3.1 Funds' Trading of Zodiac Stocks

We first present plots indicating how funds' aggregate holdings of a firm change with the zodiac year. In Figures 1, 2, and 3, the horizontal axis designates time in years with the zodiac year normalized to zero. The vertical axis represents Ownership Agg in Figure 1, ΔWeight Agg in Figure 2, and ΔOwnership Agg in Figure 3. The plots suggest a notable decline in portfolio holdings during the zodiac year, particularly relative to the years immediately preceding and following it. Since the plots depict abnormal changes, the decline in funds'

[7]We do not include a fund-firm observation if the fund never held any shares of the firm in our data.

portfolio holdings during the zodiac year is relative to their holdings in other years.

We now turn to our basic regression specification to examine whether these patterns continue to hold after controlling for fund and firm characteristics and fixed-effects. We estimate the following model:

$$\Delta\text{Weight}_{i,j,t} = \alpha + \beta\text{Zodiac}_{j,t} + \gamma\text{Fund Controls}_{i,t} + \delta\text{Firm Controls}_{j,t-1} + \epsilon_{i,j,t} \qquad (11)$$

where i denotes the fund, j denotes the firm, t is the year, and $\epsilon_{i,t}$ is an error term. We cluster standard errors by funds. The regression results are presented in Table 3. The OLS results in the first column reveal a negative relationship between Zodiac and portfolio change. The coefficient of Zodiac is -0.036 and is significant at 1% level, suggesting that funds tend to decrease portfolio holdings during a firm's zodiac year. The coefficient represents a change of about 15% of the weight of an average stock in an average fund's portfolio. We obtain similar results with alternative portfolio change measurements in columns 2, 3, and 4. In column 2, with Trade as the dependent variable, the statistically significant coefficient of -0.019 for Zodiac shows that funds are more likely to reduce their holdings of zodiac stocks relative to non-zodiac stocks. The dependent variable in column 3 is ΔOwnership. The statistically significant coefficient of -1.870 (t-statistic abbreviated as $t = -3.63$) shows a greater decline in ownership of zodiac stocks than of non-zodiac shares. In column 4, we use Weight rather than ΔWeight as a dependent variable. Since most funds do not hold shares of most firms, the dependent variable equals zero for many observations. Following Kuchler et al. (2022), we employ the Poisson Pseudo Maximum Likelihood (PPML) method to address censoring at zero. The coefficient of Zodiac is notably negatively significant (-0.205 with $t = -20.19$).[8]

We next examine whether funds' aggregate holdings change across zodiac years to alleviate any concern that our results merely represent trading of zodiac stocks among funds. Table 4 shows results of OLS regressions with three dependent variables as alternative measures of mutual funds' aggregate holdings: Ownership Agg (columns 1 and 2), ΔWeight Agg (columns 3 and 4), and ΔOwnership Agg (columns 5 and 6). For each dependent variable,

[8]Even though the dependent variables in columns 1 to 3 are not censored at zero, they are nonetheless, censored as funds cannot reduce their holdings below zero. To address such censoring, we estimate Tobit model with appropriate censoring level for each observation. Our unreported results confirm that the result that funds reduce their holdings of zodiac stocks continues to hold.

the first column shows the results of a regression spanning the entire sample period while the second column utilizes data from seven-year windows centered at zodiac years.

The negative and statistically significant coefficients of Zodiac across specifications further indicate a negative relationship between the zodiac year and mutual funds' holdings, reinforces our findings from fund-level analysis. For instance, in column 5, the coefficient of ΔOwnership Agg in a regression based on the entire sample is -0.631 ($t = -2.97$), significant at the 1% level. This implies that mutual fund ownership of a firm's shares decreases by 0.631 percent more during its chairperson's zodiac year. The results continue to hold qualitatively when we consider shorter time windows surrounding zodiac years.

Both panel regressions with fund-fixed effects and regressions with aggregate fund holdings suggest that funds reduce holdings of zodiac stocks. These analyses do not reveal whether our results are systematic or driven by a few funds. We now consider an alternative approach motivated by the two-step procedure in Fama and MacBeth (1973). Specifically, we estimate each of the regressions in Table 3, one fund at a time, dropping fund-specific variables and fund-fixed effects. Each such regression results in a set of values of the coefficients of the independent variables. We then calculate the average value of a coefficient across all regressions and assess its statistical significance based on standard deviation of values across regressions. Unlike Fama and MacBeth (1973), fund-specific regressions can have large variation in the number of observations and consequently in the precision of estimated coefficients. Since this can reduce efficiency of the average coefficient (Lee, 2020), we limit each regression to funds with at least 500 observations. This results in regressions for approximately 1950 funds. We report the results of this procedure in Table 5. All the coefficients are negative. The coefficient of Zodiac is significant at 5% significance level in column 1 indicating that fund portfolio change is lower for zodiac stocks. The coefficient of ΔOwnership in column 2 is statistically significant at 10% level. The coefficients of Trade and Weight in columns 2 and 4, respectively, are no longer significant under this alternative procedure.

As mentioned earlier, we do not observe trading dates. We partially mitigate this limitation by repeating our analysis of trading performance with semiannual data, the highest frequency portfolio data we observe. We perform regressions with different measures of funds' aggregate holdings as in Table 4, except that each observation is for a firm-semiannual period

pair rather than a firm-year pair. The seven variables of interest are binary dummy variables for seven semiannual periods that start one and a half years before the zodiac year of the firm and end one year after the zodiac year of the firm. The results are presented in Table 6. The dependent variables for the regressions reported in columns 1, 2, and 3 are funds' aggregate ownership of the stock, the change in the weight of the stock in funds' aggregate portfolio, and the change in the aggregate ownership of the stock. The coefficient for the first half of the zodiac year is negative and statistically significant across all three regressions and the coefficient for the second half of the Zodiac year is negative and statistically significant in two of the three regressions. Almost no other coefficients of the other dummy variables are statistically significant. These results combined with the statistically significant coefficient of Zodiac in Table 4 indicate that funds are more likely to sell stocks in the two halves of their zodiac years than in other periods.

Since funds' portfolios are susceptible to flow of investors' money, one explanation for our findings is that funds vary in their exposure to zodiac stocks and investor withdrawal from funds more exposed to zodiac stocks results in more sales by those funds. Since investor withdrawal is from a fund, not particular stocks held by funds, an investor withdrawal shock can be captured by fund-year fixed effects. In unreported regressions, we add fund-year fixed effects to the regressions in 3 and find little effect of this change on the coefficients of Zodiac, suggesting that involuntary trading due to fund flows is unlikely to explain our results.

One reason for the result that funds reduce a stock's holdings during its zodiac year can be that fund managers expect zodiac stocks to perform poorly. We consider several potential explanations why fund managers may have such beliefs. The first explanation, one that we do not seriously entertain, is that the superstition is justified and supernatural causes result in poor firm performance. A second explanation is that fund managers recognize that firms' chairpersons or other executives are superstitious about chairperson's zodiac year and take suboptimal actions which hurt firm performance. A third explanation is that fund managers are superstitious and believe in uncertainty and bad luck facing the chairperson of a firm in its zodiac years. A fourth explanation is that fund managers expect the market to react negatively to zodiac stocks due to other investors' belief that a zodiac year brings bad luck to a firm. We first examine whether zodiac stocks indeed perform poorly and then conduct further tests to distinguish between potential motives for funds' trading of zodiac stocks.

3.2 Firms' Performance in Zodiac Years

We now examine the firm's performance in its chairperson's zodiac year and identify the market's attitudes towards zodiac stocks. A decline in the firm's performance or a negative market reaction can be a plausible explanation for funds to divest zodiac stocks. We examine the impact of a zodiac year on a firm's operating performance and its stock's performance. Suboptimal firm policies during a chairperson's zodiac year may hurt operating performance. Even if operating performance is not impacted by zodiac years, the stock performance may reflect market superstition about zodiac stocks that is not grounded in the reality of the operating performance. We use ROA (return on assets) to measure of the operating performance of the firm and stock return[9] and stock price change (defined as stock price divided by the previous year's price) as measures of stock performance.

We present the results in Table 7. Column 1 has stock return as the dependent variable while column 2 has stock price change as the dependent variable.[10] All regressions include year fixed effects and firm fixed effects. The coefficient of Zodiac is negative and statistically significant, both in column 1 and in column 2, suggesting that zodiac stocks underperform other stocks. We next examine operating performance and report results of regressions with ROA as the dependent variable in Column 3. The statistically insignificant coefficient of Zodiac shows that the operating performance of firms in our sample does not differ between zodiac years and other years.[11] The dependent variable in column 4, ILLIQ, is a measure of stock illiquidity proposed by Amihud (2002) and the dependent variable in column 5 is stock turnover. The negative and statistically significant coefficient of Zodiac in column 4 shows that zodiac stocks are more liquid than other stocks. The main independent variables of interest in column 5 are Zodiac H1 and Zodiac H2, dummies for first and second half, respectively, of zodiac years. The statistically significant positive coefficient of Zodiac H1 shows that stock turnover is unusually high in the first half of the chairperson's zodiac year.

[9]The stock return is defined as $\frac{P_{j,t}}{P_{j,t-1}} - 1$, where $P_{j,t}$ indicates the dividend-adjusted closing price of stock j on the last trading day of year t.

[10]The number of observations differ across the two columns because our data has some observations with returns where we cannot calculate price changes.

[11]A correlation between firm performance and Zodiac is not expected to arise mechanically due to CEO turnover unless the firm systematically used the chairperson's zodiac year as a criterion for firing or hiring.

We revisit this finding later when discussing the mechanisms behind our results.

Since we do not find any impact of the zodiac year on operating performance, the stock market underperformance may be driven by investor superstition. Or the stock market underperformance of zodiac stocks may be a rational investor reaction, and we may not have adequately measured firm performance. While Fisman et al. (2023) find that investment in R&D and corporate innovations decline during chairperson's zodiac year, even they do not report any resulting differences in firm performance. However, investors may anticipate zodiac stocks to have poor future operating performance and we may not be adequately measuring firm performance. Regardless of the cause, funds' trading of zodiac stocks does not follow a decline in operating performance of the corresponding firms. However, what is more important for funds' trading is the predictability of the underperformance of zodiac stocks. Our interest is in examining how funds react to the stock return predictability around zodiac years.

3.3 Funds Profit More on Zodiac Stocks

To assess the potential motivation for funds' selling of zodiac stocks, we examine whether such trading improves fund performance through incremental profits. Buy-and-hold returns are not appropriate for our analysis as our focus is not on stock selection or on a classification of stocks based on their returns. Rather, we want to focus on the profitability of the trading behavior of funds. Since funds' trading decisions also depend on factors other than zodiac year, they may sell some zodiac stocks and buy some zodiac stocks that they expect to perform well. Buying of shares is considered profitable if the share price increases and selling of shares is considered profitable if the share price decreases. Like most studies of mutual funds, we do not observe the dates or prices of trades. We use annual change in funds' aggregate portfolio holding and annual change in stock price to calculate a metric for value change attributed to funds' trading of firm j's stock in year t, defined as:

$$\text{Value Change}_{j,t} = \frac{(\text{Aggregate Shares}_{j,t} - \text{Aggregate Shares}_{j,t-1}) \times (\text{Price}_{j,t} - \text{Price}_{j,t-1})}{\text{Market Cap}_{j,t}}, \tag{12}$$

where Market $\text{Cap}_{j,t}$ is the market capitalization of firm j in year t. This measure exactly represents incremental profit from trading if all trades take place at the last year's price. With trades scattered through the year, this measure is a noisy estimate of the incremental profits from trades.[12] To examine profitability of trades of zodiac stocks at an individual fund level, we create a similar variable Value Change $\text{Fund}_{i,j,t}$ that uses fund i's holdings rather than aggregate fund holdings and is scaled by $\text{AUM}_{i,t}$ instead of firm j's market value.

We estimate the following model of funds' trading profitability:

$$\text{Value Change}_{j,t} = \alpha + \beta \text{Zodiac}_{j,t} + \gamma \text{Firm Controls}_{j,t-1} + \epsilon_{j,t}, \tag{13}$$

The regressions results are presented in Table 8. In column 1, we include firm controls and firm and year fixed effects, so the estimated coefficients represent within-firm variation. The coefficient of Zodiac is 0.368 ($t = 2.05$), signifying that funds' trading in a zodiac stock results in a return that is on average 0.368% higher than their return from trading a non-zodiac stock (significant at the 5% level). Columns 2 and 3 present results of regressions in which we add chairperson controls and chairperson fixed effects, respectively. These results show that for a given chairperson, a fund's trades are incrementally more profitable in chairperson's zodiac year. The coefficients on Zodiac in these two regressions results are similar to that in column 1.

The incremental profitability of fund's trades in zodiac stocks is economically significant. An estimate of funds' aggregate incremental value from trading of zodiac stocks in a year can be obtained by multiplying the market capitalization of zodiac stocks in that year by 0.368 percent based on the coefficient of Zodiac in column 1 of Table 8. Using the mean and the median values of market capitalization of zodiac stocks across the years in our sample, we estimate funds' aggregate incremental value from trading of zodiac stocks to be approximately 8 billion RMB and 4.5 billion RMB, respectively (approximately 1.1 billion and 0.6 billion US dollars, respectively at current exchange rate).

We next examine the profitability of zodiac trades by considering trades at fund level and report the results in columns 4 and 5. In column 4, we include observations for all fund-firm pairs, including those in which the fund did not trade the firm's stock or did not

[12] We cannot simply use funds' profits as those profits represent trades in all stocks and cannot be divided into zodiac stocks and other stocks.

hold the firm's stock that year (Value Change $\text{Fund}_{i,j,t} = 0$ in both cases). We also add fixed effects for fund and industry combinations. The coefficient of Zodiac is 0.013, positive and statistically significant at 1% level, suggesting that an average fund's trades for a stock are more profitable in the stock's zodiac year. In column 5, we present the results of a regression that excludes observations in which the share change equals zero. The coefficient of Zodiac increases to 0.057 and continues to be statistically significant ($t = 4.74$). These results suggest that funds' trading of zodiac stocks is more profitable than their trading of other stocks.

3.4 Future Profitability of Funds' Zodiac Stock Trades

We now examine the profitability of a trade in a semiannual period based on the stock's performance in the subsequent quarters. We create fifteen new measures of trade profitability by multiplying each of the three previously defined portfolio change metrics with five measures of returns: the returns in each of the subsequent four quarters and the compounded return in these four quarters.

In Panel A of Table 9, we report the results of regressions with these new measures of trade profitability as the dependent variables. The tables reports the coefficients of Zodiac, the main variable of interest. We control for fixed effects related to firms, quarters and, fund×industries. Results in column 1 based on using ΔWeight $\times$ Return as the dependent variable and in column 2 with Trade $\times$ Return as the dependent variable show that trading in zodiac stocks in a semiannual period is associated with significantly lower profits in the second subsequent quarter and with significantly higher profits in the third and fourth subsequent quarters. The trading in zodiac stocks is associated with significantly positive profits (at the 1% and 10% level) over the four subsequent quarters. The results in column 3, with ΔOwnership $\times$ Return as the dependent variable, do not show any significant difference in the future profitability of trades of zodiac and other stocks over the four subsequent quarters. The results in Table 9 suggest that funds have an advantage in trading zodiac stocks. Moreover, funds' profits from this apparent advantage appear to materialize six months to a year after the semiannual period in which they trade.

To further examine the association between funds' trades and the temporal pattern of

profits, we estimate regressions to explain their choice of which stocks to hold based on stock performance in the subsequent quarters. These regressions have no causal interpretation as the independent variables use forward-looking information. Panel B of Table 9 reports results of a regression where the dependent variable Hold equals 1 if the fund holds or buys a stock and 0 otherwise and the independent variables include the returns of the stock in the second, third, and fourth quarters after observing fund's portfolio, along with their interactions with Zodiac. The coefficients of all three interaction terms are positive and statistically significant at the 1% level, suggesting that future positive returns are more positively correlated with funds' holdings or purchases of zodiac stocks than with their holdings or purchases of other stocks.

3.5 Funds' Advantage in Zodiac and Non-Zodiac Stocks

Our results show that funds reduce their holdings of zodiac stocks, and they profit more from trading zodiac stocks than from their trading of non-zodiac stocks. This suggests that funds possess a greater advantage in zodiac stocks than in non-zodiac stocks. We now test this hypothesis by analyzing funds' stock-picking skills. If funds have a relative advantage in zodiac stocks, this should be reflected in superior ability to pick zodiac stocks than to pick non-zodiac stocks. Following Kuchler et al. (2022), we test whether the return of zodiac stocks held by funds minus the return of zodiac stocks not held by funds exceed the return of non-zodiac stocks held by funds minus the return of non-zodiac stocks not held by funds.

To compare the performance of holding zodiac stocks, holding non-zodiac stocks, non-holding zodiac stocks, and non-holding non-zodiac stocks, we calculate four measures of return for each fund and month. The returns for held stocks are calculated as:

$$\mathrm{R}^{\mathrm{Z}}_{i,t} = \frac{\sum_{k \in Z_{i,t}} w_{i,k,t} r_{k,t+1}}{\sum_{k \in Z_{i,t}} w_{i,k,t}} \tag{14}$$

$$\mathrm{R}^{\mathrm{NZ}}_{i,t} = \frac{\sum_{k \in NZ_{i,t}} w_{i,k,t} r_{k,t+1}}{\sum_{k \in NZ_{i,t}} w_{i,k,t}} \tag{15}$$

where $\mathrm{R}^{\mathrm{Z}}_{i,t}$ is the return of zodiac stocks held by fund i in month t and $\mathrm{R}^{\mathrm{NZ}}_{i,t}$ is the return of non-zodiac stocks held by fund i in month t, $Z_{i,t}$ and $NZ_{i,t}$ are sets of zodiac stocks and non-zodiac stocks, respectively, held by fund i in month t, and $w_{i,k,t}$ is the portfolio weight

of fund i in stock k during month t.[13] We equally weigh these two measures of returns across all funds to create aggregate returns of zodiac held stocks and non-zodiac held stocks. We follow a similar process to calculate the returns of stocks that are not held by funds but use market value weights instead of portfolio weights. We then adjust the returns of these four portfolios for risk using two methods to calculate CAPM and Fama-French 5-factor alphas.

Table 10 reports the CAPM and Fama-French 5-factor alphas of the four portfolios and their differences. We find that there is no statistically significant difference in the excess returns of zodiac and non-zodiac stocks held by funds. However, the excess return (based on 5-factor model) of zodiac stocks not held by funds is 1.682% less than that of non-zodiac stocks not held by funds. This evidence further supports our hypothesis that mutual funds have a greater informational advantage in zodiac stocks than in non-zodiac stocks.

3.6 Why Do Funds Profit on Trades of Zodiac Stocks?

Since funds' trading of zodiac stocks is more profitable than their trading of non-zodiac stocks, funds' trading of zodiac stocks is unlikely to be due to fund managers' superstition.[14] Another motive for funds' selling of zodiac stocks could be that firms take suboptimal decisions in the zodiac years of their chairperson. We do not find any evidence of a decline in the operating performance of firms during their zodiac years but cannot rule out the possibility that firm's suboptimal actions associated with zodiac years have long-term consequences on operating performance.

Another possibility is that funds exploit predictable price pattern in zodiac stocks driven by other investors' superstition by taking a contrarian view. However, we find that funds tend to sell zodiac stocks rather than buy zodiac stocks. We reconcile this evidence by proposing

[13]We follow Kuchler et al. (2022) to assume fund i's holding of stock j in month t is the same as its holdings at the end of the prior semiannual period.

[14]By definition, superstition is not rational so superstition-based trading should underperform trading based on rational beliefs unless it imposes externalities on other investors as in Kyle and Wang (1997). That is, fund managers' trades cause other investors to trade in such a way that these other investors' trades, rather than fundamentals, result in funds' profits. However, we rule out this form of market manipulation as funds with such market manipulation ability would manipulate markets all the time, not just for zodiac stocks.

that funds act strategically to maximize their profits. Suppose stock price falls during zodiac year either because zodiac stocks have inferior operating performance or because some other investors act on their superstition or both. If the decline in stock price leads to an undervaluation of these stocks, funds can take a contrarian position to buy zodiac stocks. But regardless of whether the stock price decline is rational or not, as long as the decline is predictable, funds can do better by selling zodiac stocks in advance. This is like front-running by a broker ahead of a large client order with the exception that zodiac-induced trading is not funds' private information.

We now examine trading by retail investors for clues about a connection between funds' and retail investors' trading of zodiac stocks. We estimate retail investors' portfolio as the residual of the portfolios of all institutional investors in our data, excluding holdings of mutual funds, hedge funds and all other institutional investors. We estimate regressions with measures of retail investors' portfolio and trading as dependent variables and dummies for seven semiannual periods around zodiac year as main variables of interest, as in Table 6. The results are presented in Panel A of Table 11. The three dependent variables in the three columns are retail investors' ownership of stocks, change in their weight of stocks, and change in ownership of stocks. The results suggest that retail investors sell stocks in the six months following zodiac year (significant at 10% level and at 5% level). However, we do not find a significant pattern of net buying or selling by retail investors during the zodiac year. These results do not necessarily indicate that superstition does not impact retail investors. Zodiac stocks can experience low returns if some investors sell to other investors or if all investors' lower their valuation of zodiac stocks with little trading. Our data doesn't allow us to capture any of these mechanisms. However, the evidence in columns 4 and 5 of Table 7 shows that there is increased liquidity and turnover during the first half of the zodiac year, and is consistent with trading based on speculation about the valuation of zodiac stocks.

As a further test of the relation between funds' trading of zodiac stocks and retail investor activity, we examine whether funds' trading of zodiac stocks is stronger in stocks with larger retail investor base. Since there can be a mechanical correlation between funds' trading and retail investors' holding, our dependent variable is the change in the number of shares held by funds scaled by the lagged (previous semiannual period) number of shares held by funds. To avoid the econometric problem associated with a small denominator in this ratio,

we restrict to observations where the lagged number of shares held by funds is in the third tercile. We further divide observations into three terciles every semiannual period based on retail investors' holdings and keep observations in the first and the third tercile. We create a dummy variable for firms with larger retail investor base that equals one for observations in the third tercile (highest one-third values of retail holdings). We include this dummy variable, Zodiac, and their interaction as the main variables of interest. The results in Panel B of Table 11 show that funds are more likely to sell stocks in their zodiac year if retail investors hold more of those stocks.

Regardless of whether funds' trading of zodiac stocks is motivated by rational response of investors to corporate executives' superstition or other investors' superstition, it is not clear why funds profit from these trades as the timing of zodiac year is not private information. We now investigate why funds profit from zodiac year information and why competition among funds does not drive these profits down to zero. We tackle the first question first.

Funds' higher profits on their trades of zodiac stocks come at the expense of some other investors. We propose limited attention from some investors as a behavioral explanation. An investor with unlimited attention and processing power must anticipate the trading pattern around zodiac years well in advance. However, it may be costly for some investors to devote resources to plan their trading in advance. These investors may be slower than other investors in anticipating and identifying trading patterns of zodiac stocks. Funds' zodiac trades should, therefore, be more profitable in stocks where investors are more likely to suffer from limited attention. In the case of less-known companies or those with low-profile chairpersons, investors may discover the chairperson's zodiac year later than fund managers, allowing fund managers to capitalize on this informational gap.

To explore the relation between investor attention and funds' trading of zodiac stocks, we use two metrics of investor attention. The first metric, the number of financial news articles about a company, is a measure of investors' exposure to the firm. The second metric specifically gauges investors' attention towards the chairperson rather than the firm. Investors are likely to devote greater attention to zodiac years of prominent chairpersons. As examples of prominent chairpersons, we identify all chairpersons listed in the top 100 of the Forbes China Rich List from 2008 to 2019.

We create a binary variable Less Financial News Articles that equals one for firms whose

number of financial news articles is in the bottom two terciles of the distribution of the number of financial news articles across all firms. In Panel A of Table 12, we report regressions using fund-level data to investigate whether funds' incremental profitability of trades of zodiac stocks is more pronounced in less well-known stocks. In Column 1, the dependent variable is Value Change. The coefficient of the interaction of Zodiac with Less Financial News Articles is 0.020, positive and significant at 5% level.[15] In Column 2, we repeat the regression after dropping observations with zeros for stocks not held in fund portfolios. We get qualitatively similar result. Note that the results cannot be explained by general preference of funds for some firms over others, as we include firm-fixed effects.

We next create a binary variable Less Famous that equals one for firms whose chairpersons do not appear in the Forbes China Rich List from 2008 to 2019. Column 3 presents the results of a regression with Value Change as the dependent variable. The coefficient on the interaction term of Zodiac and Less Famous is 0.039, significant at 1% level. When we drop observations with zero holdings, the results in column 4 show that the coefficient of the interaction term increases. These results suggest that funds are more likely to profit from trading in zodiac years in stocks where investors are less likely to anticipate their timing of zodiac years.

In Panel B, we examine whether funds' selling of shares in zodiac years is more prevalent in stocks with limited investor attention. We perform regressions where the dependent variable measures portfolio changes and the main independent variable of interest is the interaction of Zodiac with the degree of financial news articles or with the prominence of the chairperson. We find that the coefficients of Zodiac $\times$ Less Financial News Articles are negative and statistically significant in columns 1 to 3 with three different dependent variables, but not in column 4 with ΔOwnership as the dependent variable. In columns 5 to 8, we focus on the interaction of Zodiac and Less Famous. The coefficients of this interaction term are negative and statistically significant, suggesting that funds are more likely to sell zodiac stocks if the chairpersons of these firms are less well-known. The results in Panels A and B suggest that the source of mutual funds' profitability of trades of zodiac stocks may be the lack of investor attention to these stocks' zodiac year timing.

[15]For each interaction term, we include the uninteracted variables in regressions even if they are not displayed in the tables for conciseness.

While the above evidence suggests an informational advantage for funds, it does not explain why competition among funds that share this informational advantage does not eliminate potential profits from the shared informational advantage. We consider differentiation and liquidity as two potential factors. We discuss differentiation of funds in the following subsections. We now examine how liquidity of a stock impacts funds' trades in the stock during zodiac years. Since trading costs are lower for liquid stocks, funds may be more likely to sell liquid zodiac stocks than illiquid zodiac stocks. The relation between profitability of funds' trading of zodiac stocks and stock liquidity is more subtle. Information about zodiac stocks is more likely to get incorporated into prices with aggressive trading in liquid stocks. However, in the process, if the number of funds and their informational advantage is the same across liquid and illiquid stocks, a larger fraction of non-informationally-motivated trades (noise trades) provides a greater opportunity for funds to profit from their informational advantage. We, therefore, expect more selling and greater profitability of funds' zodiac stock trades to be concentrated in more liquid stocks.

In Panel C, we use Amihud (2002) measure as a proxy for liquidity. In columns 1 to 4, we report results of regressions where we use different measures of portfolio change as dependent variables. We divide our sample into three terciles based on stocks' liquidity values, include the first and the third tercile in each regression and use Illiquid dummy for the more illiquid group of stocks. The coefficient of the interaction term Zodiac $\times$ Illiquid is positive and statistically significant at the 1% level in columns 1 to 3, suggesting that selling of zodiac stocks is more likely in liquid stocks than in illiquid stocks. However, the coefficient is statistically insignificant in column 4.

In columns 5 and 6, we explore whether the greater profitability of trading zodiac stocks is more likely in liquid stocks. Column 5 shows the results after removing zero observations (with unchanged holdings), while column 6 covers the entire sample. The coefficients of Zodiac $\times$ Illiquid are -0.04 and -0.013, significant at the 1% level, with t-statistics of -4.21 and -3.24, respectively. These results indicate that funds' trading is more profitable in more liquid zodiac stocks, suggesting that the presence of liquidity investors permit funds to profit from their informational advantage.

3.7 Which Funds Are More Likely to Sell Zodiac Stocks?

While we show that funds are more likely to sell zodiac stocks, funds trades are based on many other factors and some zodiac stocks may be better investments than some non-zodiac stocks. Profitable trading of zodiac stocks may require skills. We now explore whether funds' selling of zodiac stocks depends on the characteristics of the fund and the fund manager. The results are presented in Appendix A.

The results in Panel A of Table 18 suggest that small funds are more likely to sell zodiac stocks. However, the difference is not statistically significant. We next classify mutual funds into non-team-managed (managed by a single person) and team-managed. A comparison of the magnitude of coefficients in Panel B indicates that non-team-managed funds are more likely to sell zodiac stocks than team-managed funds. We next compare the trading of zodiac stocks between funds run only by male managers and those with at least one female manager. The results in Panel A of Table 19 show that a fund manager's gender does not explain variation in selling of zodiac stocks across funds. Chevalier and Ellison (1999) demonstrate that fund managers who graduated from higher-SAT undergraduate institutions tend to exhibit better performance and achieve higher returns. We create a dummy variable that takes value 1 for a fund manager who graduated from a top university in China and 0 otherwise, calculate the weighted average of this variable across all managers for a fund in a year, and divide funds into two groups based on the median of this continuous variable. The results in Panel B of Table 19 suggest that fund managers who graduated from top universities are more likely to sell zodiac stocks. However, none of the fund manager characteristics we considered is a statistically significant predictor of zodiac stock trading.

3.8 Does Funds' Past Performance Predict Trading of Zodiac Stocks?

If selling zodiac stocks is on average a profitable trading strategy, higher-ability funds or fund managers may be more likely to adopt this trading strategy. We test this hypothesis using two methods.

Historical performance statistics, such as relative rankings over different periods (e.g., one year, three years, five years, and since inception) are easily accessible in fund prospectuses and marketing materials (Li, Tiwari, and Tong, 2017) and act as signals of the skills of

funds or fund managers. We assess funds' abilities using their historical performance data. We divide our sample into two periods: one spanning 2008 to 2015 and the other 2016 to 2019. We perform a regression of funds' performance in the first period, measured by the annualized return of funds, on several fund and firm controls and on Zodiac variable:

$$\text{Annualized Return}_{i,j,t} = \alpha + \beta \text{Zodiac}_{j,t} + \psi_i \text{Fund}_i + \gamma \text{Fund Controls}_{i,t} + \delta \text{Firm Controls}_{j,t} + \epsilon_{i,j,t}, \tag{16}$$

This regression yields coefficient ψ_i as fixed effect for fund i. Assuming that a fund's ability remains constant over time based on these coefficients, we use ψ_i as a measure of fund i's ability in the following regression of portfolio holdings change on Zodiac:

$$\begin{aligned}\Delta\text{Weight}_{i,j,t} =& \alpha + \beta \text{Zodiac}_{j,t} + \gamma \text{Ability}_i + \delta \text{Zodiac}_{j,t} \times \text{Ability}_i + \zeta \text{Fund Controls}_{i,t} \\ &+ \eta \text{Firm Controls}_{j,t-1} + \epsilon_{i,j,t}.\end{aligned} \tag{17}$$

We report regression results in Panel A of Table 13. The first column uses PPML regression with Weight as the dependent variable, while columns 2, 3 and 4 use OLS regressions. The coefficients of Zodiac $\times$ Ability with dependent variables ΔWeight (column 2), Trade (column 3), and ΔOwnership (column 4), are -0.044 ($t = -2.13$) significant at 5% level, -0.096 ($t = -3.93$) significant at 1% level, and -6.573 ($t = -2.08$) significant at 5% level, respectively, suggesting that funds with higher ability inferred from past performance are more likely to sell zodiac stocks.

In Panel B, we follow Au et al. (2023) to evaluate past performance of fund managers. We present results based on fund performance over the last two years though we get similar results when we measure performance over the preceding three years. We calculate a fund manager's Alpha in a year as the CAPM-adjusted alpha of the fund manager's funds in the previous two years. Note that we account for fund managers' transitions across funds by computing past performance at the fund manager level rather than at a fund level. The coefficient of the interaction term is -0.080 in column 1, significant at 10% level. The coefficient of Zodiac $\times$ Alpha with dependent variable ΔWeight in column 2 is -0.018 ($t = -2.04$), significant at 5% level. With dependent variable Trade in column 3, the coefficient is -0.049 ($t = -4.36$), significant at 1% level and with dependent variable ΔOwnership in column 4, the coefficient is -3.872 ($t = -2.01$), significant at 5% level. The results in both panels suggest that managers with higher skill or ability are more likely to sell zodiac stocks.

We now test whether higher-ability fund managers can maintain profitability or sacrifice returns by their more aggressive trading of zodiac stocks. We use Value Change at fund level as the dependent variable and include Zodiac, Alpha, the interaction Zodiac × Alpha and other controls in these regressions. Panel C of Table 13 present the results. In column 1, the coefficient of Alpha is positive and significant, indicating that higher-ability fund managers earn greater profits. However, the coefficient of the interaction term is not significant, suggesting that the superior profits of higher-ability fund managers do not differ across their trades of zodiac and non-zodiac stocks. This regression includes observations for firms where a fund does not trade and the dependent variable is zero. For the next regression, we drop these zero observations and report the results in column 2. The results indicate that higher-ability funds trade more profitably and that trades of zodiac stocks are more profitable. However, the coefficient of the interaction term continues to be statistically insignificant, again suggesting that the incremental profitability of zodiac trades is similar across lower-ability and higher-ability funds.

If more intense selling of zodiac stocks by higher-ability funds were indiscriminate rather than skill-based, their incremental profits from zodiac trades would be diluted relative to lower-ability managers as funds experience decreasing returns to scale, as theoretically argued by Berk and Green (2004) and documented empirically by Yan (2008). However, the lack of statistical significance of the coefficient of the interaction Zodiac × Alpha shows that higher-ability funds maintain their superior performance while trading zodiac stocks more intensely. This suggests that more intense zodiac trading by higher-ability funds can be attributed to their ability, in accordance with the observation in Zhu (2018) that the value that a fund extracts from capital markets is a better measure of a fund's skill than its alpha.

4 Robustness Checks

We perform several analyses in this section to test the robustness of the results of our baseline regressions in Table 3 and Table 4.

4.1 Exclusion of Stocks Not Held

In the fund-firm level analysis, even if a fund does not hold shares of a firm, we include that fund-firm observation, taking the fund's holding of the firm to be 0. Since a fund not holding shares of a firm cannot sell its shares and short-selling is restricted, changes in the firm's position may not fully reflect the fund's attitude toward the stock. We now repeat baseline regression of Table 3 after dropping all observations where a fund holds zero shares of a firm in successive years and show the results in Table 14.

Columns 1 to 4 use different measures of change in funds' holdings as dependent variables. The results are qualitatively similar to our baseline results. The dependent variable is Weight in column 1. The coefficient of Zodiac, -0.128 ($t = -14.52$), is significant at a 1% level, indicating that funds reduce their holding of zodiac stocks. In column 2, with ΔWeight as the dependent variable, we find that funds divest from zodiac stocks by 7.9 basis points ($t = -13.66$) relative to non-zodiac stocks, significant at a 1% level. This effect is economically significant as it equals about 8% of the standard deviation of the dependent variable. In column 3, the coefficient on Zodiac in explaining Trade is -0.040 ($t = -5.79$), significant at a 1% level. Finally, the results in column 4 with ΔOwnership as the dependent variable show that funds decrease their ownership of zodiac stocks by 3.81 percentage points ($t = -2.42$) compared to non-zodiac stocks, significant at a 5% level.

4.2 Average Portfolio Through Year

In measuring the change in a fund's stock holdings as the difference between its holdings at the end of a year and the end of the preceding year, we may be overlooking funds' portfolio adjustments throughout the year. This may impact our results if funds' year-end holdings differ systematically from their holdings throughout the year. To address this concern, we now consider funds' holdings in a firm averaged over the two halves of each year.

Figure 4, Figure 5, and Figure 6 show plots illustrating the relationship between zodiac year and funds' holdings averaged through the two halves each year. The plots reveal a consistent pattern, similar to that observed using annual holdings data. There is a significant reduction in funds' holdings of zodiac stocks.

Table 15 presents the results of the regressions based on average holdings throughout

the year. Columns 1 to 3 show regression results based on firm-level (aggregate) data while columns 4 to 6 show results of regressions based on data for fund-level data. In column 1, we replicate the previous dependent variable Ownership Agg by using funds' average aggregate holdings within a year instead of year-end shareholding of the firm. The coefficient of Zodiac is -0.333 ($t = -2.02$), which is consistent with our previous findings. In columns 2 and 4, with dependent variables ΔAverage Weight Agg and ΔAverage Weight, respectively, coefficients of Zodiac are negative and statistically significant (-0.013 with $t = -1.96$ and -0.023 with $t = -7.48$). The coefficient of Zodiac is negative and statistically significant (-0.009 with $t = -2.39$) when we use Trade as the dependent variable in column 5. The dependent variables in column 3 and column 6 are ΔOwnership Agg and ΔOwnership, respectively. Fund-level results show that funds decrease their holdings of zodiac stocks by 83.1 basis points ($t = -2.01$) compared to non-zodiac stocks. Based on aggregate data, funds reduce their holdings of zodiac stocks by 26.9 basis points ($t = -2.48$) relative to non-zodiac stocks.

4.3 Semiannual Evidence

To capture any systematic patterns in portfolio holdings during the year. We now use semiannual holdings data for a more granular examination of portfolio holdings. Firm and stock data is also measured at a semiannual frequency and lagged values are lagged by six months for this analysis.

Table 16 revisits our baseline regressions with semiannual holdings data. Panel A uses fund-firm-semiannual-period data and Panel B uses aggregate firm-semiannual-period data. We estimate PPML regression for the dependent variable Weight, and OLS regressions for other dependent variables. The results in column 1 of Panel A show that funds reduce Weight by 0.092 ($t = -12.36$) for zodiac stocks relative to non-zodiac stocks. This result is statistically significant at a 1% level. Column 2 results show that ΔWeight is reduced by 0.016 ($t = -15.21$) for zodiac stocks compared to non-zodiac stocks, again significant at the 1% level. Qualitatively similar results obtain with dependent variables Trade and ΔOwnership.

In Panel B, with aggregate firm-semiannual-period data, the dependent variable is Own-

ership Agg in columns 1 and 2. Column 1 uses data from the entire sample to show that funds exhibit a statistically significant 33.9 basis points ($t = -3.09$) reduction in their holdings of zodiac stocks relative to non-zodiac stocks. Column 2 considers the temporal window from 3 years before the zodiac year to 3 years after the zodiac year. The results are comparable to those in column 1 (-0.302 with $t = -2.69$). Columns 3 and 5 utilize ΔWeight Agg and ΔOwnership Agg as the dependent variables, respectively. The results show statistically significant changes of -0.009 ($t = -2.37$) and -0.331 ($t = -2.78$), respectively, for zodiac stocks. The results continue to be similar if a shorter time window around zodiac year is considered, as shown in columns 4 and 6. These empirical findings are consistent with our baseline results that funds reduce their holdings of zodiac stocks.

4.4 Placebo Test with SOEs

Investors are less likely to react to the zodiac year of a chairperson if the chairperson has less impact on a firm's policies. We use this restriction to conduct a set of placebo tests to validate our interpretation of results. In contrast to non-state-owned enterprises, whose chairperson represents their own financial interests as a controlling shareholder, the chairperson of a state-owned enterprise represents the interests of (and takes instructions from) the government. An SOE chairperson thus serves more of a custodial role in carrying out the government's wishes. For SOEs, corporate policies such as capital expenditure and mergers and acquisitions activity need to comply with the state-owned enterprise investment management rules formulated by local governments as well as local SASAC (State-owned Assets Supervision and Administration Commission) offices (Fisman et al., 2023). Further, SOEs in China enjoy more privileges in the capital market than private enterprises, including preferential access to bank loans (Geng and Pan, 2023) and implicit government guarantee which significantly lowers their risk of default (Jin, Wang, and Zhang, 2022).

Hence, we assume a chairpersons' zodiac year is less relevant to SOEs' performance. Even if people believe that bad luck may impact the operations of a SOE in its chairperson's zodiac year, they expect the government to support the enterprise. Therefore, we do not expect a significant reduction in fund holdings of a SOE during its chairperson's zodiac years.

Table 17 presents results of the placebo regressions that test these ideas. The results sug-

gest that funds do not reduce their holdings in zodiac years of SOEs' chairpersons. Columns 1, 3, and 5 examine funds' holdings of SOEs with different measures of fund holdings. The coefficient of Zodiac is not statistically significant in any of these regressions. We consider both SEOs and non-SOEs in columns 2, 4 and 6. The independent variables of interest are Zodiac and the interaction term Zodiac $\times$ SOE. We find that the coefficient of Zodiac is negative and statistically significant in each regression, indicating a reduction in funds' holdings of non-SOE zodiac stocks. In contrast, the interaction term is positive and statistically significant coefficient (except for ΔOwnership Agg), at least at the 10 percent level. The change in fund holdings during zodiac years of SEO stocks, obtained by adding the coefficient of Zodiac with the coefficient of the interaction terms, is not statistically significant.

5 Conclusion

Our examination of how mutual funds react to superstitious beliefs about stocks reveals that funds divest stocks in zodiac years of their chairperson. Additional analyses reveal that funds' trades in zodiac stocks are more profitable than their trades in non-zodiac stocks, suggesting that funds exploit the impact of superstitious beliefs on prices. The evidence about funds' trades and profits together suggests that funds enjoy informational advantage that allows them to trade to exploit anticipated return predictability induced by investor superstition. Funds' selling of zodiac stocks is not confined to specific funds or fund-manager type. However, funds are more likely to sell zodiac stocks if fund managers are more skilled, if the stocks are more liquid, and if the funds are more likely to have an informational edge in the stocks.

Our results show that arbitrageurs' can adopt complex trading strategies beyond trading aggressively to eliminate mispricing. This suggests that there may be other phenomenon with return predictability where institutional investors behave similarly. Our results also show that knowledge of cultural norms and beliefs can be useful to institutional investors. A puzzle arising from our results is what prevents more institutional investors from joining funds in exploiting predictable returns associated with superstitious beliefs and thereby diluting funds' profits.

References

Abbott, Kevin R., and Thomas N. Sherratt, 2011, The evolution of superstition through optimal use of incomplete information, *Animal Behavior*, 82, 85–92.

Adebambo, B, and X Yan, 2017, Investor overconfidence, firm valuation, and corporate decisions, *Management Science*, 64.

Amihud, Yakov, 2002, Illiquidity and stock returns: Cross-section and time-series effects, *Journal of financial markets*, 5, 31–56.

Au, S Y, M Dong, and X Zhou, 2023, Does social interaction spread fear among institutional investors? evidence from covid-19, *Management Science*.

Bai, J, Y Tang, C Wan, and H Yüksel, 2022, Fund manager skill in an era of globalization: Offshore concentration and fund performance, *Journal of Financial Economics*, 145, 18–40.

Barberis, Nicholas C., and Richard H. Thaler, 2003, A survey of behavioral finance, in George. M. Constantinides, Milton M. Harris, and Rene M. Stultz, eds., *Handbook of the Economics of Finance* (Elsevier/North-Holland), volume 1B, chapter 18, 1053–1128.

Beck, Jan, and Wolfgang Forstmeier, 2007, Superstition and belief as inevitable by-products of an adaptive learning strategy, *Human Nature*, 18, 35–46.

Berk, Jonathan B., and Richard C. Green, 2004, Mutual fund flows and performance in rational markets, *Journal of Political Economy*, 112, 1269–1295.

Berk, Jonathan B., and Jules H. van Binsbergen, 2015, Measuring skill in the mutual fund industry, *Journal of Financial Economics*, 118, 1–20.

Bhattacharya, Utpal, Wei-Yu Kuo, Tse Chun Lin, and Jing Zhao, 2018, Do superstitious traders lose money?, *Management Science*, 64, 3772–3791.

Bollen, Nicolas P. B., and Jeffrey A. Busse, 2001, On the timing ability of mutual fund managers, *Journal of Finance*, 56, 1075–1094.

Brav, Alon, J. B. Heaton, and Si Li, 2010, The limits of the limits of arbitrage, *Review of Finance*, 14, 157–187.

Bryzgalova, Svetlana, Jiantao Huang, and Christian Julliard, 2023, Bayesian solutions for the factor zoo: We just ran two quadrillion models, *Journal of Finance*, 78, 487–557.

Busse, Jeffrey A., and Qing Tong, 2012, Mutual fund industry selection and persistence, *Review of Asset Pricing Studies*, 2, 245–274.

Chen, X, and J Zhao, 2023, From the stars to the stock market: Calendar superstition and IPO returns, *Working paper, The Hong Kong Polytechnic University.*

Chevalier, J, and G Ellison, 1999, Are some mutual fund managers better than others? Cross-sectional patterns in behavior and performance, *Journal of Finance*, 54, 875–899.

Comstock, Frannie, 2024, Chinese zodiac, in *Encyclopedia Britannica* (Britannica Group).

Daniel, Kent, Mark Grinblatt, Sheridan Titman, and Russ Wermers, 1997, Measuring mutual fund performance with characteristic-based benchmarks, *Journal of Finance*, 52, 1035–1058.

Edelen, Roger M., Ozgur S. Ince, and Gregory B. Kadlec, 2016, Institutional investors and stock return anomalies, *Journal of Financial Economics*, 119, 472–488.

Elton, Edwin J., Martin J. Gruber, and Christopher R. Blake, 2011, An examination of mutual fund timing ability using monthly holdings data, *Review of Finance*, 16, 619–645.

Fama, Eugene, and James D. MacBeth, 1973, Risk, return, and equilibrium: Empirical tests, *Journal of Political Economy*, 81, 607–636.

Farmer, Leland E., Lawrence Schmidt, and Allan Timmermann, 2023, Pockets of predictability, *Journal of Finance*, 78, 1279–1341.

Fisman, Ray, Wei Huang, Bo Ning, Yue Pan, Jiaping Qiu, and Yongxiang Wang, 2023, Superstition and risk taking: Evidence from "zodiac year" beliefs in China, *Management Science*, 69, 5174–5188.

Fortin, Nicole M., Andrew J. Hill, and Jeff Huang, 2014, Superstition in the housing market, *Economic Inquiry*, 52, 974–993.

Foster, Kevin R., and Hanna Kokko, 2009, The evolution of superstitious and superstition-like behaviour, *Proceedings of the Royal Society B*, 276, 31–37.

Fudenberg, D, and D K Levine, 2006, Superstition and rational learning, *American Economic Review*, 96, 630–651.

Garcia, D, and J M Vanden, 2009, Information acquisition and mutual funds, *Journal of Economic Theory*, 144, 1965–1995.

Geng, Z, and W J Pan, 2023, The SOE premium and government support in China's credit market, *National Bureau of Economic Research, 2019.*

Gromb, Denis, and Dimitri Vayanos, 2010, Limits of arbitrage, *Annual Review of Financial Economics*, 2, 251–275.

Haggard, K S, 2015, Stock returns in Chinese markets and lucky numbered days, Managerial Finance, Working Paper 9.

He, Jia, Haoming Liu, Tien Foo Sing, Changcheng Song, and Wei-Kang Wong, 2020, Superstition, conspicuous spending, and housing markets: Evidence from Singapore, *Management Science*, 64, 783–804.

Hira, Kenji, Tsuguya Fukui, Akira Endoh, Mahbubur Rahman, and Munetaka Maekawa, 1998, Influence of superstition on the date of hospital discharge and medical cost in Japan: Retrospective and descriptive study, *British Medical Journal*, 317, 19–26.

Hirshleifer, David, 2015, Behavioral finance, *Annual Review of Financial Economics*, 7.

Hirshleifer, David, Ming Jian, and Huai Zhang, 2018, Superstition and financial decision making, *Management Science*, 64, 235–252.

Hombert, Johan, and David Thesmar, 2014, Overcoming limits of arbitrage: Theory and evidence, *Journal of Financial Economics*, 111, 26–44.

Huang, C, F Li, and X Weng, 2020, Star ratings and the incentives of mutual funds, *Journal of Finance*, 75, 1715–1765.

Jiang, Y, A Cho, and R Adaval, 2009, The unique consequences of feeling lucky: Implications for consumer behavior, *Journal of Consumer Psychology*, 19, 171–184.

Jin, S, W Wang, and Z Zhang, 2022, The real effects of implicit government guarantee: Evidence from Chinese SOE defaults, *Management Science*, 69, 3650–3674.

Kacperczyk, Marcin, and Amit Seru, 2007, Fund manager use of public information: New evidence on managerial skills, *Journal of Finance*, 62.

Ke, Bin, and Santhosh Ramalingegowda, 2005, Do institutional investors exploit the post-earnings announcement drift?, *Journal of Accounting and Economics*, 39, 25–53.

Kuchler, T, Y Li, L Peng, and Etal., 2022, Social proximity to capital: Implications for investors and firms, *Review of Financial Studies*, 35, 2743–2789.

Kyle, Albert S., and Albert Wang, 1997, Speculation duopoly with agreement to disagree: Can overconfidence survive the market test?, *Journal of Finance*, 52, 2073–2090.

Larrick, Richard P., and Daniel C. Feiler, 2015, Expertise in decision making, in Gideon Keren and George Wu, eds., *The Wiley Blackwell Handbook of Judgment and Decision Making, II* (Wiley), 696–721.

Lee, Kyuseok, 2020, A weighted Fama-MacBeth two-step panel regression procedure: asymptotic properties, finite-sample adjustment, and performance, *Studies in Economics and Finance*, 37, 347–360.

Li, C W, A Tiwari, and L Tong, 2017, Investment decisions under ambiguity: Evidence from mutual fund investor behavior, *Management Science*, 63, 2509–2528.

Li, Jiarong, Jie Michael Guo, Nan Hu, and Ke Tang, 2021, Do corporate managers believe in bad luck? Evidence of the Chinese zodiac effect, *International Review of Financial Analysis*, 77, 101861.

Ljungqvist, Alexander, and Wenlan Qian, 2016, How constraining are limits to arbitrage?, *Review of Financial Studies*, 29, 1975–2028.

Ng, T, T Chong, and X Du, 2010, The value of superstitions, *Journal of Economic Psychology*, 31, 293–309.

Pham, Dai Van, 2024, The effects of superstition on firms' investment behavior: Evidence from Vietnam, an irreligious country, *Journal of Comparative Economics*, 52, 1–27.

Pool, V, N Stoffman, and S Yonker, 2012, No place like home: Familiarity in mutual fund manager portfolio choice, *Review of Financial Studies*, 25, 2563–2599.

Shum, M, W Sun, and G Ye, 2014, Superstition and "lucky" apartments: Evidence from transaction-level data, *Journal of Comparative Economics*, 42, 109–117.

Yan, Xuemin (Sterling), 2008, Liquidity, investment style, and the relation between fund size and fund performance, *Journal of Financial and Quantitative Analysis*, 43, 741–767.

Zeng, Huixiang, Xinxin Zhang, Zhifang Zhou, Tao Zhang, and Qiong Zhou, 2022, Does the effect of the annual year taboo exist? Empirical evidence from senior managers' zodiac year and corporate inefficient investment., *British Accounting Review*, 54, 101–114.

Zhu, Min, 2018, Informative fund size, managerial skill, and investor rationality, *Journal of Financial Economics*, 130, 114–134.

Figure 1: Funds' ownership (Ownership Agg) around zodiac year: year-end portfolios

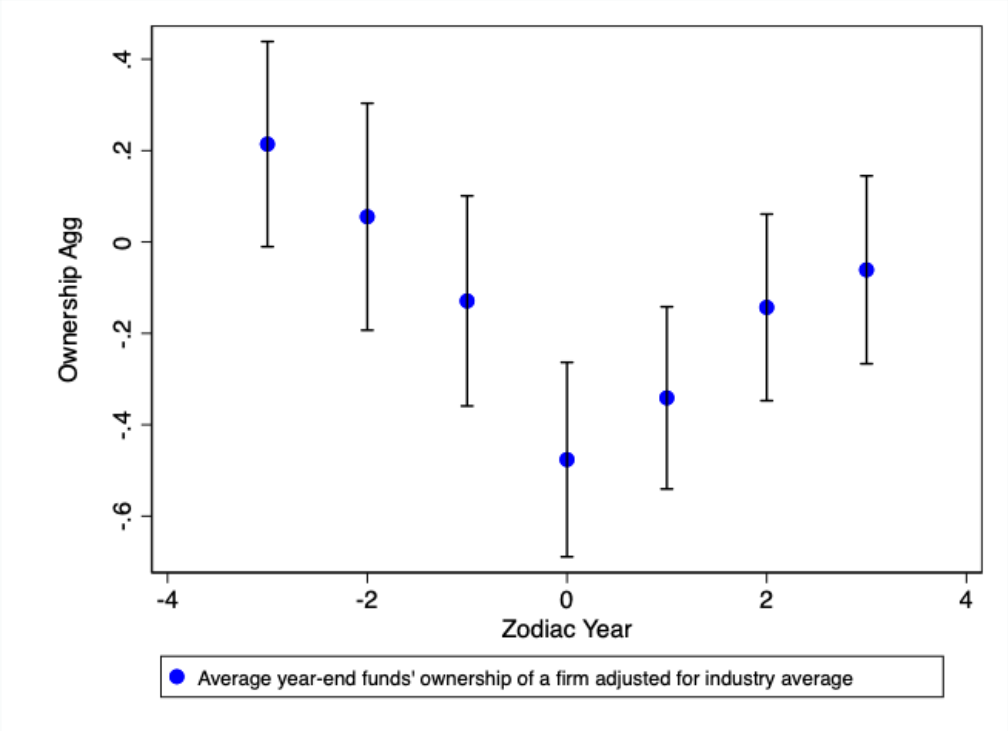


Figure 2: Funds' change in portfolio weight (ΔWeight Agg) around zodiac year: year-end portfolios

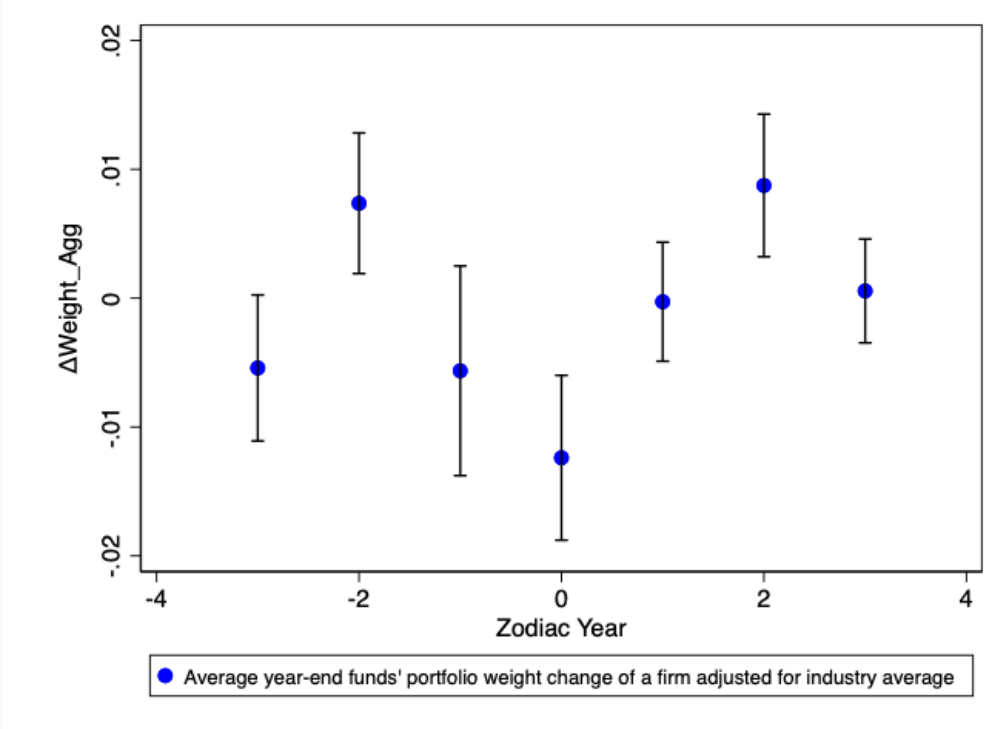


Figure 3: Funds' change in ownership (ΔOwnership Agg) around zodiac year: year-end portfolios

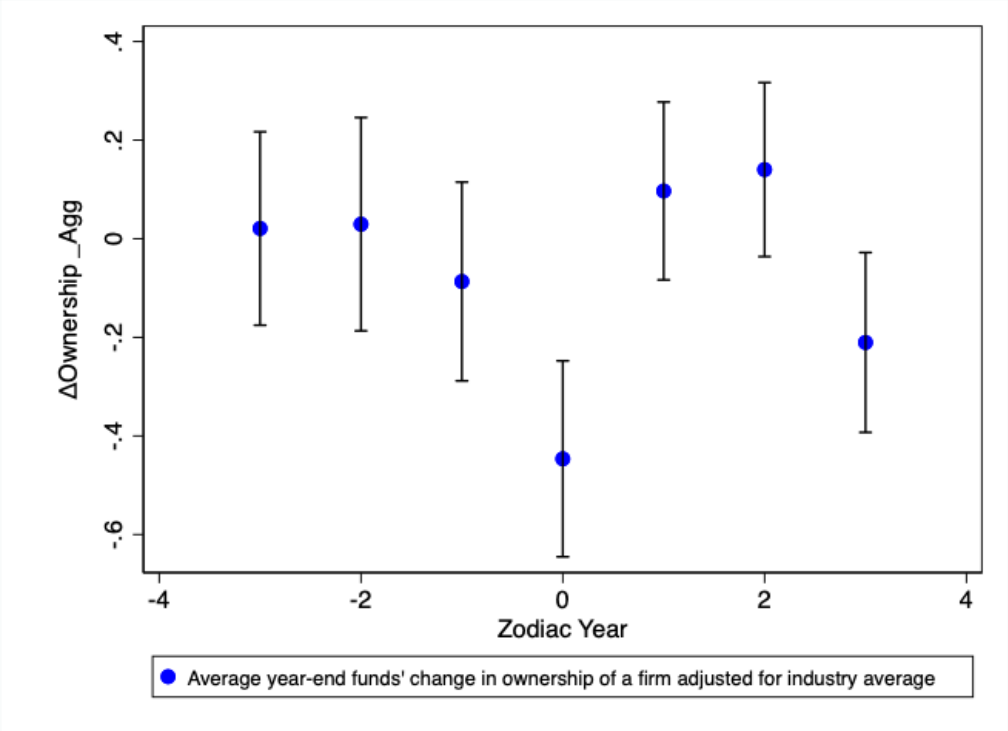


Figure 4: Funds' ownership (Ownership Agg) around zodiac year: average semiannual portfolio

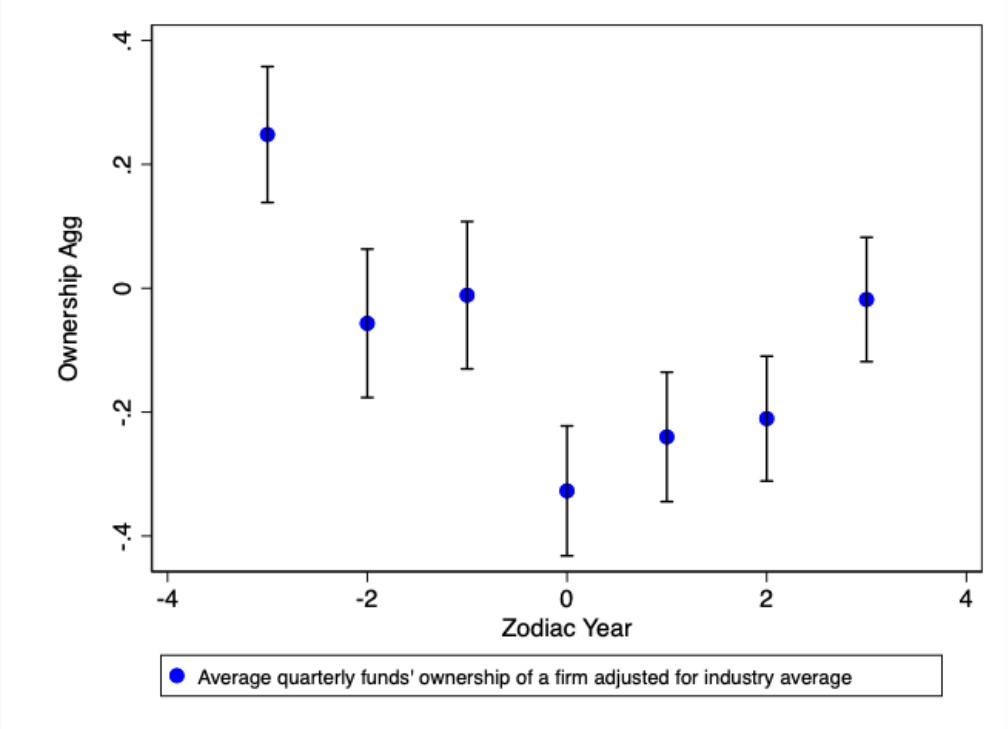


Figure 5: Funds' change in portfolio weight (ΔWeight Agg) around zodiac year: average semiannual portfolio

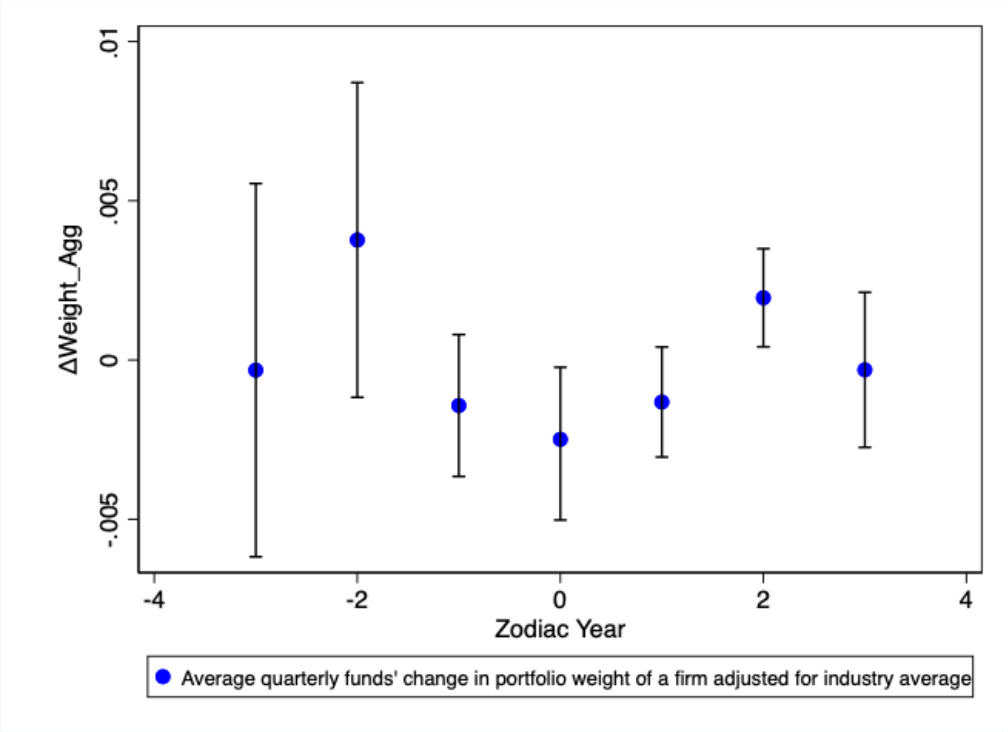


Figure 6: Funds' change in ownership (ΔOwnership Agg) around zodiac year: average semiannual portfolio

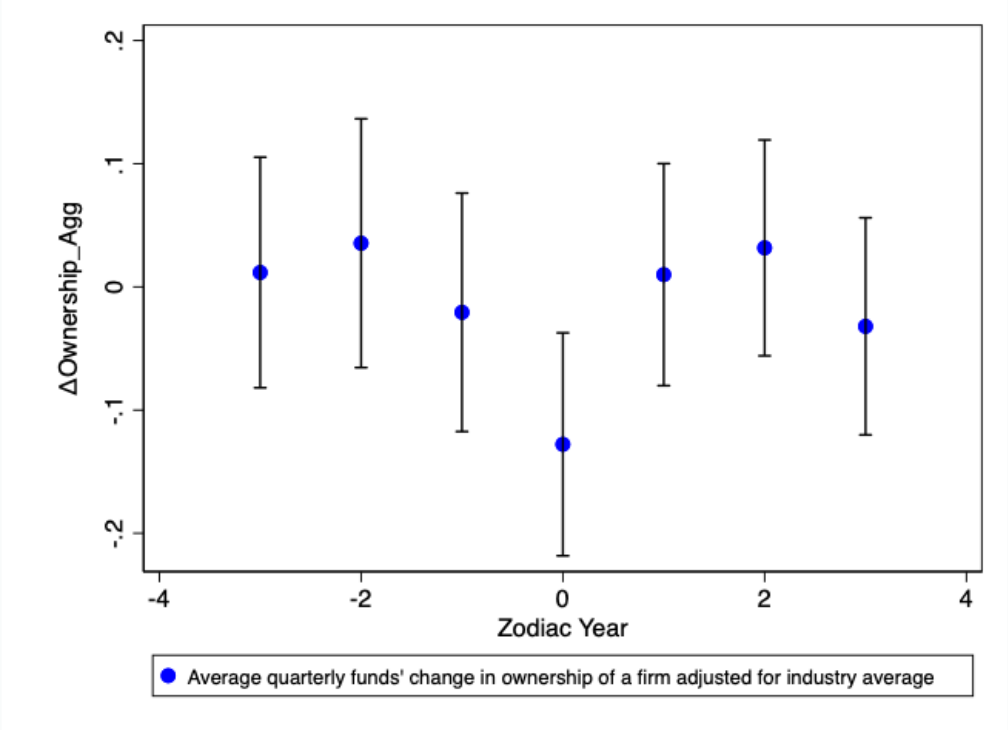


Table 1: **Variable Definitions**

Variable	**Definition**
$\text{Zodiac}_{j,t}$	1 if year t is zodiac year for firm j's chairperson, 0 otherwise
$\text{AUM}_{i,t}$	(Assets under management) the aggregate value of fund i's equity holdings in year t
$\text{Weight}_{i,j,t}$	Value of fund i's holding of firm j in year $t \times 100$/ $\text{AUM}_{i,t}$
$\Delta\text{Weight}_{i,j,t}$	$\text{Weight}_{i,j,t}$ - $\text{Weight}_{i,j,t-1}$
$\text{Shares}_{i,j,t}$	Number of shares of firm j held by fund i in year t
$\text{Price}_{j,t}$	Share price of firm j in year t
$\text{Trade}_{i,j,t}$	$\left(\frac{\text{Shares}_{i,j,t} \times \text{Price}_{j,t-1}}{\text{AUM}_{i,t}} - \frac{\text{Shares}_{i,j,t-1} \times \text{Price}_{j,t-1}}{\text{AUM}_{i,t-1}}\right) \times 100$
$\Delta\text{Ownership}_{i,j,t}$	$(\text{Shares}_{i,j,t} - \text{Shares}_{i,j,t-1}) \times 10^5$ / outstanding shares of firm j in year t
$\text{Weight Agg}_{j,t}$	Value of funds' aggregate holding of firm j in year $t \times 100$ / funds' aggregate AUM in year t
$\Delta\text{Weight Agg}_{j,t}$	$\text{Weight Agg}_{j,t}$ - $\text{Weight Agg}_{j,t-1}$
$\text{Ownership Agg}_{j,t}$	$\sum_i \text{Shares}_{i,j,t} \times 100$ / outstanding shares of firm j in year t
$\Delta\text{Ownership Agg}_{j,t}$	$(\sum_i \text{Shares}_{i,j,t} - \sum_i \text{Shares}_{i,j,t-1}) \times 100$ / outstanding shares of firm j in year t
$\text{Value Change}_{j,t}$	$(\sum_i \text{Shares}_{i,j,t} - \sum_i \text{Shares}_{i,j,t-1}) \times (\text{Price}_{j,t} - \text{Price}_{j,t-1})$ / Market Cap of firm j in year t
$\text{Value Change Fund}_{i,j,t}$	$(\text{Shares}_{i,j,t} - \text{Shares}_{i,j,t-1}) \times (\text{Price}_{j,t} - \text{Price}_{j,t-1})$ / $\text{AUM}_{i,t}$
$\text{Top University}_{i,t}$	1 if manager of fund i in year t graduated from a top 39 university ("985"), 0 otherwise
$\text{Degree}_{i,t}$	3, 2, or 1 if manager of fund i in year t had a doctoral, master's, or bachelor's degree, respectively
$\text{Overseas Background}_{i,t}$	3 if manager of fund i in year t had foreign birth, otherwise, 2 if foreign study, otherwise 1 if foreign work experience, 0 otherwise
$\text{Certificate}_{i,t}$	Number of CFA, CPA, FRM certifications held by manager of fund i in year t (0-3)
$\text{Work Years}_{i,t}$	Years of industry work experience of manager of fund i in year t
$\text{Political}_{i,t}$	1 if manager of fund i in year t is a member of the Communist Party of China, 0 otherwise
$\text{Gender}_{i,t}$	1 if manager of fund i in year t is male, 0 otherwise
$\text{Non Team Managed}_{i,t}$	1 if fund is individually managed in year t
$\text{NAV Growth}_{i,t}$	The growth rate from year $t-1$ to year t of fund i's assets less liabilities divided by shares outstanding
$\text{Tobin's Q}_{j,t}$	Market value of equity plus the book value of debt divided by total assets for firm j at end of year t
$\text{Log Size}_{j,t}$	Logarithm of the firm j's assets at the end of year t
$\text{Leverage}_{j,t}$	Ratio of total liabilities to total assets for firm j at the end of year t
$\text{B/M}_{j,t}$	Book-to-market ratio of firm j at the end of year t
$\text{R\&D}_{j,t}$	Research and development expenditure ratio to sales for firm j in year t
$\text{Log Firm Age}_{j,t}$	Logarithm of firm j's age in year t
$\text{Chairperson Gender}_{j,t}$	1 if chairperson of firm j in year t is male, 0 otherwise
$\text{Chairperson Age}_{j,t}$	The age of firm j's chairperson in year t.
$\text{Duality}_{j,t}$	1 if the chairperson of firm j in year t is also the CEO, 0 otherwise
SOE	1 if the firm is a state-owned enterprise, 0 otherwise

Table 2: Summary Statistics

This table presents descriptive data of fund-firm pairs, fund manager characteristics, aggregate firm-level data, and chairpersons' characteristics for all non-State-owned enterprises (non-SOEs) traded on the Shanghai and Shenzhen exchanges from 2008 to 2019. Zodiac indicates whether the chairperson of a firm is in their zodiac year. Weight represents a metric of the institutional holding of a stock in a fund's portfolio. ΔWeight, our primary dependent variable, is the change in Weight relative to the previous year. Alternative dependent variables are Trade, which adjusts the primary measure by removing the price impact, and ΔOwnership, calculated as the change in the fund's shares of a firm between years t and $t-1$, scaled by the firm's total outstanding shares in year t. For fund managers, Top University denotes enrollment at a premier "985" university in China, Degree represents the education level, and Overseas Background their foreign experience. Certificate reflects professional certifications. Work Years approximates industry tenure, Political identifies Communist Party membership, and Gender is 1 for males and 0 for females. In aggregate (across funds) data at a firm-year level, Weight Agg is the percentage of firm shares held by mutual funds and ΔWeight Agg is the change in Weight Agg relative to the previous year. ΔOwnership Agg is the change in the number of shares of a firm held by mutual funds from year relative to the previous year, divided by the total outstanding shares of the firm. Log Size corresponds to the logarithm of the firm's assets. Leverage represents the total liabilities to total assets ratio. B/M stands for the book-to-market ratio. R&D is the ratio of research and development expenditure to sales. Tobin's Q is the year-end total market value of equity plus the book value of debt divided by total assets. Stock Return is the stock return of the firm. Log Firm Age is the logarithm of the firm's age. Duality dummy equals one if the firm's chairperson is also the CEO. Chairperson Gender is 1 if the chairperson is male and 0 otherwise. Chairperson Age is the age of the chairperson. Columns 4 and 5 report mean values for zodiac and non-zodiac observations, respectively, and column 6 reports their differences.

	Mean	**Median**	**SD**	**N**	**Mean Zodiac=0**	**Mean Zodiac=1**	**Difference (6)-(5)**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Funds				4,326			
Non-SOE Firms				2,477			
SOE Firms				1,012			
Fund-Non-SOE Firm-Year Observations							
Zodiac	0.08	0.0	0.27	2,281,074			
Weight	0.24	0.0	0.86	2,281,074	0.249	0.219	–0.031***
ΔWeight	0.01	0.0	0.96	2,041,271	0.013	-0.021	–0.034***
Trade	0.02	0.0	1.06	2,007,113	0.023	-0.005	–0.028***
ΔOwnership	1.68	0.0	211.06	2,035,557	1.826	–0.012	–1.838***
Fund-Year Observations							
Top University	0.25	0.0	0.39	20,129			
Political	0.01	0.0	0.07	20,129			
Gender	0.83	1.0	0.33	20,129			
Degree	1.70	2.0	0.73	20,108			
Certificate	0.07	0.0	0.27	20,087			
Overseas Background	0.13	0.0	0.41	20,085			
Work Years	3.93	3.42	2.32	20,114			
Non-SOE Firm-Year Observations							
Ownership Agg	5.41	1.80	8.34	16,081	5.43	5.14	–0.29
ΔWeight Agg	-0.01	0.0	0.17	12,131	–0.006	–0.021	–0.016***
ΔOwnership Agg	0.78	0.02	6.66	13,829	0.816	0.326	–0.49***
Log Size	21.76	21.66	1.18	16,064	21.759	21.729	–0.030
Leverage	0.43	0.38	0.82	16,064	0.428	0.418	–0.011
B/M	0.57	0.58	0.24	15,598	0.575	0.568	–0.006
R&D	4.02	3.20	5.78	16,081	4.027	3.936	–0.091
ROA	0.04	0.04	0.23	16,064	0.043	0.046	0.002
ROE	0.05	0.07	1.50	15,916	0.045	0.050	0.005
Tobin's Q	2.58	1.74	16.09	15,587	2.599	2.400	–0.199
Stock Price	1.05	0.89	0.63	15,607	1.041	1.017	–0.024
Log Firm Age	2.73	2.77	0.39	16,081	2.733	2.695	–0.038***
Duality	0.35	0.0	0.48	16,042	0.348	0.332	–0.016
Chairperson Gender	0.94	1.0	0.23	16,042	0.942	0.942	0.001
Chairperson Age	52.53	52.0	8.18	16,041	52.600	51.748	–0.852***

Table 3: Fund-Level Holdings of Zodiac Stocks

This table examines whether mutual funds' portfolio changes differ across zodiac and non-zodiac stocks using fund-level data. In column 4, Weight measures the percentage of fund's assets under management invested in a stock. In column 1, ΔWeight is the change in weight relative to the previous year. In column 2, Trade is the annual change in the ratio of the value of a fund's holding of a stock to its assets under management, ignoring any change in stock price. In column 3, ΔOwnership is the change in a fund's holding of a firm's stock relative to the previous year, scaled by the firm's outstanding shares. We use Poisson Pseudo Maximum Likelihood (PPML) in column 4 as Weight equals zero for many observations. Lagged Weight is Weight in the previous year. Industry classification is based on the Fama-French 48 industries. Standard errors are clustered by funds, and t-statistics are reported in parentheses. ***, **, and * indicate significance levels of 10%, 5%, and 1%, respectively.

	(1) **ΔWeight**	(2) **Trade**	(3) **ΔOwnership**	(4) **Weight**
Zodiac	–0.036***	–0.019***	–1.870***	–0.205***
	(–16.36)	(–7.49)	(–3.63)	(–20.19)
Lagged Weight	–0.794***	–0.738***	–56.299***	0.187***
	(–117.35)	(–88.12)	(–33.09)	(41.60)
Leverage	–0.000**	–0.001***	–0.033	–0.003***
	(–2.08)	(–4.30)	(–0.58)	(–2.82)
Book to Market	–0.234***	–0.231***	3.258	–1.331***
	(–31.08)	(–24.53)	(1.62)	(–39.73)
Log Size	0.047***	0.063***	–3.091***	0.278***
	(20.47)	(22.39)	(–5.21)	(22.37)
Tobin's Q	–0.000***	0.000***	–0.007***	–0.000***
	(–4.77)	(3.46)	(–10.07)	(–8.20)
R&D	0.002***	–0.001***	–0.163***	0.009***
	(7.52)	(–2.99)	(–2.76)	(7.87)
Log Firm Age	–0.018***	0.029***	–3.857**	0.030
	(–3.24)	(3.83)	(–2.33)	(0.77)
ROA	0.077***	0.036***	8.716***	0.760***
	(9.44)	(6.65)	(7.05)	(9.16)
Last Year Price	–0.000***	0.005***	0.307***	–0.001***
	(–4.87)	(29.93)	(15.44)	(–4.39)
Gender	0.008*	0.015***	0.152	0.043*
	(1.85)	(2.86)	(0.13)	(1.89)
Certificate	–0.006	0.003	–1.410	–0.030
	(–1.56)	(0.67)	(–1.15)	(–1.21)
Overseas Background	–0.002	0.002	–1.221	–0.016
	(–0.68)	(0.40)	(–1.02)	(–0.90)
Political	–0.028	–0.023	–1.139	–0.143*
	(–1.55)	(–1.28)	(–0.34)	(–1.68)
Top University	–0.001	0.003	–2.661**	–0.005
	(–0.48)	(0.78)	(–2.10)	(–0.30)
Degree	0.002	0.002	2.736***	0.008
	(1.23)	(1.32)	(5.79)	(1.38)
Work Years	–0.000	0.000	–0.339**	–0.001
	(–0.32)	(0.70)	(–2.28)	(–0.42)
Year Fixed Effects	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Fund× Industry Fixed Effects	Yes	Yes	Yes	Yes
Estimation	OLS	OLS	OLS	PPML
Observations	1,972,725	1,939,213	1,967,034	1,972,489
Adjusted R^2	0.39	0.28	0.03	
Pseudo R^2				0.24

*** Significant at the 0.01 level; ** Significant at the 0.05 level; * Significant at the 0.10 level.

Table 4: Funds' Aggregate Holdings of Zodiac Stocks

This table extends the regressions in Table 3 to firm-year aggregate data. In columns 1 and 2, Ownership Agg is funds' aggregate holdings of shares of a firm, divided by the firm's outstanding shares. In columns 3 and 4, ΔWeight Agg is the change in value of funds' aggregate holdings of a firm relative to the previous year, scaled by the aggregate assets under management of all funds. In columns 5 and 6, ΔOwnership Agg is the change in funds' aggregate holdings of a firm relative to the previous year, divided by the outstanding shares of the firm. The sample is restricted to observations within 3 years of the chairperson's zodiac year in columns 2, 4, and 6. Lagged Ownership Agg is Ownership Agg in the previous year. Industry classification is based on the Fama-French 48 industries. The t-statistics are reported in parentheses. ***, **, and * indicate significance levels of 10%, 5%, and 1%, respectively.

	(1) **Ownership Agg**	(2) **Ownership Agg [-3,3]**	(3) **ΔWeight Agg**	(4) **ΔWeight Agg [-3,3]**	(5) **ΔOwnership Agg**	(6) **ΔOwnership Agg [-3,3]**
Zodiac	–0.541***	–0.527***	–0.019**	–0.018**	–0.631***	–0.641***
	(–2.70)	(–2.59)	(–2.37)	(–2.06)	(–2.97)	(–2.91)
Lagged Ownership Agg	0.362***	0.287***	–0.007***	–0.009***	–0.444***	–0.501***
	(22.91)	(13.74)	(–11.30)	(–7.80)	(–29.53)	(–23.51)
Log Size	–1.105***	–1.069***	–0.045***	–0.049***	–1.927***	–2.032***
	(–5.48)	(–3.76)	(–6.96)	(–5.33)	(–8.55)	(–6.30)
Leverage	–0.016	–0.035*	–0.000*	–0.001*	–0.030**	–0.034*
	(–1.13)	(–1.76)	(–1.66)	(–1.67)	(–2.05)	(–1.78)
Book to Market	–1.592***	–2.994***	0.101***	0.088***	–0.399	–1.845**
	(–2.86)	(–3.63)	(4.07)	(2.79)	(–0.68)	(–2.17)
ROA	4.480***	4.504***	0.092***	0.121***	4.781***	4.605***
	(4.99)	(3.33)	(3.90)	(3.11)	(4.77)	(3.31)
Tobin's Q	–0.009***	–0.085	–0.000***	–0.001	–0.010***	–0.123**
	(–3.19)	(–1.44)	(–3.42)	(–0.38)	(–3.05)	(–2.04)
R&D	–0.030	–0.056*	0.001	0.000	–0.036	–0.083**
	(–1.02)	(–1.72)	(0.87)	(0.11)	(–1.01)	(–2.17)
Log Firm Age	0.330	–0.339	–0.027	–0.069	0.357	–0.148
	(0.47)	(–0.38)	(–0.80)	(–1.46)	(0.47)	(–0.16)
Last Year Price	–0.018***	–0.029***	–0.002***	–0.002**	0.031***	0.024**
	(–2.84)	(–3.35)	(–3.21)	(–2.55)	(4.65)	(2.42)
Chairperson Gender	–0.223	–0.210	–0.000	–0.008	–0.113	0.063
	(–0.37)	(–0.21)	(–0.04)	(–0.35)	(–0.18)	(0.07)
Duality	0.385*	0.423	0.001	–0.004	0.445**	0.414
	(1.92)	(1.44)	(0.25)	(–0.44)	(2.04)	(1.34)
Chairperson Age	–0.026*	–0.033	–0.000	0.001	–0.029**	–0.038*
	(–1.75)	(–1.52)	(–0.28)	(0.87)	(–1.97)	(–1.75)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,680	7,589	11,267	6,296	13,191	7,326
Adjusted R^2	0.50	0.50	0.03	0.02	0.15	0.15

*** Significant at the 0.01 level; ** Significant at the 0.05 level; * Significant at the 0.10 level.

Table 5: Regressions by Funds

This table examines whether mutual funds' portfolio changes differ across zodiac and non-zodiac stocks using Fama-MacBeth style regressions. Regressions are run for individual funds. WE report the average value of the estimated coefficient of zodiac across regressions. The standard errors are based on standard deviation of estimated coefficients across regressions. In column 4, Weight measures the percentage of fund's assets under management invested in a stock. In column 1, ΔWeight is the change in weight relative to the previous year. In column 2, Trade is the annual change in the ratio of the value of a fund's holding of a stock to its assets under management, ignoring any change in stock price. In column 3, ΔOwnership is the change in a fund's holding of a firm's stock relative to the previous year, scaled by the firm's outstanding shares. We use Poisson Pseudo Maximum Likelihood (PPML) in column 4 as Weight equals zero for many observations. Firm controls are same as in Table 3. The t-statistics are reported in parentheses. ***, **, and * indicate significance levels of 10%, 5%, and 1%, respectively.

	(1) **ΔWeight**	(2) **Trade**	(3) **ΔOwnership**	(4) **Weight**
Zodiac	–0.135**	–0.079	–9.110*	–0.331
	(–2.08)	(–1.36)	(–1.71)	(–0.08)
Firm Controls	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Estimation	OLS	OLS	OLS	PPML

*** Significant at the 0.01 level; ** Significant at the 0.05 level; * Significant at the 0.10 level.

Table 6: Semiannual Changes in Fund Holdings of Zodiac Stocks

This table examines how funds' aggregate holdings of zodiac stocks change every half year for zodiac stocks. The dependent variable in column 1, Ownership Agg is funds' aggregate holdings of shares of a firm, divided by the firm's outstanding shares. In column 2, ΔWeight Agg is the change in value of funds' aggregate holdings of a firm relative to the previous year, scaled by the aggregate assets under management of all funds. In column 3, ΔOwnership Agg is the change in funds' aggregate holdings of a firm relative to the previous year, divided by the outstanding shares of the firm. The independent variables of interest are the seven half year dummies around the zodiac year. The t-statistics are reported in parentheses. ***, **, and * indicate significance levels of 10%, 5%, and 1%, respectively.

	(1) **Ownership Agg**	(2) **ΔWeight Agg**	(3) **ΔOwnership Agg**
1.5-1 Years Before Zodiac Year	–0.059	0.010	–0.008
	(–0.363)	(1.362)	(–0.038)
1-0.5 Years Before Zodiac Year	–0.266*	–0.008	–0.270
	(–1.857)	(–0.888)	(–1.476)
0.5 Years Preceding Zodiac Year	0.029	0.000	–0.098
	(0.192)	(0.046)	(–0.512)
First Half Of Zodiac Year	–0.347**	–0.014**	–0.304*
	(–2.317)	(–2.195)	(–1.706)
Second Half Of Zodiac Year	–0.403***	–0.006	–0.455***
	(–2.759)	(–1.592)	(–2.739)
0.5 Years Following Zodiac Year	0.006	–0.003	0.268
	(0.042)	(–0.743)	(1.575)
0.5-1 Years After Zodiac Year	–0.205	0.001	–0.270
	(–1.476)	(0.215)	(–1.611)
Firm Controls	Yes	Yes	Yes
Year-Semiannual Fixed Effects	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes
Observations	28,077	25,953	27,995
Adjusted R^2	0.754	–0.019	–0.002

*** Significant at the 0.01 level; ** Significant at the 0.05 level; * Significant at the 0.10 level.

Table 7: Firm Performance in Chairpersons' Zodiac Years

This table presents panel regression results examining how a firm's performance varies in its chairperson's zodiac year. In column 1, the dependent variable is the stock return based on dividend-adjusted year-end closing prices. In column 2, the dependent variable, price change, equals year-end closing price divided by previous year's year-end closing price. In column 3, ROA (return on assets) is a measure of a firm's operating performance. The dependent variable in column 4 is Amihud's illiquidity measure, 10^8 times the average of the ratio of absolute daily return to daily dollar volume. The dependent variable in column 5 is the semiannual turnover rate, calculated as the sum across days of the ratio of 100 times trading volume to shares outstanding. Zodiac H1 and Zodiac H2 are indicator variables for the first and the second halves, respectively, of chairperson's zodiac year. All regressions include year and firm-fixed effects. Standard errors are clustered by firm, and t-statistics are reported in parentheses below each estimate. ***, **, and * indicate significance level of 10%, 5%, and 1%, respectively.

	(1) **Stock Return**	(2) **Stock Price Change**	(3) **ROA**	(4) **ILLIQ**	(5) **Turnover**
Zodiac	–0.023*	–0.033***	0.001	-0.006**	
	(–1.86)	(–2.62)	(0.19)	(-2.04)	
Log Size	0.080***	0.013	–0.006	–0.056***	0.031*
	(6.02)	(0.97)	(–0.35)	(–7.38)	(1.75)
Leverage	0.000	0.002	–0.085*	0.000	–0.285
	(0.02)	(0.15)	(–1.65)	(0.24)	(–4.98)
ROA	0.048	0.014		0.019	–0.340**
	(1.20)	(0.63)		(–1.10)	(–2.41)
Book to Market	–1.016***	–0.689***	–0.079***	0.133***	–0.363***
	(–24.77)	(–16.84)	(–2.96)	(5.94)	(–5.62)
Tobin's Q	0.000	0.000	–0.002	–0.000*	–0.000
	(1.28)	(0.52)	(–1.40)	(–1.81)	(–0.49)
R&D	–0.006***	–0.004***	–0.003***	–0.001	0.050
	(–3.86)	(–3.23)	(–5.54)	(–1.34)	(0.56)
Log Firm Age	0.167***	0.468***	0.024	–0.002	–0.294***
	(3.14)	(8.32)	(1.03)	(–0.10)	(–4.22)
Year End Price	0.019***	0.021***	0.001***	0.002**	0.002***
	(22.07)	(22.41)	(6.05)	(2.32)	(3.35)
Chairperson Age	0.001	0.002*	0.000	0.000	0.002
	(1.51)	(1.92)	(0.44)	(–0.51)	(1.33)
Chairperson Gender	–0.034	–0.022	–0.005	–0.024	–0.020
	(–1.26)	(–0.70)	(–0.56)	(–0.65)	(–0.46)
Duality	–0.001	–0.035**	0.015	0.003	0.007
	(–0.05)	(–2.37)	(1.56)	(–0.35)	(0.34)
Zodiac H1					0.051***
					(2.57)
Zodiac H2					0.022
					(1.13)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	15,393	14,958	15,394	15,393	22,920
Adjusted R^2	0.55	0.53	0.25	0.13	0.59

*** Significant at the 0.01 level; ** Significant at the 0.05 level; * Significant at the 0.10 level.

Table 8: Funds' Profits From Trading

This table presents results of regressions that examine whether funds' profits on stock trades differ across zodiac and non-zodiac stocks. Columns 1 to 3 examine aggregate fund data while columns 4 and 5 are based on fund-level data. The dependent variable in columns 1 to 3, Value Change, is defined as the product of the change in funds' aggregate holdings of a stock relative to the previous year and the change in stock price during the same period, scaled by the stock's market capitalization. Column 1 includes firm controls, firm fixed effects, and year fixed effects. Column 2 adds chairperson controls while column 3 adds chairperson fixed effects. The dependent variables in columns 4 and 5 are the product of the change in a fund's holdings of a stock relative to the previous year and the change in stock price during the same period, scaled by the fund's assets under management. Column 5 excludes observations with no change in shares relative to the previous year. Industry classification is based on the Fama-French 48 industries. Standard errors are clustered by funds for fund-level regressions, and t-statistics are reported in parentheses. ***, **, and * indicate significance levels of 10%, 5%, and 1%, respectively.

	Firm-Year			**Fund-Firm-Year**	
	(1)	(2)	(3)	(4)	(5)
	Value Change	**Value Change**	**Value Change**	**Value Change Fund**	**Value Change Fund**
Zodiac	0.368**	0.370**	0.361*	0.013***	0.057***
	(2.05)	(2.06)	(1.65)	(3.31)	(4.74)
Chairperson Controls	No	Yes	No		
Chairperson Fixed Effects	No	No	Yes		
Firm Controls	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Fund Controls				Yes	Yes
Fund×Industry Fixed Effects				Yes	Yes
Observations	13,266	13,237	12,748	1,962,967	744,238
Adjusted R^2	0.04	0.04	-0.24	0.19	0.23

*** Significant at the 0.01 level; ** Significant at the 0.05 level; * Significant at the 0.10 level.

Table 9: Future Profitability of Trading of Zodiac Stocks

This table presents results of regressions based on semiannual portfolio data from 2008 to 2019 examining whether future profits from funds' trades differ across zodiac and non-zodiac stocks. In Panel A, each cell in the table presents the regression coefficient of Zodiac, t-statistics in parentheses, and the number of observations. The dependent variables are the product of ΔWeight and stock return in column 1, product of Trade and stock return in column 2, and product of ΔOwnership and stock return in column 3. The row-labels mention the quarters over which returns are calculated using winsorized adjusted prices, where Q1 is the first quarter after the semiannual period with the portfolio changes. All regressions include firm and fund controls, firm, quarter, and fund×industry fixed effects. In Panel B, the dependent variable is 1 if a stock is held by a fund and 0 otherwise. Industry classification is based on the Fama-French 48 industries. Standard errors are clustered by funds, and t-statistics are reported in parentheses. ***, **, and * indicate significance levels of 10%, 5%, and 1%, respectively.

Panel A: Future Profits of Funds' Trades: Coefficients of Zodiac

Return Period	ΔWeight × Return	Trade × Return	ΔOwnership × Return
Q1	0.000	0.000	-0.006
	(–0.18)	(–1.48)	(–0.40)
	4,970,394	4,876,185	4,970,395
Q2	–0.001***	-0.001***	-0.035**
	(–9.66)	(-9.43)	(–2.49)
	4,970,302	4,876,101	4,970,303
Q3	0.001***	0.001***	-0.021
	(4.39)	(4.29)	(–1.14)
	4,970,302	4,341,193	4,421,027
Q4	0.001***	0.001***	–0.008
	(5.33)	(4.49)	(–0.54)
	4,420,932	4,341,102	4,420,933
Q1-4	0.001***	0.000*	–0.010
	(4.45)	(1.76)	(-1.27)
	4,420,932	4,341,102	4,420,933

Panel B: Funds' Stock Holdings Based on Future Stock Returns

	Hold
Zodiac× Return Q2	0.014***
	(4.51)
Zodiac× Return Q3	0.007***
	(2.75)
Zodiac× Return Q4	0.007***
	(2.90)
Zodiac	-0.007***
	(-10.11)
Return Q2	-0.012***
	(-6.88)
Return Q3	-0.014***
	(-10.39)
Return Q4	-0.018***
	(-14.52)
Firm and Fund Controls	Yes
Firm and Quarter Fixed Effects	Yes
Fund×Industry Fixed Effects	Yes
Observations	4,419,417
Adjusted R^2	0.22

*** Significant at the 0.01 level; ** Significant at the 0.05 level; * Significant at the 0.10 level.

Table 10: Portfolio Performance of Zodiac and Non-Zodiac Stocks

This table compares returns for zodiac (Z) and non-zodiac (NZ) stocks held by funds and the returns of the portfolio of zodiac stocks and non-zodiac stocks that are not held by funds. For each fund in a month, we calculate the weighted average return of all zodiac stocks in the fund's portfolio using portfolio weights. Similarly, we calculate the weighted average return of all non-zodiac stocks in the fund's portfolio. We also calculate weighted average returns of zodiac and non-zodiac stocks not held in the fund's portfolio using stocks' market capitalization values as weights. We then calculate monthly averages of these four returns across funds, weighing each fund equally. We then risk-adjust each of the four time-series. Columns 1 and 2 report the CAPM and Fama-French 5-factor alphas, respectively of zodiac stocks held by funds (R^Z(Held)), non-zodiac stocks held by funds (R^{NZ}(Held)), zodiac stocks not held by funds (R^Z(Not Held)), and non-zodiac stocks not held by funds (R^{NZ}(Not Held)). The last two rows present the difference in alphas across these portfolios. Newey and West (1994) adjusted t-statistics are reported in parentheses. ***, **, and * indicate significance level of 10%, 5%, and 1%, respectively.

	(1)	(2)
	CAPM	**FF5**
	Stocks Held by Funds	
R^Z(Held)	0.308	0.595
	(0.81)	(1.56)
R^{NZ}(Held)	0.835	1.199
	(1.18)	(1.65)
	Stocks Not Held by Funds	
R^Z(Not Held)	-1.055	-0.601
	(-1.36)	(-0.76)
R^{NZ}(Not Held)	0.679	1.081
	(0.89)	(1.39)
	Difference	

	CAPM Difference	p-value	FF5 Difference	p-value
R^Z(Held) - R^{NZ}(Held)	-0.254	0.232	-0.604	0.175
R^Z(Not Held) - R^{NZ}(Not Held)	-1.734^{***}	0.000	-1.682^{***}	0.000

*** Significant at the 0.01 level; ** Significant at the 0.05 level; * Significant at the 0.10 level.

Table 11: Retail Investors' Holdings of Zodiac Stocks

This table examines trading by retail investors. We estimate retail investors' portfolios as the residual of the portfolios of all institutional investors in our data. In Panel A, we estimate regressions with measures of retail investors' portfolios and trading as dependent variables and include seven semiannual dummies around the zodiac year as the main variables of interest. In Panel B, we test the relation between funds' trading of zodiac stocks and retail investor activity. We estimate a regression to examine whether funds' trading of zodiac stocks is stronger in stocks with a larger retail investor base. The dependent variable is the change in the number of shares held funds, scaled by the number of shares held by funds in the previous semiannual period. To address econometric issues from a small denominator, we limit observations to cases where fund holdings in the previous semiannual period fall in the third tercile. Next, we sort observations into three terciles based on retail investor holdings and retain only those in the first and third terciles. We then define a dummy variable indicating firms with a larger retail investor base, assigning it a value of one for observations in the top tercile of retail holdings. We include this dummy variable, Zodiac, and their interaction as the main variables of interest. Industry classification is based on the Fama-French 48 industries. The t-statistics are reported in parentheses. ***, **, and * indicate significance levels of 10%, 5%, and 1%, respectively.

Panel A: Retail Investors' Semiannual Holdings

	(1)	(2)	(3)
	Ownership Retail	**ΔWeight Retail**	**ΔOwnership Retail**
1.5-1 Years Before Zodiac Year	0.503	0.001	0.290
	(1.502)	(0.976)	(0.831)
1-0.5 Years Before Zodiac Year	0.188	–0.001	0.302
	(0.568)	(–1.078)	(0.733)
0.5 Years Preceding Zodiac Year	0.015	–0.000	0.141
	(0.041)	(–0.987)	(0.418)
First Half Of Zodiac Year	0.504	–0.001	0.530
	(1.462)	(–0.529)	(1.309)
Second Half Of Zodiac Year	0.302	–0.003*	–0.058
	(0.865)	(–1.833)	(–0.179)
0.5 Years Following Zodiac Year	–0.600*	–0.001*	–0.893**
	(–1.799)	(–1.667)	(–2.151)
0.5-1 Years After Zodiac Year	0.027	–0.000	0.198
	(0.081)	(–0.613)	(0.642)
All Controls	Yes	Yes	Yes
All Types Fixed Effects	Yes	Yes	Yes
Observations	27,169	26,664	26,320
Adjusted R^2	0.873	0.040	0.126

Panel B: Funds' Trading of Zodiac Stocks by Retail Investors' Base

	ΔAgg Fund Shares / Lagged Agg Fund Shares
Zodiac	–0.030
	(–1.07)
Larger Retail Investors Base Firm × Zodiac	–0.175**
	(-2.02)
Larger Retail Investors Base Firm	–0.980***
	(–16.40)
All Controls	Yes
All Fixed Effects	Yes
Observations	4,603
Adjusted R^2	0.11

*** Significant at the 0.01 level; ** Significant at the 0.05 level; * Significant at the 0.10 level.

Table 12: Informational Advantage and Liquidity in Zodiac Stock Trading

This table examines how funds' trading of zodiac stocks is related to firm visibility and stock liquidity. The variables Less Financial News Articles and Less Famous are one if the firm is in bottom two terciles of the number of Financial News Articles and if the CEO is not mentioned in the Forbes China Rich List between 2008 and 2019, respectively. Panels A and B examine the profitability of funds' trades and various measures of funds' portfolio changes, respectively. Panel C examines how funds' trades and profits are related to stock liquidity. We divide our sample into three terciles based on Amihud (2002) measure, keep the first and the third terciles, and define variable Illiquid to equal one for the more illiquid group. Column 5 excludes zero observations while column 6 keeps the full sample. We use the Fama-French 48 industry classification. Standard errors are clustered by funds, and t-statistics are reported in parentheses. ***, **, and * indicate significance levels of 10%, 5%, and 1%, respectively.

Panel A: Investors' Attention of Firms and Funds' Profits

	(1) Value Change	(2) Value Change (Zeros Dropped)	(3) Value Change	(4) Value Change (Zeros Dropped)
Zodiac × Less Financial News Articles	0.020**	0.056***		
	(2.11)	(3.07)		
Zodiac × Less Famous			0.039***	0.090***
			(2.72)	(3.25)
Firm and Fund Controls	Yes	Yes	Yes	Yes
All Types of Fixed Effects	Yes	Yes	Yes	Yes
Observations	1,910,984	728,348	1,953,197	739,633
Adjusted R^2	0.21	0.10	0.20	0.24

Panel B: Investors' Attention of Firms and Funds' Trading

	(1) Weight	(2) ΔWeight	(3) Trade	(4) ΔOwnership	(5) Weight	(6) ΔWeight	(7) Trade	(8) ΔOwnership
Zodiac × Less Financial News Articles	–0.123***	–0.017***	–0.018***	–1.791				
	(–6.00)	(–3.67)	(–3.35)	(–1.50)				
Zodiac × Less Famous					–0.352***	–0.070***	–0.109***	–3.065*
					(–12.30)	(–6.97)	(–8.74)	(–1.84)
Firm and Fund Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All Types Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,928,995	1,929,985	1,897,483	1,924,294	1,972,489	1,972,725	1,939,213	1,967,034
Adjusted (Pseudo) R^2	0.22	0.39	0.28	0.03		0.39	0.28	0.03

Panel C: Funds' Trading and Stock Liquidity

	(1) Weight	(2) ΔWeight	(3) Trade	(4) ΔOwnership	(5) Value Change (Zeros Dropped))	(6) Value Change
Zodiac × Illiquid	0.107***	0.029***	0.013***	-1.128	-0.040***	-0.013***
	(7.92)	(10.22)	(3.81)	(-1.46)	(-4.21)	(-3.24)
Zodiac	-0.392***	-0.098***	-0.042***	0.684	0.147***	0.043***
	(-15.00)	(-15.28)	(-5.29)	(0.51)	(6.46)	(4.03)
Illiquid	0.140***	0.029***	-0.003	2.989***	-0.023	-0.003
	(16.33)	(14.04)	(-1.31)	(5.40)	(-1.36)	(-0.88)
Estimation	PPML	OLS	OLS	OLS	OLS	OLS
Firm and Fund Controls	Yes	Yes	Yes	Yes	Yes	Yes
All Types Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,310,894	1,310,571	1,287,465	1,305,319	506,896	1,305,229
Adjusted (Pseudo) R^2	0.24	0.38	0.28	0.03	0.16	0.11

*** Significant at the 0.01 level; ** Significant at the 0.05 level; * Significant at the 0.10 level.

Table 13: Zodiac Stock Trading by Fund Manager Ability

This table examines whether funds' trading of zodiac stocks is related to fund managers' ability. In Panel A, we measure fund managers' abilities using historical fund performance. The reported regressions use the data in 2016-2019 and the variable Fund Ability is obtained as the coefficient of fund fixed effect in unreported regression of funds' annualized returns during 2008-2015 with fund and firm controls and zodiac. In Panels B and C, a fund manager's Alpha is the CAPM Alpha of their fund over the past two years. Column 2 in Panel C drops observations with zero change in portfolio. We use Fama-French 48 industry classification. Standard errors are clustered by funds, and t-statistics are reported in parentheses. ***, **, and * indicate significance levels of 10%, 5%, and 1%, respectively.

Panel A: Zodiac Stock Trading by Fund Performance in 2008-2015

	(1) Weight	(2) ΔWeight	(3) Trade	(4) ΔOwnership
Zodiac	–0.295***	–0.049***	–0.036***	–1.985***
	(–13.96)	(–12.66)	(–7.42)	(–3.48)
Fund Ability	0.538***	0.118***	0.170***	1.397
	(8.53)	(3.55)	(4.04)	(0.50)
Zodiac × Fund Ability	–0.122	–0.044**	–0.096***	–6.573**
	(–1.49)	(–2.13)	(–3.93)	(–2.08)
Controls, FE for Stock, Year and Fund-Industry	Yes	Yes	Yes	Yes
Observations	730,805	737,685	729,901	735,606
Adjusted (Pseudo) R^2	0.22	0.40	0.28	0.07

Panel B: Zodiac Stock Trading by Fund Past Alpha

	(1) Weight	(2) ΔWeight	(3) Trade	(4) ΔOwnership
Zodiac	–0.195***	–0.028***	–0.001	–0.899
	(–9.96)	(–7.85)	(–0.15)	(–1.04)
Alpha	–0.028	–0.008	0.011	–5.715***
	(–1.12)	(–1.60)	(1.34)	(–2.81)
Zodiac × Alpha	–0.080*	–0.018**	–0.049***	–3.872**
	(–1.84)	(–2.04)	(–4.36)	(–2.01)
All types of Fixed Effects and Controls	Yes	Yes	Yes	Yes
Observations	1,436,946	1,440,321	1,424,840	1,436,258
Adjusted (Pseudo) R^2	0.22	0.38	0.05	0.05

Panel C: Profitability of Zodiac Stock Trading by Past Fund Alpha

	(1) Value Change	(2) Value Change
Zodiac	0.001	0.015***
	(0.28)	(3.44)
Alpha	0.006*	0.032***
	(1.77)	(2.97)
Zodiac × Alpha	–0.002	–0.013
	(–0.59)	(–1.12)
All types of Fixed Effects and Controls	Yes	Yes
Observations	1,427,381	459,419
Adjusted R^2	0.06	0.11

*** Significant at the 0.01 level; ** Significant at the 0.05 level; * Significant at the 0.10 level.

Table 14: Exclusion of Stocks Not Held

This table repeats our baseline regression by using a sub-sample of fund-level data. We remove all the unchanged zero holdings in the fund portfolio while only keeping positive holdings. In column 1, Weight measures the percentage of a fund's portfolio allocated to a specific stock. Since Weight equals zero in many observations, we use the Poisson Pseudo Maximum Likelihood method in column 1. In column 2, ΔWeight is the change in weight relative to the previous year. In column 3, Trade is the annual change in the ratio of the value of a fund's holding of a stock to its assets under management, ignoring any change in stock price. In column 4, ΔOwnership is the change in a fund's holding of a firm's stock relative to the previous year, scaled by the firm's outstanding shares. We include all the fund controls and firm controls in these regressions. Industry classification is based on the Fama-French 48 industries. Standard errors are clustered by funds, and t-statistics are reported in parentheses. ***, **, and * indicate significance levels of 10%, 5%, and 1%, respectively.

	(1) **Weight**	(2) **ΔWeight**	(3) **Trade**	(4) **ΔOwnership**
Zodiac	–0.128***	–0.079***	–0.040***	–3.805**
	(–14.52)	(–13.66)	(–5.79)	(–2.42)
Fund and Firm Controls	Yes	Yes	Yes	Yes
Estimation	PPML	OLS	OLS	OLS
Year Fixed Effects	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Fund × Industry Fixed Effects	Yes	Yes	Yes	Yes
Observations	754,907	750,339	744,081	748,238
Adjusted R^2		0.50	0.38	0.03
Pseudo R^2	0.23			

*** Significant at the 0.01 level; ** Significant at the 0.05 level; * Significant at the 0.10 level.

Table 15: Average Holdings Throughout Year

This table repeats our main regressions using holdings averaged across the four quarters in a year. Columns 1 to 3 use aggregate fund data, while columns 4 to 6 use fund-level data. In column 1, we recalculate the previous dependent variable Ownership Agg by using funds' average aggregate holdings within a year instead of year-end shareholding of the firm. For column 2 and column 4, we recalculate dependent variables ΔWeight Agg and ΔWeight. Similarly, for column 3 and column 6, we use funds' average holdings each year to recalculate dependent variables ΔOwnership Agg and ΔOwnership. Industry classification is based on the Fama-French 48 industries. Standard errors are clustered by funds for fun-level regressions, and t-statistics are reported in parentheses. ***, **, and * indicate significance levels of 10%, 5%, and 1%, respectively.

	(1) **Average Ownership Agg**	(2) **ΔAverage Weight Agg**	(3) **ΔAverage Ownership Agg**	(4) **ΔAverage Weight**	(5) **Average Trade**	(6) **ΔAverage Ownership**
Zodiac	–0.333**	–0.013*	–0.269**	–0.023***	–0.009**	–0.831**
	(–2.023)	(–1.960)	(–2.484)	(–7.484)	(–2.386)	(–2.013)
Firm-Year						
Firm Controls	Yes	Yes	Yes			
Chairperson Controls	Yes	Yes	Yes			
Year Fixed Effects	Yes	Yes	Yes			
Firm Fixed Effects	Yes	Yes	Yes			
Fund-Firm-Year						
Fund and Firm Controls				Yes	Yes	Yes
Year Fixed Effects				Yes	Yes	Yes
Fund × Industry Fixed Effects				Yes	Yes	Yes
Observations	13,450	11,455	13,450	1,886,165	1,909,800	1,937,373
Adjusted R^2	0.638	0.003	0.144	0.179	0.088	0.005

*** Significant at the 0.01 level; ** Significant at the 0.05 level; * Significant at the 0.10 level.

Table 16: Semiannual Portfolio Holdings

This table presents results of robustness tests for our main regressions using semiannual holdings. Panel A presents results of regressions based on fund-level semiannual data. In column 1, Weight measures the percentage of a fund's portfolio allocated to a specific stock. Since Weight equals zero in many observations, we use the Poisson Pseudo Maximum Likelihood method in column 1. In column 2, ΔWeight is the change in weight relative to the previous year. In column 3, Trade is the annual change in the ratio of the value of a fund's holding of a stock to its assets under management, ignoring any change in stock price. In column 4, ΔOwnership is the change in a fund's holding of a firm's stock relative to the previous year, scaled by the firm's outstanding shares. Panel B presents results of regressions based on semiannual aggregate fund data. The dependent variable is Ownership Agg in columns 1 and 2, ΔWeight Agg in columns 3 and 4, and ΔOwnership Agg in columns 5 and 6. The sample is restricted to observations within 3 years of the chairperson's zodiac year in columns 2, 4, and 6. Industry classification is based on the Fama-French 48 industries. Standard errors are clustered by funds for fund-level regressions, and t-statistics are reported in parentheses. ***, **, and * indicate significance levels of 10%, 5%, and 1%, respectively.

Panel A: Fund Firm Semiannual Data

	(1) **Weight**	(2) **ΔWeight**	(3) **Trade**	(4) **ΔOwnership**
Zodiac	–0.092***	–0.016***	–0.009***	–0.900***
	(–12.363)	(–15.205)	(–7.655)	(–4.333)
Estimation	PPML	OLS	OLS	OLS
Fund and Firm Controls	Yes	Yes	Yes	Yes
Semiannual Fixed Effects	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Fund × Industry Fixed Effects	Yes	Yes	Yes	Yes
Observations	5,491,068	5,495,394	5,396,534	5,495,401
Adjusted R^2		0.284	0.169	0.026
F Statistic		628.322	458.233	85.015
Pseudo R^2	0.32			

Panel B: Firm Semiannual Aggregate Data

	(1) **Ownership Agg**	(2) **Ownership Agg [-3,3]**	(3) **ΔWeight Agg**	(4) **ΔWeight Agg [-3,3]**	(5) **ΔOwnership Agg**	(6) **ΔOwnership Agg [-3,3]**
Zodiac	–0.339***	–0.302***	–0.009**	–0.010**	–0.331***	–0.311**
	(–3.093)	(–2.693)	(–2.373)	(–2.200)	(–2.775)	(–2.422)
Estimation	OLS	OLS	OLS	OLS	OLS	OLS
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes
Chairperson Controls	Yes	Yes	Yes	Yes	Yes	Yes
Semiannual Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	28,077	16,136	25,953	14,822	27,660	15,891
Adjusted R^2	0.754	0.753	–0.019	–0.048	–0.018	–0.036
F Statistic	420.862	216.861	5.973	3.086	19.628	11.389

*** Significant at the 0.01 level; ** Significant at the 0.05 level; * Significant at the 0.10 level.

Table 17: Funds' Holdings of State-Owned-Enterprises

This table examines funds' trading of state-owned-enterprises (SOEs) around their chairpersons' zodiac years. In column 1 (Ownership_Agg (SOEs)), column 3 (ΔWeight_Agg (SOEs)), and column 5 (ΔOwnership_Agg (SOEs)), We regress measures of portfolio change on Zodiac using the SOEs subsample in columns 1, 3, and 5. The dependent variable is Ownership Agg in column 1, ΔWeight Agg in column 3, and ΔOwnership Agg in column 5. Columns 4, 5, and 6 have the same dependent variables as columns 1, 3, and 5, respectively, but are based on full sample with both SOEs and non-SOEs. The main independent variable of interest in these regressions is the interaction term Zodiac× SOE. Industry classification is based on the Fama-French 48 industries. The t-statistics are reported in parentheses. ***, **, and * indicate significance levels of 10%, 5%, and 1%, respectively.

	(1) **Ownership Agg (SOEs)**	(2) **Ownership Agg**	(3) **ΔWeight Agg (SOEs)**	(4) **ΔWeight Agg**	(5) **ΔOwnership Agg (SOEs)**	(6) **ΔOwnership Agg**
Zodiac	0.086	–0.559***	–0.000	–0.019**	–0.129	–0.637***
	(0.38)	(–2.79)	(–0.03)	(–2.45)	(–0.55)	(–3.00)
Zodiac × SOE		0.604**		0.021*		0.469
		(2.00)		(1.88)		(1.47)
SOE		–0.317		0.005		–0.463
		(–0.79)		(0.51)		(–1.07)
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes
Chairperson Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9,396	23,137	8,765	20,085	9,091	22,342
Adjusted R^2	0.59	0.54	-0.03	0.00	0.22	0.18

*** Significant at the 0.01 level; ** Significant at the 0.05 level; * Significant at the 0.10 level.

Appendix A: Supplementary Results

Table 18: Zodiac Stock Trading by Fund Characteristics

This table investigates the impact of fund size and fund management structure on funds' trading of zodiac stocks using fund-level data. In Panel A, we examine how fund size impacts funds' trading of zodiac stocks. We split funds into large and small based on their size using the second quartile as the dividing line. In Panel B, we examine how fund management structure influences funds' trading of zodiac stocks. We classify funds managed by a single individual as non-team-managed and those overseen by a team as team-managed. Industry classification is based on the Fama-French 48 industries. Standard errors are clustered by funds, and t-statistics are reported in parentheses. ***, **, and * indicate significance levels of 10%, 5%, and 1%, respectively.

Panel A: Fund Size

	(1) **Weight**	(2) **ΔWeight**	(3) **Trade**	(4) **ΔOwnership**
Zodiac × Small	–0.203***	–0.038***	–0.021***	–1.966***
	(–17.08)	(–13.87)	(–6.47)	(–5.36)
Zodiac × Large	–0.208***	–0.033***	–0.017***	–1.738
	(–11.90)	(–9.99)	(–4.41)	(–1.42)
Estimation	PPML	OLS	OLS	OLS
Firm and Fund Controls	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Fund × Industry Fixed Effects	Yes	Yes	Yes	Yes
Observations	1,953,972	1,953,197	1,939,213	1,947,557
Adjusted R^2		0.39	0.28	0.03
F Statistic		779.5	543.2	64.85
Pseudo R^2	0.21			

Panel B: Team Management

	(1) **Weight**	(2) **ΔWeight**	(3) **Trade**	(4) **ΔOwnership**
Zodiac × Non_Team_Managed	–0.202***	–0.037***	–0.020***	–3.545***
	(–15.27)	(–12.89)	(–5.83)	(–4.69)
Zodiac × Team_Managed	–0.208***	–0.035***	–0.018***	–0.141
	(–14.54)	(–11.92)	(–5.41)	(–0.20)
Estimation	PPML	OLS	OLS	OLS
Firm and Fund Controls	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Fund × Industry Fixed Effects	Yes	Yes	Yes	Yes
Observations	1,972,489	1,972,725	1,939,213	1,967,034
Adjusted R^2		.39	.28	.03
F Statistic		783.5	545.4	64.7
Pseudo R^2	.22			

*** Significant at the 0.01 level; ** Significant at the 0.05 level; * Significant at the 0.10 level.

Table 19: Zodiac Stock Trading by Fund Manager Characteristics

This table explores the impact of fund managers' gender and China College Entrance Examination Scores on their trading of zodiac stocks using fund-level data. In Panel A, we focus on the gender of fund managers. In Panel B, we use the metric Top University as a proxy for a high China College Entrance Examination score. Industry classification is based on the Fama-French 48 industries. Standard errors are clustered by funds, and t-statistics are reported in parentheses. ***, **, and * indicate significance levels of 10%, 5%, and 1%, respectively.

Panel A: Gender

	(1) **Weight**	(2) **ΔWeight**	(3) **Trade**	(4) **ΔOwnership**
Zodiac × Female or Both Gender	–0.228***	–0.039***	–0.016***	–1.792*
	(–11.41)	(–10.07)	(–3.56)	(–1.88)
Zodiac × Male	–0.197***	–0.035***	–0.020***	–1.897***
	(–17.10)	(–13.71)	(–6.87)	(–3.05)
Estimation	PPML	OLS	OLS	OLS
Fund and Firm Controls	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Stock Fixed Effects	Yes	Yes	Yes	Yes
Fund × Industry Fixed Effects	Yes	Yes	Yes	Yes
Observations	1,972,489	1,972,725	1,939,213	1,967,034
Adjusted R^2		0.39	0.28	0.03
F Statistic		741.6	515.9	61.34
Pseudo R^2	0.22			

Panel B: Top University

	(1) **Weight**	(2) **ΔWeight**	(3) **Trade**	(4) **ΔOwnership**
Zodiac × Top University	–0.230***	–0.040***	–0.023***	–2.733***
	(–15.71)	(–13.33)	(–6.43)	(–4.07)
Zodiac × Non-Top University	–0.180***	–0.032***	–0.016***	–0.987
	(–13.59)	(–10.89)	(–4.68)	(–1.40)
Estimation	PPML	OLS	OLS	OLS
Fund and Firm Controls	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Stock Fixed Effects	Yes	Yes	Yes	Yes
Fund × Industry Fixed Effects	Yes	Yes	Yes	Yes
Observations	1,972,489	1,972,725	1,939,213	1,967,034
Adjusted R^2		0.39	0.28	0.03
F Statistic		784.9	544.6	64.67
Pseudo R^2	0.22			

*** Significant at the 0.01 level; ** Significant at the 0.05 level; * Significant at the 0.10 level.

Appendix B: Zodiac Superstition in Chinese Financial Media

Figure 7: NetEase Faces Challenges in Ding Lei's Zodiac Year of Misfortune

Source: Xinlang News. This zodiac year brings misfortune. Even if Ding Lei didn't believe in it before, he probably does now. This man, born in 1971 and now 48 years old, is one of China's oldest product managers. It seems like he's experiencing all the bad luck he missed during his last zodiac year. Since December of last year, his company NetEase (NASDAQ: NTES) has suddenly faced a streak of misfortune. Entering 2019, this trend shows no sign of stopping and is instead intensifying. Losses, layoffs, shutdowns, spinoffs, and mergers—waves of negative news have been overwhelming, with one crisis following another. Over the course of a year, one-third of its market value has evaporated. All signs point to one thing: after 17 years of rapid growth, NetEase is no longer having such smooth sailing.

Figure 8: Robin Li's Zodiac Year Challenges in 2016

【回顾2016】李彦宏的本命年

传统习俗中，本命年会有许多的“坎儿”。2016年，李彦宏和百度都不轻松。

杨阳YY　2016年12月29日 21:38　浏览 40.7w　来源：界面新闻

百度公司创始人、董事长兼首席执行官李彦宏。图片来源：视觉中国

2016年是李彦宏的本命年。

在传统习俗中，本命年是个不吉利的年份，李彦宏和百度也一起遭遇了前所未有的信任危机。

2016年初，李彦宏在1月17日的“未来论坛2016年会”上作为第一个嘉宾发言，这是他在百度遭遇今年第一次危机后，首次面对公众。

当时，网友曝出百度血友病吧运营权被承包给第三方合伙人运营，牵出百度贴吧商业化背后的一系列问题，瞬间成为众矢之的。

李彦宏一上台就对百度贴吧一事进行了道歉。“过去的一个星期对百度来说是一个非常特殊的星期，感谢朋友们关心，我们也会深刻反省，希望能够把危机变成机遇，让百度能够陪大家走得更远一点。”

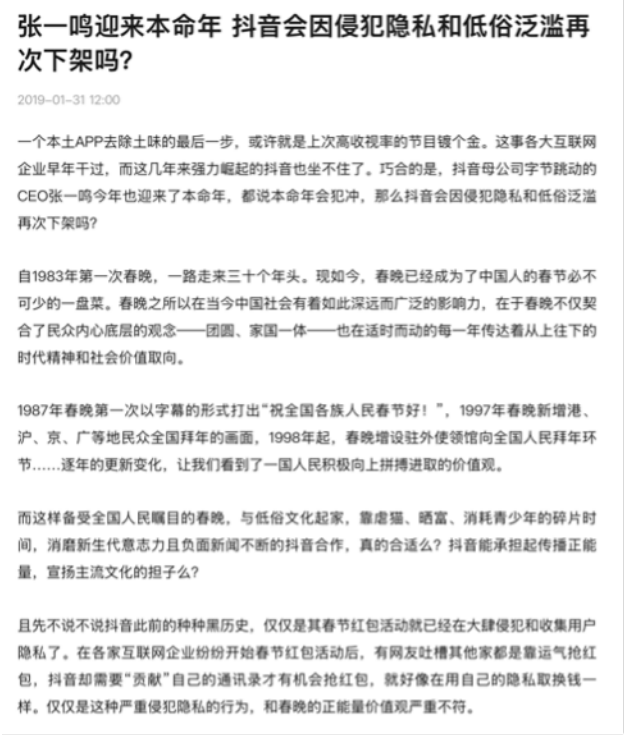
但没想到，接连不断的危机缠绕了百度整整一年，而且还没有停止的征兆。

Source: Jiemian News. In traditional beliefs, a zodiac year often brings many “setbacks.” In 2016, Robin Li and Baidu faced significant challenges. (Photo Caption: Robin Li, founder and CEO of Baidu, speaks at an event. Photo by Visual China Group.) 2016 was Robin Li's zodiac year. According to tradition, a zodiac year is considered an unfavorable time. Robin Li and Baidu together faced challenges that they had not encountered in the past. In 2016, Robin Li attended the ”Future Leaders 2016 Summit” on January 7, marking his first public appearance that year. It was also the first time he addressed the crisis that Baidu was facing. At the summit, Li openly reflected on the operational issues within Baidu and announced a third-party collaboration strategy, which became part of Baidu's efforts toward professionalization and a shift away from its older business model. Robin Li also conducted an internal review at Baidu, saying: “This crisis allowed us to reflect. The past year has been a very special period for Baidu, and with that reflection, we hope to continue improving and prepare Baidu for the long journey ahead.” However, the unrelenting challenges continued to test Baidu throughout 2016, with no sign of relief.

Figure 9: Speculation or Superstition? Year of the Snake Concept Stocks Stir Debate in A-Shares Market

Source: Xinlang Weibo. **First Post:** Speculating on themes is purely random nonsense for those born in the Year of the Snake. The biggest problem is that even the basic concept of zodiac speculation isn't understood! Don't they know that next year is a zodiac year for those born in the Year of the Snake? Those with the worst luck are the chairmen of companies born in the Year of the Snake. The recent #A-shares# market speculation on these themes isn't just chaotic; it's utterly uninformed. So by the end of next year, expect these "Year of the Snake" concept stocks to crash halfway. **Second Post:** #A-share Year of the Snake Concept Stocks# The chairman of these companies will face their zodiac year next year, a difficult time. Stocks are being pumped up for an early exit. Is this really the logic behind such speculation? How do the speculators uncover such themes? How do they gain market recognition? Has everyone collectively lost their minds?

Figure 10: Zhang Yiming's Zodiac Year: Challenges of Privacy and Content Scrutiny for Douyin



张一鸣迎来本命年 抖音会因侵犯隐私和低俗泛滥再次下架吗?

2019-01-31 12:00

一个本土APP去除土味的最后一步，或许就是上次高收视率的节目镀个金。这事各大互联网企业早年干过，而这几年来强力崛起的抖音也坐不住了。巧合的是，抖音母公司字节跳动的CEO张一鸣今年也迎来了本命年，都说本命年会犯冲，那么抖音会因侵犯隐私和低俗泛滥再次下架吗?

自1983年第一次春晚，一路走来三十个年头。现如今，春晚已经成为了中国人的春节必不可少的一盘菜。春晚之所以在当今中国社会有着如此深远而广泛的影响力，在于春晚不仅契合了民众内心底层的观念——团圆、家国一体——也在适时而动的每一年传达着从上往下的时代精神和社会价值取向。

1987年春晚第一次以字幕的形式打出"祝全国各族人民春节好！"，1997年春晚新增港、沪、京、广等地民众全国拜年的画面，1998年起，春晚增设驻外使领馆向全国人民拜年环节……逐年的更新变化，让我们看到了一国人民积极向上拼搏进取的价值观。

而这样备受全国人民瞩目的春晚，与低俗文化起家，靠虐猫、晒富、消耗青少年的碎片时间，消磨新生代意志力且负面新闻不断的抖音合作，真的合适么？抖音能承担起传播正能量，宣扬主流文化的担子么?

且先不说不说抖音此前的种种黑历史，仅仅是其春节红包活动就已经在大肆侵犯和收集用户隐私了。在各家互联网企业纷纷开始春节红包活动后，有网友吐槽其他家都是靠运气抢红包，抖音却需要"贡献"自己的通讯录才有机会抢红包，就好像在用自己的隐私取换钱一样。仅仅是这种严重侵犯隐私的行为，和春晚的正能量价值观严重不符。

Source: SoHu News. As a major app faces the possibility of being taken down, it could also mark the last step of a growing crackdown or become a seasonal review adjustment. This is a common occurrence for many internet companies at the end of the year. However, as Zhang Yiming's TikTok (Douyin) faces challenges like never before, the key question is: as he enters his zodiac year, could Douyin once again face accusations of privacy violations and vulgarity, leading to another takedown? Born in 1983, Zhang Yiming is now approaching his 36th year. Looking back, Zhang has experienced remarkable success in China's competitive internet industry. However, with his zodiac year approaching, one has to wonder whether the associated belief of "bad luck" might apply to his ventures. After all, many believe that the zodiac year often coincides with challenges in professional and personal life. Historically, some entrepreneurs have seen setbacks during their zodiac years. In 1987, one prominent example wished their employees a happy year in vain. By 1997, another case highlighted a leader whose fortunes took a sharp downturn. By 2009, another saw the peak of their influence crumble. The belief that the zodiac year could signal challenges for leaders seems to have historical precedent. As we step into 2019, with the rapid evolution of internet platforms, Zhang Yiming faces significant hurdles. With Douyin's explosive growth, will it encounter more scrutiny from regulators? Will the balance between content creativity and platform ethics continue to challenge its trajectory? Moreover, as public concerns around privacy and vulgar content grow, can Douyin's innovations continue to thrive? Will Zhang Yiming's upcoming zodiac year mark a turning point or merely a bump in the road? How these elements unfold will likely define his year ahead.

Figure 11: Alibaba's Zodiac Year: Jack Ma's Crisis Management Under Fire

阿里巴巴本命年遇四道坎：马云危机感是内因

新京报 新京报官方账号 2012.01.30 02:19

2011年历经B2B平台欺诈事件、围攻淘宝商城事件等，寻求变革将淘宝一分为三；董事长马云称没想到本命年麻烦会这么多

随着2012年春节鞭炮声的远去，属兔的阿里巴巴集团(成立于1999年)，已度过了自己的第一个本命年。

这一年，用阿里巴巴集团董事长马云的话说，"从来没想过会这么痛，这么苦。我其实已经有预感，十二年是一个本命年，本命年麻烦多，但我没想到会有这么多"。

本命年在民间也被称为"坎儿年"，去年年初爆发的阿里巴巴B2B平台欺诈事件，成为阿里集团本命年的第一道坎儿。随后，淘宝网维权事件、支付宝所有权转移事件、围攻淘宝商城事件接踵而至。

面对这四道坎儿，麻烦缠身的阿里集团欲寻求变革和突破，比如将淘宝一分为三、联合国外资本尝试部分或全部收购雅虎股份、淘宝商城更名，以及推出独立购物搜索引擎一淘网等。这些变革与上述麻烦密切相关，甚至就是一体两面。

马云对此总结称："无论是支付宝事件，还是年初阿里巴巴的诚信问题，跟别人去辩论没有用。要改变自己，完善自己，我想这就是我们所认为的建设性破坏"。

Source: Xinmin Evening News. After the 2011 B2B fraud incident, the Taobao business regulation crisis, and the split into three divisions, Chairman Jack Ma attributed these events to the challenges of Alibaba's zodiac year. As spring 2012 approaches, Alibaba Group (founded in 1999, the Year of the Rabbit) is entering its first zodiac year since its establishment. This year, as Jack Ma, Chairman of Alibaba Group, put it, "I never thought it would be like this. This year, I've experienced a lot of pain. Every twelve years comes a zodiac year, and it always brings many challenges." During its zodiac year, Alibaba faced setbacks. In the previous year, its B2B platform fraud incident became one of its first major challenges. Later, the tightening of Taobao regulations and the restructuring into three divisions also created ripple effects that required significant adjustments. What's more, Jack Ma has been criticized for lacking awareness of crises and taking an overconfident approach, especially as the company faced increasing market demands and scrutiny. From a lack of forward-looking strategies to deficiencies in operational efficiency, the underlying causes seemed to stem from management issues, rather than external pressures. In Jack Ma's own words, " Whether it's regulating Taobao or addressing the fraud issues, if others can't solve it, Alibaba must. At the end of the day, I take responsibility for the B2B fraud incidents and the operational adjustments."

Figure 12: 222 A-Share Chairmen Enter Zodiac Year: A Test of Leadership and Luck

Source: New Fortune Magazine Official Weibo. In the A-share market, a total of 222 chairmen of listed companies are entering their zodiac year, including Shunfeng's Wang Wei, Yili's Pan Gang, and Wens' Wen Zhifang, among others. Their companies primarily focus on industries such as machinery and medical biology. Notably, 14 of these chairmen were born in 1946 and are now 72 years old, exceeding the statutory retirement age in China.